



UNIVERSITY OF DEBRECEN
FACULTY OF LAW
DISSERTATION ABSTRACT

**FROM TRADITION TO INNOVATION: THE EVOLUTION AND FUTURE OF AI IN
INTERNATIONAL ARBITRATION**

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ABSTRACT

This dissertation examines the evolution of international arbitration and the transformative role of artificial intelligence (AI) within inter-state arbitration, international investment arbitration, and international commercial arbitration. Arbitration has historically developed as a flexible and effective alternative to litigation, rooted in diplomatic practices and progressively formalized through treaties, conventions, and institutional frameworks. In recent years, technological advancements, particularly the rise of AI, have introduced new dynamics that are reshaping arbitral processes, decision-making, and procedural efficiency.

The study adopts a mixed-methods approach, combining doctrinal legal analysis, historical examination, survey research, and semi-structured interviews with arbitration practitioners. This methodological combination allows for both theoretical exploration and empirical validation of the research questions. The dissertation investigates how AI is currently used in arbitration, evaluates its potential benefits and risks, and assesses whether AI can replace or merely support human arbitrators.

The findings indicate that AI has significant potential to enhance efficiency, consistency, and accessibility in arbitration, particularly in case management, document analysis, and procedural tasks. However, the integration of AI also raises critical concerns related to transparency, fairness, accountability, and the preservation of human judgment. Empirical results demonstrate that practitioners generally perceive AI as a supportive tool rather than a replacement for human arbitrators, emphasizing the continued importance of human oversight in ensuring legitimacy and due process.

The dissertation concludes that while AI will play an increasingly important role in international arbitration, its effective integration requires the development of clear regulatory frameworks, ethical guidelines, and institutional safeguards. The study contributes to the growing body of literature on technology and dispute resolution by providing a comprehensive, comparative, and forward-looking analysis of AI's impact on arbitration across multiple domains.

Keywords: Artificial Intelligence, International Arbitration, Investment Arbitration, Commercial Arbitration, Inter-State Arbitration, Legal Technology

1. Introduction and Research Foundation

1.1. Background and Significance of the Study

International Arbitration, as an alternative to litigation, has undergone significant development and progress over the years. The development of international arbitration over time reflects a process of continuous evolution and innovation. Arbitration has continually evolved to the changing requirements of society and industry, from its basic roots in ancient cultures to its contemporary international form.

The rationale behind this study stems from the recognition that, although inter-state, international investment, and international commercial arbitration differ in their legal foundations and institutional structures, they are now facing similar transformations driven by technology, particularly by the growing influence of Artificial Intelligence (AI). Bringing these three areas together allows for a broader and more integrated perspective on how AI is reshaping the way disputes are resolved across different levels of international arbitration. This study focuses on the commercial dimensions of international arbitration, namely inter-state, international investment, and international commercial arbitration. International consumer arbitration, although it is also increasingly influenced by AI, was not included, as it raises distinct considerations related to consumer protection and individual access to justice rather than commercial or institutional dispute resolution. Despite their distinctions, all three share the same ultimate goal: to deliver fair, efficient, and legitimate outcomes through neutral and independent decision-making. AI challenges and enhances these shared goals, making it an ideal common ground for comparative exploration.

The significance of this study lies in its comparative and forward-looking nature. Most existing research tends to focus on AI in one form of arbitration, often commercial arbitration, without linking it to the wider international landscape. This thesis takes a different approach by examining how AI interacts with the legal, ethical, and procedural dimensions of all three forms of international arbitration. It aims to highlight both the opportunities and the challenges that come with integrating AI into these systems. On one hand, AI has the potential to improve efficiency, consistency, and access to justice; on the other, it raises serious questions about transparency, accountability, and the preservation of human judgment in decision-making. The research also reflects some of the new trends shaping the field today, such as digitalization, the rise of online dispute resolution, and the increasing use of algorithmic and predictive tools in arbitral proceedings. These developments are not only changing how the processes are managed but also influencing how evidence is evaluated and how decisions are formed. As arbitration moves further into the digital age, it faces the ongoing challenge of embracing innovation while remaining faithful to its fundamental values of impartiality, confidentiality, and due process.

To complement its theoretical and historical analysis, this study also incorporates original survey research and semi-structured interviews with practicing arbitrators. These empirical methods were designed to capture the real-world perspectives of arbitrators who directly engage with arbitration and may soon face or already are facing the integration of AI in their work. The aim was to move beyond theory and understand how arbitrators themselves perceive the benefits, limitations, and ethical implications of using AI tools. Their insights add depth and authenticity to the study,

allowing it to combine academic analysis with practical experience. This mix of doctrinal, historical, and empirical approaches gives the research a balanced foundation, one that connects abstract legal principles with the evolving realities of arbitral practice and procedures.

1.2. Research Objectives and Hypotheses

This dissertation examines the development of the three principal forms of international arbitration, namely inter-state arbitration, international investment arbitration, and international commercial arbitration, from both historical and legal perspectives. It seeks to trace the evolution of these forms of dispute resolution, identify the legal foundations and turning points that shaped them, and situate them within the broader transformation currently taking place in international dispute resolution.

Building on this foundation, the dissertation explores the growing influence of technology, and particularly artificial intelligence, on international arbitration. It assesses how AI is affecting arbitral practice in areas such as case management, procedural administration, decision-making support, and overall efficiency. The study also considers the broader opportunities and challenges created by the interaction between traditional arbitral mechanisms and emerging technological tools.

In addition to its historical and legal analysis, the dissertation adopts a comparative and forward-looking perspective by evaluating how AI may continue to shape the future of international arbitration across its different forms. Particular attention is given to the practical and normative implications of AI integration, including its impact on arbitral roles, procedural fairness, and institutional legitimacy. The study further aims to provide recommendations on how international arbitration may adapt to these developments while preserving its core legal values.

This thesis tackles the following hypothesis questions throughout its chapters:

- The historical evolution of international arbitration, namely inter-state, international investment, and international commercial arbitration, from treaty-based codification to AI-assisted processes, illustrates a continuing tension between legal standardization and technological innovation in the governance of cross-border disputes.
- The integration of artificial intelligence tools in international arbitration improves efficiency in case management and procedural tasks, but simultaneously introduces challenges related to transparency, fairness, and legitimacy.
- Artificial intelligence will progressively redefine roles within the arbitral process, but its long-term impact will differ across inter-state, international investment, and international commercial arbitration due to variations in legal frameworks and institutional practices.
- Artificial intelligence tools cannot currently replace human arbitrators in international arbitration due to technological, ethical, and legal constraints, but they can function as complementary tools supporting arbitrators.
- The effective and legitimate integration of artificial intelligence in arbitration depends on the development of regulatory safeguards, ethical standards, and institutional reforms recognized by practitioners and policymakers.

1.3. Structure of the Thesis

The dissertation is structured into seven chapters, each addressing a specific aspect of international arbitration and its interaction with artificial intelligence.

Chapter One examines the historical and legal development of inter-state arbitration. It explores the evolution of this form of dispute resolution from its diplomatic origins to its modern legal framework, with particular attention to key treaties, conventions, and institutional developments.

Chapter Two examines the historical and legal development of international investment arbitration. It explores the evolution of this form of dispute resolution from its early treaty-based foundations to its modern institutional framework, with particular focus on bilateral investment treaties and the legal principles that continue to shape investor–state dispute settlement.

Chapter Three examines the historical and legal development of international commercial arbitration. It explores the evolution of this form of dispute resolution from its origins to its modern international framework, with particular focus on the conventions, institutional rules, and legal structures that govern cross-border commercial disputes.

Chapter Four explores the intersection between artificial intelligence and international arbitration, including inter-state, international investment, and international commercial arbitration. It examines how AI is currently used in arbitral proceedings and evaluates both its potential benefits and its limitations. In addition to the doctrinal and analytical discussion, the chapter also incorporates insights drawn from interviews conducted with arbitrators, thereby adding a practical dimension to the assessment of AI's growing role in arbitration.

Chapter Five adopts a forward-looking perspective by analyzing the future role of artificial intelligence in international arbitration, including inter-state, international investment, and international commercial arbitration. It considers emerging technological tools, anticipated developments, and evolving regulatory frameworks. The chapter also draws on the views and reflections of interviewed arbitrators in order to assess how practitioners themselves perceive the future direction of AI in international arbitration and the extent to which it may reshape arbitral roles and procedures.

Chapter Six examines the question of whether artificial intelligence could replace human arbitrators. It analyses this issue from both legal and practical perspectives, supported by empirical findings derived from survey data and practitioner insights.

Chapter Seven provides a comprehensive analysis of the findings of the dissertation. It brings together theoretical and empirical results, offers key insights, and presents recommendations for the future development of international arbitration in the context of artificial intelligence.

2. Theoretical Framework and Literature Review

2.1. Historical Foundations of International Arbitration

International arbitration has developed over time as one of the most important mechanisms for resolving disputes beyond domestic courts. Its historical development reflects changing political, legal, and commercial realities, as arbitration gradually evolved from informal and diplomatic practices into more structured and institutionalized forms of dispute resolution. Understanding this

development is important to the present dissertation, as the contemporary transformation of arbitration through artificial intelligence can only be properly understood against its historical background.

The dissertation approaches the historical foundations of international arbitration through its three principal forms: inter-state arbitration, international investment arbitration, and international commercial arbitration. Each of these was developed in response to different needs and legal contexts. Inter-state arbitration emerged primarily as a peaceful means of resolving disputes between sovereign states. International investment arbitration developed as a mechanism for resolving disputes between states and foreign investors, particularly through the rise of bilateral investment treaties and investor–state dispute settlement. International commercial arbitration, by contrast, grew largely out of cross-border trade and commercial practice, eventually becoming one of the most widely used methods for resolving international commercial disputes.

Although these three forms of arbitration differ in their origins and institutional development, they share a common trajectory: each has moved from relatively limited or fragmented forms of dispute settlement toward increasingly formalized and internationally recognized systems. This historical evolution is central to the dissertation because it demonstrates that arbitration has always adapted to broader legal and structural change. In that sense, the integration of artificial intelligence should not be seen as an isolated development, but rather as part of the continuing evolution of international arbitration.

2.2. Legal Foundations of the Three Forms of International Arbitration

Alongside its historical development, international arbitration is also shaped by distinct legal foundations that determine how each form of arbitration operates in practice. A central part of this dissertation is therefore devoted to examining the legal frameworks that govern inter-state arbitration, international investment arbitration, and international commercial arbitration, with the aim of showing that these are not identical systems, but rather separate arbitral fields with different legal structures, sources, and institutional logics.

Inter-state arbitration is grounded primarily in public international law and is shaped by treaties, conventions, diplomatic agreements, and institutional mechanisms designed to facilitate peaceful dispute settlement between states. International investment arbitration rests largely on treaty-based protections for foreign investors, especially bilateral investment treaties, multilateral agreements, and institutional frameworks such as ICSID, which have played a major role in the development of investor–state dispute settlement. International commercial arbitration, on the other hand, is rooted more strongly in private autonomy and contractual relations, and is governed by arbitration agreements, institutional rules, international conventions, and domestic arbitration laws that support the enforcement of arbitral awards across borders.

The legal analysis undertaken in this dissertation is important not only because it clarifies the operation of these three forms of arbitration, but also because it provides the framework for understanding how technological developments, particularly artificial intelligence, may affect them differently. The dissertation proceeds on the basis that AI cannot be meaningfully analyzed in arbitration without first recognizing the legal diversity of the arbitral systems into which it is being introduced. This comparative legal foundation is therefore essential to the broader research.

2.3. Artificial Intelligence as an Ongoing Development in International Arbitration

Having established the historical and legal foundations of international arbitration, the dissertation then turns to one of the most significant ongoing developments affecting the field: the growing role of artificial intelligence. As legal practice becomes increasingly shaped by digitalization and data-driven technologies, arbitration is also beginning to incorporate AI-based tools into different aspects of arbitral procedure and administration. This development forms the central contemporary focus of the research.

In the context of this dissertation, artificial intelligence is approached not as a single or uniform technology, but as a broad category of tools capable of supporting legal and procedural functions within international arbitration. These may include document review, legal research, case management, translation, predictive analytics, and decision-support functions. The dissertation examines how such technologies are beginning to affect arbitral proceedings in inter-state arbitration, international investment arbitration, and international commercial arbitration, and considers the extent to which they may reshape both the administration and the practice of international arbitration.

At the same time, the dissertation does not approach AI as a purely technical improvement. Rather, it treats AI as a development that raises broader questions about the future direction of international arbitration itself. While AI may contribute to efficiency, organization, and procedural support, it also invites deeper reflection on issues such as fairness, transparency, legitimacy, and the continuing role of human judgment within arbitral decision-making. In this way, the dissertation frames AI not only as a practical innovation but also as a legal and institutional challenge that may significantly influence the future of international arbitration. This perspective is further strengthened through the empirical dimension of the research, including survey findings and insights gathered from interviews with arbitrators, which help situate the discussion within contemporary arbitral practice.

3. Research Methodology and Design

3.1. Research Philosophy and Design

The dissertation employs a mixed-methods research methodology, combining qualitative and quantitative approaches to examine the historical, legal, and technological dimensions of international arbitration, with particular attention to the integration of AI. The rationale for adopting a mixed-methods approach lies in the need to balance doctrinal legal analysis with empirical evidence, ensuring both theoretical depth and practical insight.

3.2. Doctrinal and Historical Analysis

The study begins by examining the historical and legal development of inter-state, international investment, and international commercial arbitration. This was achieved through an extensive review of legal documents, treaties, conventions, arbitral rules, scholarly books, and journals. This doctrinal method provided a solid foundation for identifying how arbitration has evolved and how technological advancements, particularly AI, are now influencing the field.

3.3. Survey Research

To complement the doctrinal analysis with empirical evidence, an online survey was distributed to arbitrators and legal professionals with experience or familiarity in the field of arbitration. The survey was designed to generate quantitative data on key themes relevant to this research, including the extent of AI adoption in arbitral practice, the perceived impact of AI on the role of arbitrators, and professional attitudes toward the fairness, efficiency, and reliability of AI-assisted processes. In particular, the survey explored the frequency and nature of AI use, perceptions regarding whether AI functions primarily as a supportive tool or as a potential substitute for certain arbitral functions, and respondents' views on the extent to which AI may influence decision-making, procedural efficiency, and the future scope of arbitral work. These questions were deliberately chosen because they directly address the core hypotheses of this dissertation: whether AI enhances efficiency, whether it can or should replace human arbitrators, and whether it poses risks to fairness and legitimacy. Alternative questions, such as broad inquiries into technology adoption in general or the use of unrelated digital tools, were excluded because they would not provide specific or actionable insights into the impact of AI on arbitration. By focusing tightly on efficiency, fairness, legitimacy, and the future role of arbitrators, the survey ensured that the data collected was both relevant and aligned with the research objectives.

3.4. Semi-Structured Interviews

To enrich the survey results with qualitative depth, semi-structured interviews were conducted with experienced arbitrators and practitioners from diverse jurisdictions. The interview questions were selected because they reflect the practical, normative, and future-oriented dimensions of the research. Broader questions, such as general attitudes toward technology or unrelated legal innovations, were intentionally excluded, as they would not contribute meaningfully to the central aim of this dissertation: assessing the opportunities, risks, and future of AI in arbitration. The chosen questions strike a balance between theoretical concerns and practical considerations.

3.5. Historical and Ethical Approaches

In addition to doctrinal, survey, and interview methods, a historical approach was applied to situate modern developments within the longer trajectory of arbitration. Ethical standards were carefully observed throughout the research. Participants in both the survey and interviews were informed of the study's objectives, assured of confidentiality, and provided consent before participation.

4. Comprehensive Data Analysis and Findings

4.1. Findings on the Historical and Legal Evolution of International Arbitration

The dissertation finds that international arbitration has not developed as a single, uniform system, but rather through three distinct yet interconnected branches: inter-state arbitration, international investment arbitration, and international commercial arbitration. Each of these fields emerged in response to different legal, political, and economic needs, and each has developed its own institutional and procedural identity over time. Despite these differences, the research shows that all three forms of arbitration have gradually moved toward greater formalization, codification, and international recognition. A further finding of the dissertation is that the legal and historical development of these arbitral fields continues to shape the way they function today. Their legal foundations, institutional structures, and procedural logic remain highly relevant when assessing the contemporary role of artificial intelligence. The study, therefore, concludes that AI cannot be

meaningfully discussed within arbitration without first understanding the historical and legal frameworks into which it is being introduced. This part of the dissertation also demonstrates that the evolution of arbitration has consistently involved adaptation to changing legal and practical realities. In this sense, the growing use of artificial intelligence may be understood as part of a broader historical pattern of transformation rather than as a completely separate or unprecedented development.

4.2. Findings on the Current Role of Artificial Intelligence in International Arbitration

The dissertation finds that artificial intelligence is already beginning to influence international arbitration in practical and visible ways. Its role is most evident in areas such as document review, legal research, case administration, procedural organization, and other functions aimed at improving efficiency and reducing the administrative burden of arbitral proceedings. In this respect, AI is no longer merely a theoretical possibility but an emerging reality within arbitral practice. At the same time, the research demonstrates that the current role of AI in arbitration remains largely supportive rather than determinative. The dissertation finds that AI is presently used more as an assistive tool than as an autonomous decision-maker. Its value appears strongest in procedural and analytical support rather than in replacing the core adjudicative functions traditionally carried out by arbitrators. Another important finding is that the impact of AI cannot be treated as identical across all arbitral fields. Because inter-state arbitration, international investment arbitration, and international commercial arbitration operate within different legal and institutional settings, the extent and implications of AI integration may vary across them. The dissertation, therefore, concludes that AI's role in arbitration must be understood in a comparative and context-sensitive manner across different legal and institutional frameworks.

4.3. Findings from the Survey and Arbitrator Interviews

The empirical component of the dissertation adds an important practical dimension to the legal and theoretical analysis. The findings drawn from the survey and semi-structured interviews indicate that arbitration practitioners generally acknowledge the growing relevance of artificial intelligence in arbitral practice and recognize its potential to improve efficiency, consistency, and procedural support. At the same time, the empirical findings reveal a clear degree of caution among practitioners regarding the broader use of AI in arbitration. While many participants appear open to the use of AI as a supportive tool, they also express concerns relating to fairness, transparency, reliability, legitimacy, and the risk of excessive dependence on automated systems. These concerns suggest that, although AI is increasingly accepted as part of legal and arbitral practice, its integration remains subject to important professional and normative reservations. The interviews with arbitrators were particularly valuable in demonstrating that professional attitudes toward AI are neither entirely supportive nor entirely resistant. Rather, the findings point to a more nuanced position in which AI is viewed as potentially useful, but only if its use remains carefully controlled and consistent with the procedural and ethical foundations of arbitration.

4.4. Findings on the Limits of Artificial Intelligence in Replacing Arbitrators

One of the most important findings of the dissertation is that artificial intelligence cannot currently replace human arbitrators in any complete or legitimate sense. Although AI may assist in analytical and procedural tasks, the research shows that arbitration involves forms of reasoning and judgment that remain closely tied to human decision-making. These include legal interpretation, contextual analysis, procedural discretion, evaluation of arguments, and sensitivity to fairness and legitimacy. The dissertation further finds that the question of replacing arbitrators is not merely a technical one, but also a legal and normative one. Even if AI systems become increasingly advanced, their use in

core adjudicative functions raises serious concerns regarding enforceability, accountability, transparency, and due process. These concerns are particularly significant where procedural deficiencies may give rise to challenges to arbitral awards, potentially affecting their recognition and enforcement across jurisdictions. The findings therefore support the view that AI is currently better understood as a complementary tool rather than as a substitute for human arbitral authority. In this respect, the dissertation concludes that the future of AI in arbitration is more likely to involve human–AI collaboration than full adjudicative automation.

4.5. Overall Analytical Findings of the Dissertation

Taken together, the findings of the dissertation demonstrate that artificial intelligence is becoming an increasingly relevant part of international arbitration across inter-state arbitration, international investment arbitration, and international commercial arbitration. The research shows that AI already offers practical value in a number of areas, particularly in improving efficiency, accuracy, cost-effectiveness, document review, legal research, and case management. In this respect, AI is no longer a purely theoretical development, but an emerging feature of contemporary arbitral practice. At the same time, the dissertation finds that the integration of AI into arbitration raises important legal, ethical, and procedural concerns. These include questions relating to transparency, accountability, procedural fairness, confidentiality, algorithmic bias, and the possible effect of AI-assisted processes on the legitimacy of arbitral proceedings. The study therefore concludes that, while AI can make a meaningful contribution to arbitral practice, its use must remain subject to careful oversight and appropriate safeguards.

A central analytical finding of the dissertation is that artificial intelligence should presently be understood as a complementary tool rather than a substitute for human arbitrators. Although AI may support certain procedural and analytical functions, the research demonstrates that arbitration continues to depend on human judgment, legal interpretation, discretion, and sensitivity to context. The findings therefore suggest that the future of arbitration lies not in the replacement of arbitrators by machines, but in the responsible and balanced integration of AI within a human-centered arbitral framework. More broadly, the dissertation concludes that international arbitration is entering a new phase of development in which innovation and legal tradition must coexist. Artificial intelligence has the potential to reshape procedures and professional roles, but its future role must remain consistent with the core values of arbitration, including fairness, legitimacy, neutrality, and due process. In this sense, the study finds that the future of arbitration is not a choice between technology and human judgment, but rather the challenge of integrating both in a legitimate and responsible manner.

5. Discussion, Implications, and Conclusion

5.1. Discussion and Implications

One of the clearest conclusions that emerges is that the relationship between AI and international arbitration is not as straightforward as it may first appear. On the one hand, AI clearly offers practical advantages, such as greater efficiency, faster processing of information, and support in managing increasingly complex disputes. On the other hand, its use immediately raises deeper concerns about legitimacy, fairness, and the role of human judgment. In other words, AI is not just being introduced as a helpful tool; it is forcing the arbitration community to rethink what makes arbitration trustworthy and acceptable in the first place. What becomes especially important here is that AI is not entering a single, uniform system. It is entering three different branches of international arbitration, inter-state arbitration, international investment arbitration, and international commercial

arbitration, and each of these respond to AI in a different way.

Inter-state arbitration is clearly the most cautious. That is not surprising, since disputes between states are closely tied to sovereignty, diplomacy, and public authority. In this context, the process itself carries symbolic weight, and the role of human judgment is part of what gives the outcome its legitimacy. Because of that, AI is unlikely to play anything more than a limited, supporting role. It can help with research, document organization, or translation, and in those areas, it may even be quite useful. But once AI begins to move closer to legal reasoning or decision-making, the concerns become much stronger. States are unlikely to accept a system where technology appears to interfere with or replace the human element in resolving disputes of that nature. So, in this branch, AI may improve how things are done, but it is unlikely to change the structure of decision-making itself.

International Investment arbitration sits somewhere in between. It is more open to AI than inter-state arbitration, but at the same time, it is already under pressure when it comes to legitimacy, transparency, and fairness. Investor-state disputes tend to involve large amounts of documentation and complex procedural histories, so there is a clear practical benefit in using AI to help manage and organize that material. In that sense, AI can make the process more efficient and, potentially, more accessible. However, that openness comes with limits. Because this field is already sensitive to concerns about fairness and accountability, AI cannot simply be used without careful consideration of its effects on due process. For example, if AI is used to summarize submissions or organize evidence, there is a real risk that certain arguments may be simplified or not fully captured. This connects directly to the right to be heard. It is not enough that parties are allowed to present their case; they also need to feel that their arguments are properly understood and considered. So, while AI may be useful in this branch, its role needs to remain clearly controlled and transparent.

International Commercial arbitration, by contrast, seems to be the most open to AI and, in many ways, the most experimental. This is largely because it is driven by different priorities, efficiency, flexibility, cost reduction, and party autonomy. In this environment, AI is not just acceptable, but often attractive. It can already assist with legal research, drafting, document review, case preparation, and even aspects of strategy. That said, even here, AI is not replacing the arbitrator. What it is really doing is changing how arbitration is carried out in practice. It is reshaping the workflow rather than the core authority behind the decision. In that sense, commercial arbitration may be the place where we first see how AI can be integrated into arbitration more broadly, but even there, the human decision-maker remains central.

When looking at all three branches together, a broader pattern becomes clear. AI tends to be accepted where it improves efficiency without interfering with what each branch considers essential for its legitimacy. Where it starts to affect fairness, transparency, or human judgment, resistance becomes stronger. This is why AI does not have the same impact everywhere. Its role depends on what each branch is trying to protect. At the same time, there are certain issues that appear across all three branches, even if they show up in different ways. One of these is the growing tension between efficiency and human judgment. AI can handle many tasks faster than before, but arbitration is not only about processing information. It also involves interpretation, discretion, and the ability to engage with the parties' positions in a meaningful way. This is where the limits of AI become clear. It cannot replicate empathy or the kind of contextual understanding that often shapes how fairness is perceived.

Another issue is more practical, but still important, is the effect of AI on how arbitration work is valued and billed. As AI takes over or speeds up tasks like research, drafting, and document review, it starts to challenge the traditional link between time spent and value delivered. This is especially relevant in commercial and investment arbitration, where billing structures are more directly tied to

professional time. If work can be done faster, it raises the question of whether costs will actually decrease for parties, or whether the structure will simply adapt in other ways. So, AI is not just changing procedure; it is also starting to affect the economics of arbitration practice.

There is also the issue of transparency and proof. As AI becomes more integrated into legal work, it may not always be clear when or how it is being used. This creates a problem if a party believes that AI has influenced the process in a way that affected fairness. How can that be shown? In many cases, the party raising the concern may not have access to the tools or systems involved. That makes it difficult to identify, let alone prove, the role AI may have played. This raises questions about accountability and whether current frameworks are equipped to deal with this kind of situation.

Overall, what this thesis suggests is that AI is unlikely to completely transform international arbitration in a uniform way, but it is also unlikely to remain a minor or temporary development. Its role will probably grow over time, but in a way that reflects the specific needs and concerns of each branch. In that sense, its development is likely to be gradual rather than disruptive. Just as arbitration itself evolved over time through legal frameworks, institutional practices, and shared expectations, the use of AI will also depend on how well it can be integrated into those existing structures. Ultimately, AI is likely to become an important part of international arbitration, but only to the extent that it supports, rather than weakens, the principles that the system relies on being fairness, transparency, human judgment, and trust in the process. These findings also reinforce the need for a balanced regulatory approach to AI in international arbitration. As discussed in Chapter 5, neither a purely soft-law framework nor a fully centralized binding regime is sufficient to address the challenges identified. Instead, the evolving role of AI across the different branches of arbitration supports the need for a hybrid approach, combining flexibility with targeted safeguards. Such an approach allows arbitration to adapt to technological developments while ensuring that core principles such as fairness, transparency, and human judgment are preserved.

5.2. Conclusion

This thesis examined the role of AI in international arbitration, focusing on inter-state, international investment, and international commercial arbitration. Through surveys and interviews with arbitrators, the research has identified the current applications of AI, its advantages, limitations, and potential future developments.

The study reveals that AI is increasingly seen as a valuable tool in arbitration, improving efficiency, accuracy, and cost-effectiveness, particularly in tasks such as document review, legal research, and case management. However, concerns remain about the transparency of AI decision-making processes, its ethical implications, and the potential destruction of arbitrators' autonomy. While AI can assist, it should not replace human judgment in the core elements of arbitration. The findings suggest that AI should be integrated into the arbitral process with caution and balanced oversight to ensure it enhances rather than diminishes the integrity of the procedure.

In terms of existing regulatory frameworks, this research acknowledges the regulations that have already been put in place to guide AI's use in arbitration. However, these regulations still require further development in order to address emerging challenges and ensure the ethical, transparent, and procedurally sound use of AI in arbitration. In this respect, the findings of this thesis support the development of a balanced regulatory framework that combines flexible guidance with targeted binding safeguards, ensuring both adaptability and legal certainty in the use of AI within arbitration. In particular, clearer guidance is needed on the disclosure of AI involvement in the preparation of submissions, the assessment of evidence, and potentially even the drafting of awards. Further safeguards are also necessary to address issues of algorithmic bias, confidentiality, and transparency, as well as the evidentiary difficulties that may arise where a party seeks to prove the

improper use of AI in arbitral proceedings. In addition, greater attention should be given to the possible impact of AI use on the enforceability of arbitral awards, procedural fairness, and the allocation of costs and billing, where AI significantly alters the way legal and arbitral work is performed. In this context, the increasing use of AI may raise important questions regarding the validity and enforceability of arbitral awards. As noted in the article written by Prof. Dr. Adam Boóc, there is a recognized equivalence between the grounds for setting aside arbitral awards and the grounds for refusing their recognition and enforcement. This relationship is generally reflected in international arbitration frameworks. In this respect, concerns may arise where the use of AI is perceived to have affected due process, including the right to be heard or the fairness of the proceedings. Where AI tools influence the assessment of evidence or the reasoning of the tribunal, parties may argue that the decision-making process has been compromised. This, in turn, may lead to challenges to arbitral awards, which could ultimately affect their enforceability in other jurisdictions. Furthermore, differences in how national courts approach the recognition of annulled awards may lead to inconsistent outcomes in cross-border disputes. This highlights the importance of ensuring that AI is used in a transparent and controlled manner, with clear limits on its role in the decision-making process.

This study contributes to the theoretical discourse on AI in international arbitration, highlighting its implications for procedural fairness and legitimacy. It also has practical relevance, offering guidance for arbitrators and policymakers on how to navigate the challenges of AI integration in a way that aligns with the core principles of arbitration, including neutrality, confidentiality, and flexibility. Despite the insights provided, this research has limitations, including the relatively small sample size of interviewees and the fast pace of AI advancements, which may lead to new developments not covered in the study. Future research could explore the long-term implications of AI in arbitral decision-making, investigate the impact of AI on human arbitrators' roles, and continue to monitor the evolution of regulatory standards for AI in international arbitration.

In conclusion, AI presents exciting opportunities for the future of international arbitration, but its adoption must be approached thoughtfully and with caution. While AI can significantly enhance efficiency and accessibility in arbitration, it is crucial to ensure that its use remains aligned with the fundamental principles of the arbitration process. As AI technology advances, the arbitration community must be proactive in shaping its role to ensure it serves the interests of justice and fairness. In other words, this thesis demonstrates that international arbitration is not confronted with a choice between tradition and innovation. Rather, it faces the responsibility of integrating both. Artificial intelligence will continue to reshape procedures, redefine professional roles, and transform the management of disputes. Yet these developments must unfold within a framework that safeguards the core values of arbitration: fairness, transparency, accountability, and human judgment.

The future of international arbitration, therefore, is not one in which machines replace arbitrators, but one in which technology strengthens human decision-making. In this sense, the evolution of arbitration from tradition to innovation is not a break with the past, but a continuation of its historical mission: to adapt to change while remaining faithful to justice.

Appendix A

Summary of Research Hypotheses

#	Description	Result
H1	The historical evolution of international arbitration, namely inter-state, international investment, and international commercial arbitration, from treaty-based codification to AI-assisted processes, illustrates a continuing tension between legal standardization and technological innovation in the governance of cross-border disputes.	Accepted
H2	The integration of artificial intelligence tools in international arbitration improves efficiency in case management and procedural tasks, but simultaneously introduces challenges related to transparency, fairness, and legitimacy.	Accepted
H3	Artificial intelligence will progressively redefine roles within the arbitral process, but its long-term impact will differ across inter-state, international investment, and international commercial arbitration due to variations in legal frameworks and institutional practices.	Accepted
H4	Artificial intelligence tools cannot currently replace human arbitrators in international arbitration due to technological, ethical, and legal constraints, but they can function as complementary tools supporting arbitrators.	Accepted
H5	The effective and legitimate integration of artificial intelligence in arbitration depends on the development of regulatory safeguards, ethical standards, and institutional reforms recognized by practitioners and policymakers.	Accepted



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List of publications related to the dissertation

Articles, studies (2)

1. **Al Fatayri, L.:** Possibility for AI Arbitrators To Replace Human Arbitrators: Legal and Social Perspective.
International Review of Law. "Accepted by Publisher", 1-21, 2026. ISSN: 2710-2505.
Level of HAS Committee on Legal and Political Sciences: C
2. **Al Fatayri, L.:** The Impact of AI Tools on the Arbitration Process.
Richmond Journal of Law and Technology. 2023 (10), 1-20, 2023. ISSN: 1091-7322.

Conference presentations (1)

3. **Al Fatayri, L.:** Virtual arbitration hearing: a bright outcome?
In: Doktoranduszok fóruma, 2022. Szerk.: Jámborné Róth Erika, Miskolci Egyetem, Állam- és Jogtudományi Kar, Miskolc, 131-133, 2023. ISBN: 9789633583272





List of other publications

Articles, studies (2)

4. **Al Fatayri, L.:** The Possibility of Addressing Mandatory Rules and Its Adjustments in the Framework of International Commercial Arbitration.
Essays of Faculty of Law University of Pécs. 2024 (1), 23-35, 2024. ISSN: 2061-8824.
DOI: <http://dx.doi.org/10.15170/studia.2024.01.02>
5. **Al Fatayri, L.:** The role of an arbitrator in investigating corruption cases in International Commercial Arbitration.
Public Goods & Governance. 8 (1), 22-33, 2023. EISSN: 2498-6453.
DOI: <http://dx.doi.org/10.21868/PGnG.2023.1.2>.
Level of HAS Committee on Legal and Political Sciences: C

**By the directives of HAS Committee on Legal and Political Sciences:
Publications in periodicals level „C”: 2, related to the dissertation: 1.**

The Candidate's publication data submitted to the Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.

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