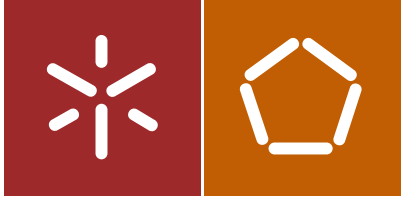
Universidade do Minho
Escola de Engenharia

Cinara Maria Carneiro Rocha

Effects of Court Case Management Systems on Justice

October 2025

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Universidade do Minho
Escola de Engenharia

Cinara Maria Carneiro Rocha

Effects of Court Case Management Systems on Justice

PhD thesis
Doctoral Program in Information Systems and Technology

Thesis performed under the supervision of
Professor João Álvaro Carvalho
Professor Antônio Suxberger
Professor Delfina Sá Soares

October 2025

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ACKNOWLEDGEMENTS

I am deeply grateful to my advisor, Dr. João Álvaro Carvalho of the University of Minho and the United Nations University Operating Unit on Policy-Driven Electronic Governance, for his invaluable guidance, support, and patience over the past four years. His mentorship has profoundly shaped my academic journey, making me a researcher. A full professor, in the rarest and most distinguished sense of the word, embodies the highest standards of teaching, dedication, and intellectual guidance—not merely by providing answers but by inspiring and challenging his students to find their paths.

I would also like to express my sincere gratitude to my advisors, Dr. Antônio Suxberger (Centro Universitário de Brasília) and Dr. Delfina Sá Soares (United Nations University Operating Unit on Policy-Driven Electronic Governance), for their precious insights and guidance on legal matters and electronic governance (EGOV), respectively. Their expertise was fundamental to the success of my research.

Finally, I would like to thank the Ministério Público do Distrito Federal e Territórios for their generous support of my studies.

This thesis is dedicated to my family—Wagner, Janaína, and Cora—for their love and support during my research journey's good and challenging times.

It is also dedicated to my parents, Diogo and Margarida, who instilled in me the value of education.

DECLARATION OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

ABSTRACT

Effects of Court Case Management Systems on Justice

This thesis examines how information technology (IT) affects judicial efficiency and justice values through two studies on the use of Court Case Management Systems (CCMS) in Brazil. The first study assesses the effects of CCMS use on efficiency indicators - case duration, clearance rates, and pending cases – by conducting a statistical analysis of 14 years of judicial data. Through interviews with judicial professionals, the second study investigates the influence of CCMS use on justice values: access to justice, equality, independence and impartiality, due process, and the quality of judicial decisions. Additionally, the second study examines the effects of videoconferencing and artificial intelligence-based functionalities, which complement the CCMS core features. Results from the first study revealed no statistically significant correlation between CCMS use and improved efficiency across criminal, civil, ordinary, and small claims courts, contradicting the core rationale behind the global adoption of e-justice. In turn, the second study indicates that CCMS use has a positive effect on justice values, particularly on access to justice, due to the possibility of remote filing of court cases and 24/7 access to information, which extended procedural and informational access to justice. While the digital divide raises concerns about the extensive use of CCMS, it strengthens equality, independence, impartiality, and due process. Videoconferencing, initially a secondary focus of the research, proved to be of significant importance. Findings indicate that it enhances efficiency and values of justice despite concerns regarding its effects on procedural fairness. This thesis not only evaluates whether CCMS delivers on its promised efficiency gains but also presents the first comprehensive framework for understanding its simultaneous effects on multiple justice values. The findings offer valuable insights for policymakers, judicial administrators, and researchers seeking to leverage technology while mitigating potential drawbacks in justice.

Keywords: Electronic Justice, e-justice evaluation, justice efficiency, justice values.

RESUMO

Efeitos dos Sistemas de Gestão de Processos Judiciais Eletrônicos na Justiça

Esta tese examina como a tecnologia da informação (TI) afeta a eficiência e os valores da justiça por meio de dois estudos sobre o uso de Processo Judicial Eletrônico (PJE) no Brasil. O primeiro estudo avalia os efeitos do uso do PJE em indicadores de eficiência – duração dos processos, taxa de congestionamento e número de casos pendentes – por meio de uma análise estatística de 14 anos de dados judiciais. O segundo estudo investiga, por meio de entrevistas com profissionais do sistema judiciário, a influência do uso do PJE sobre os valores da justiça: acesso, igualdade, independência e imparcialidade, devido processo legal e qualidade das decisões judiciais. Além disso, o segundo estudo examina os efeitos da videoconferência e das funcionalidades baseadas em inteligência artificial, que complementam as funções centrais do PJE. Os resultados do primeiro estudo não identificaram correlação estatisticamente significativa entre o uso do PJE e a melhoria da eficiência nos tribunais criminais, cíveis, comuns e de pequenas causas, contrariando a principal justificativa para a adoção global da justiça eletrônica. Por outro lado, o segundo estudo indica que o uso do PJE tem um efeito positivo sobre os valores da justiça, especialmente no acesso à justiça, o que está relacionado à possibilidade de peticionamento remoto e ao acesso ininterrupto às informações processuais, ampliando o acesso tanto procedimental quanto informacional à justiça. Embora a exclusão digital levante preocupações sobre o uso do PJE, o sistema contribui para fortalecimento da igualdade, independência, imparcialidade e do devido processo legal. A videoconferência, inicialmente um foco secundário da pesquisa, revelou-se de grande importância. Os resultados indicam que essa tecnologia melhora a eficiência e os valores da justiça, apesar das preocupações com seus efeitos sobre a justiça processual. Esta tese não apenas avalia se o PJE cumpre as promessas de ganhos em eficiência, mas também apresenta o primeiro modelo abrangente para compreender seus efeitos simultâneos sobre diversos valores da justiça. As conclusões oferecem insights valiosos para formuladores de políticas, administradores judiciais e pesquisadores interessados em aproveitar a tecnologia enquanto mitigam potenciais desafios na justiça.

Palavras-chave: Justiça eletrônica, avaliação da e-justice, eficiência judicial, valores da justiça.

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LIST OF ABBREVIATIONS/ACRONYMS

AI	Artificial Intelligence
API	Application Programming Interface
CCMS	Court Case Management Systems
CT	Courtroom Technologies
EM	Electronic Monitoring
ER	Electronic Repositories
IDB	Inter-American Development Bank
ICP-Brasil	Infraestrutura de Chaves Públicas Brasileira (Brazilian Public Key Infrastructure)
IT	Information Technology
JS	Justice Systems
CEPEJ	European Commission for the Efficiency of Justice
DATAJUD	National Digital Platform of Brazilian Judiciary
e-PROC	Electronic Process
EC	European Commission
EGOV	Electronic Government
EJP	Electronic Judicial Process
EMS	European Member States
ERP	Enterprise Resource Planning
EU	European Union
ICCE	International Consortium for Court Excellence
NCJ	National Council of Justice
MoReq-Jus	Model Requirements for System Computerised Process Management and Legal Documents
ODR	Online Dispute Resolution
OECD	Organisation for Economic Cooperation and Development
PROJUDI	Electronic Digital Process
SDG	Sustainable Development Goal(s)
WB	World Bank

WJP	World Justice Project

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1. INTRODUCTION

This doctoral thesis focuses on how the use of Information Technology (IT) affects judicial efficiency and fundamental justice values. This chapter outlines the research context, highlights the study's relevance, identifies the research gap, presents the research questions and objectives, briefly explains the research design, and details the structure of the thesis.

Global Challenges to Justice

Justice is a fundamental pillar of democratic regimes, playing a crucial role not only in fostering peace, social welfare, and crime prevention but also in promoting economic development, ensuring the enforcement of private contracts, and strengthening institutional trust (Kapopoulos et al., 2023; Maqueda et al., 2021; Susskind, 2019). Its significance is further underscored by Sustainable Development Goal (SDG) 16, which aims to *"promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels"* (United Nations, 2023).

Despite its importance, the global state of justice has deteriorated in recent years. The World Justice Project (WJP) publishes the Rule of Law Index, the world's leading independent source of data on the rule of law. Its 2023 report indicates that six billion people—76% of the world's population—live in countries where the rule of law has weakened over the past year (WJP, 2023). Additionally, a prior WJP report revealed that 1.5 billion people worldwide lack access to justice for civil, administrative, or criminal matters (WJP, 2019).

One of the primary contributors to this global challenge is the inefficiency of justice systems, often characterised by delays, excessive resource consumption, and overwhelming case backlogs. These inefficiencies persist across jurisdictions, regardless of a country's specific characteristics (Cerrillo et al., 2008; Fauvrelle et al., 2016). In response, many countries have turned to IT-enabled judicial reforms based on the premise that modern courts do not consistently deliver optimal outcomes for their citizens and that digitalisation can enhance efficiency and quality in dispute resolution (Susskind, 2019). These reforms integrate IT tools into judicial operations (e-justice) to improve efficiency, expand access to justice, ensure timely decision-making, reduce costs, and enhance transparency and accountability (Cerrillo et al., 2008; Susskind, 2017) aligned with the principles of Electronic Government (EGOV).

However, despite substantial investments in e-justice initiatives, the outcomes have often fallen short of expectations (Agrifoglio et al., 2016; Cerrillo et al., 2008; Vuyst et al., 2006).

This underperformance is primarily attributed to technological, legal, organisational, and institutional complexities inherent to justice systems (Contini et al., 2015; CEPEJ, 2022; Fabri, 2008, 2021).

1.1 Contextualizing IT Use and Evaluation in Justice

Even after the widespread acceleration of IT adoption in courts following the COVID-19 pandemic, the implementation and use of basic technologies in the justice system (JS) remain limited. For example, the European Commission for the Efficiency of Justice (CEPEJ) reported that, across European judiciaries, the average IT use index stands at only 3.55 out of 10 (CEPEJ, 2024, p. 146). This aligns with the conclusion that the deployment of IT in justice has been slow compared to other government branches (Al-Naimat et al., 2021; Schaad et al., 2005; Schmitzj, 2019; Susskind, 2017).

Academic assessments of e-justice initiatives have primarily focused on deployment processes, considering political, organisational, and normative aspects to highlight challenges and guide future projects (Cerrillo and Fabra 2008; Fedushko 2019; Mykolenko et al. 2021; Rosa et al. 2013). Other evaluation studies focus on individual aspects of user satisfaction or website evaluation (Agrifoglio et al., 2013; Sandoval-Almazan et al., 2020). However, few empirical studies assess the practical outcomes of IT deployment and actual use in judicial systems (Al-Naimat et al., 2021; Fabri, 2009, 2021; Velicogna et al., 2011).

It is also important to note that while many countries report high IT deployment rates in their judiciaries, actual use rates remain low. Few countries have achieved a high rate of IT use. Brazil stands out, with nearly 100% of cases handled digitally. This provides a rare opportunity to assess the real impact of IT in practice.

As the delivery of a more efficient justice is the primary rationale for IT deployment, it is worth questioning whether IT systems have fulfilled their promise. For instance, a survey conducted in 2022 among Brazilian citizens who had recently been involved in judicial processes—99% of which were handled digitally—found that 65.1% believed the duration of their cases exceeded their expectations (CNJ, 2023, p. 50). While efficiency gains from IT adoption may seem self-evident, academic research has provided little empirical and detailed analysis to support these claims.

Another issue arises from the unique nature of justice. Justice operates on non-negotiable core values that must not be compromised in the pursuit of efficiency (CEPEJ, 2019; Prahassacitta et al., 2023; Whalen, 2022). Justice risks becoming unfair if these values—such as access to justice, equality, independence, impartiality, and due process—are undermined. Rather than prioritising efficiency at all

costs, e-justice should aim to enhance and uphold these fundamental principles. Given this concern, the question is whether IT systems designed to improve efficiency might, in practice, be harming justice's core values.

A deeper understanding of these impacts is essential, mainly since existing literature confirms that research in this domain remains scarce and fragmented. Empirical studies examining the effects of IT on justice are even more limited.

1.2 Research Aim and Motivation

This research aims to evaluate the effects of IT on judicial efficiency and justice values, using data from Brazil and focusing on Court Case Management Systems (CCMS) as the primary IT tool. The study's motivation stems from the author's extensive experience working within justice institutions, observing firsthand the implementation of the electronic judicial process and its consequences since its adoption in Brazil in 2006. As a public official in the Brazilian Public Prosecutor's Office since 1997, the author's professional background also provided valuable opportunities to access and gather empirical data, further enriching the study.

1.3 Research Questions

This research fills a gap in e-justice literature, particularly in assessing the impact of the actual use of IT on judicial efficiency and its effects on justice values. Based on this focus, the research investigates the following questions:

1 - *What is the impact of the actual use of IT on justice efficiency?*

2 - What are the effects of the actual use of IT on justice values?

To address these questions, the study develops the following research activities:

- Examine the impact of Court Case Management Systems on justice efficiency.
- Analyse the effects of Court Case Management Systems on justice values, including access to justice, equality, independence, impartiality, and due process of law.
- Investigate the mechanisms through which these effects occur.
- Identify additional, unforeseen effects of e-justice that may emerge.
- Explore, as a secondary objective, the impact of videoconferencing and AI-based systems on justice.

By examining the actual use of IT in judicial processes, this study seeks to provide a comprehensive understanding of how e-justice systems influence both efficiency and the core values of justice.

1.4 Research Approach

This research combines quantitative and qualitative methods to examine the effects of the Court Case Management System (CCMS) on justice efficiency and justice values in Brazil. The quantitative component focuses on measuring judicial efficiency using objective indicators such as case clearance rates, average case duration, and caseload statistics. These metrics provide precise, measurable data to assess how the adoption of CCMS impacts the efficiency of the justice system.

On the other hand, the qualitative approach is used to investigate the effects of CCMS on justice values, such as access to justice, equality, independence, impartiality, and due process. These values are complex and subjective, making them difficult to measure quantitatively. Instead, the study uses in-depth interviews with justice professionals (judges, prosecutors, lawyers, and clerks) to gather insights into their experiences and perceptions. This method is particularly effective for understanding the nuanced and often intangible effects of technology on justice values. By combining both methods, the research provides a comprehensive understanding of how CCMS impacts the justice system's operational efficiency and its foundational values.

1.5 Structure of the Thesis

The thesis is structured into ten chapters. After this introduction in Chapter 1, the remaining document is organised as shown in Table 01:

Table 1: Structure of the Thesis

Chapter	Title
1	Introduction
2	Justice
3	e-Justice
4	Court Case Management Systems in Justice Institutions: The Case of Brazil
5	Existing Research on the Effects of Court Case Management Systems on Justice
6	Research Design
7	Impact of Court Case Management Systems on Justice Efficiency

8	Effects of Court Case Management Systems on Justice Values
9	Effects of Videoconferencing Technology on Justice Values
10	Conclusion

Chapter 2 introduces the context of justice, outlining its core values, the judicial actors, and the phases of the legal process. Chapter 3 defines e-justice, describes the technologies used in justice, differentiates between e-justice and e-gov, outlines the expected benefits of e-justice, and presents the research questions. Chapter 4 presents a global overview of IT uses in justice, detailing the Brazilian case and covering the Brazilian judicial system, normative framework, and CCMS deployment process. Chapter 5 presents a literature review on the empirical evidence of the effects of CCMS on justice, including studies that evaluate its impact on judicial efficiency and justice values. Chapter 6 presents the research design considering quantitative and qualitative approaches. Quantitative research design encompasses the research model and hypothesis, as well as the description of data and methodology. The qualitative research design depicts the process of research approval at the Ethics Committee for Research in Social and Human Sciences of the University of Minho, as well as the interview and coding processes. Chapter 7 presents a descriptive analysis of the variables model, examines the analysis and results of CCMS effects on justice efficiency, describes the robustness test conducted, and discusses the results. Chapter 8 presents the results of the interview process, indicating the effects of CCMS on each selected justice value and the rising demand for justice as an emerging effect from the data. The relationship among the effects found is presented at the end of the chapter. Chapter 9 examines the impact of videoconferencing technology on justice values, as well as the challenges of videoconferencing that are not directly related to justice values and the judicial cases that are suitable for videoconferencing hearings. Chapter 10 presents the PhD research conclusions, the answers to the research questions, contributions, study limitations, future research directions, and publications from the four-year study period.

2. JUSTICE

To effectively study and contextualise the use of IT in justice, it is first necessary to outline its particularities and confront it with other public organisations. So, the research results can be analysed through the lens of the judicial environment, which differs significantly from the other state branches. This understanding helps to interpret the effects of technology in its intended environment.

The concept of justice has been a central concern of human thought since the earliest philosophers, reflecting its significance in shaping societies. Ancient philosophers explored justice as a fundamental virtue for personal morality and societal harmony. More contemporary thinkers consider justice as fairness (Rawls, 1971). The abstract concept of justice finds its tangible expression in the justice branch of the state and its institutional embodiment, the judiciary.

The role of the judiciary, as shaped in modern democracies, originated from the separation and balance of powers between distinct and independent branches of state. Montesquieu proposed checks and balances to prevent abuses and the emergence of tyrannical governments. The judiciary was left to hold the executive and legislative branches accountable, interpret the law, and administer justice to ensure the resolution of conflicts among citizens. The judiciary serves as the mechanism to interpret and enforce laws in alignment with justice values and principles (Vile, 1998).

2.1 Justice Values

The difference between the judiciary and other branches of the state is not only in its role, as defined by Montesquieu. Justice is guided by specific values derived from legal and philosophical traditions. In a white paper by the Inter-American Development Bank (IDB), the authors discuss abstract concepts that encompass multiple justice-specific values: legitimacy (or democracy), economy (government by resource scarcity), legality (government by law), and access, and then present a toolkit for addressing how IT impacts judicial systems (Cordella & Contini, 2020). Lupo (2016) has adopted values such as independence, accountability, impartiality, equal access, transparency, privacy, and legal validity to design an e-justice evaluation framework.

As many ancient and contemporary legal sources state, access to justice, equality, independence, impartiality, and due process of law are fundamental values of justice, mainly related to fundamental human rights. They offer a summary of the basics of judicial function and were selected for the scope of the research. Although these values also, to some extent, guide other sectors of public administration

and even private institutions, in the case of justice organisations, they serve as foundational pillars. These values are indispensable prerequisites for ensuring justice is effectively delivered and upheld.

The right to timely judicial proceedings is fundamentally connected to judicial efficiency. However, this section does not detail efficiency as it is not exclusively a justice value.[1]

These conceptual and doctrinal values are transposed through 'legal technologies,' encompassing institutional arrangements and tools designed to achieve specific legal and policy objectives (Coutinho, 2018). IT systems within justice organisations can be viewed as a public policy at the level of legal technologies, through which these fundamental values and principles are implemented and maintained in modern judicial practice.

2.1.1 Access to Justice

Access to justice has many conceptual dimensions and is a vast subject. Access to justice encompasses fundamental legal principles, including equality before the law, judicial impartiality and independence, and the right to proceedings of reasonable duration. The absence or compromise of these essential elements effectively denies access to justice. These interconnected components form the foundational framework through which judicial systems ensure meaningful legal recourse for all parties (African Charter on Human and People's Rights, 1981; European Convention on Human Rights, 1950; Universal Declaration of Human Rights, 1948; Cappelletti & Garth, 1978). Access to justice is codified across multiple hierarchical legal sources, encompassing national constitutions, judicial precedents, and regional agreements, with varying scope and implementation across jurisdictions.

However, access to justice can be seen as a procedural aspect of making courts and the legal process more accessible, including information on judicial cases. This research considers two dimensions of the access to justice concept: 1) Procedural accessibility - encompasses the ease of gaining entry to the legal process and effectively utilising facilities, including access to legal counsel, reasonable fees, and facility for filing a case. 2) Informational accessibility - encompasses the ability to obtain accurate, complete information about judicial cases (Dinamarco, 2013; International Consortium for Court Excellence, 2020).

[1] Efficiency aspects, including the right to timely judicial proceedings, are detailed In Chapter 7.

2.1.2 Equality

Equality is one of the necessary components of a fair trial. It means there must be a fair balance between the opportunities afforded by the parties involved in a dispute. It encompasses equal treatment before the law, equal access to legal remedies, representation, and non-discrimination (Cappelletti et al., 1978; European Court of Human Rights, 1950; International Consortium for Court Excellence, 2020; *Universal Declaration of Human Rights*, 1948).

This research conceptualises equality as a fundamental value that requires uniform treatment before the law, regardless of individual, economic, social, or cultural differences (Council of Europe - Venice Commission, 2016; World Justice Project, 2023).

2.1.3 Independence and Impartiality

Independence and impartiality, alongside access and equality, are fundamental values embodied within principal international human rights instruments (African Charter on Human and People's Rights, 1981; European Convention on Human Rights, 1950; Universal Declaration of Human Rights, 1948). Judicial independence and impartiality are addressed together because they are deeply intertwined. Both are vital for upholding fairness in the legal system. Independence is a foundation for impartiality; without it, external influences could affect judiciaries and judges, undermining their ability to remain unbiased. Independence and impartiality encompass both the judiciary as an institution and individual judges, with these values operating in interconnected dimensions.

This research focuses on the independence and impartiality related to the judge's ability to make decisions based on a thorough understanding of the applicable law and the facts of the case, not being subject to political influence or manipulation (Council of Europe - Venice Commission, 2016; International Consortium for Court Excellence, 2020).

2.1.4 Due Process of Law

Due process of law constitutes the safeguards that ensure all legal proceedings are conducted following established rules and principles, safeguarding individual rights (World Justice Project, 2023). The concept of due process of law includes procedural due process, which focuses on the steps and requirements that must be taken during legal proceedings to guarantee they are conducted fairly and that individuals can be heard, have the right to present evidence and receive adequate notice (Collin, 2004).

2.2 The Judicial Actors

The administration of justice involves a wide range of participants. While the broader judicial process includes auxiliary figures such as law enforcement officers, mediators, and arbitrators, the principal actors shaping judicial proceedings are judges, judicial staff, parties, prosecutors, lawyers, and witnesses.

Judges are the primary judicial authority responsible for interpreting law, presiding over proceedings, making legal determinations, and issuing binding decisions. They manage courtroom proceedings, evaluate evidence, ensure procedural fairness, and render judgments.

Court staff form the operational backbone of the judicial system. Court clerks manage administrative tasks, maintain official records, handle case documentation, schedule hearings, support judges with legal research and document drafting, and produce official records of proceedings.

The parties are the justice system participants, broadly referring to any individuals, organisations, or entities involved in a legal agreement, transaction, or proceeding. More specifically, parties can be called litigants—those actively involved in a legal dispute: plaintiffs or claimants who initiate lawsuits and defendants who respond to these claims.

Lawyers are legal representatives of the parties who act as intermediaries between the court and their clients. They present cases, submit legal documents, and advocate for their clients. Public defenders provide legal representation for defendants who cannot afford private counsel.

In most legal traditions, prosecutors represent the state in criminal cases. They investigate crimes, decide whether to file charges and present evidence against the accused person in court. They work to maintain law and order by identifying and prosecuting law violations. Unlike other countries, Brazilian prosecutors have the authority to act in a wide range of civil matters such as health, education, environment, and cultural heritage.

Witnesses serve as information providers in the judicial process describing events who have direct knowledge, testifying about someone's reputation or behaviour or providing technical or professional opinions as specialists.

Figure 1 illustrates the judicial actors pointing to their central role:

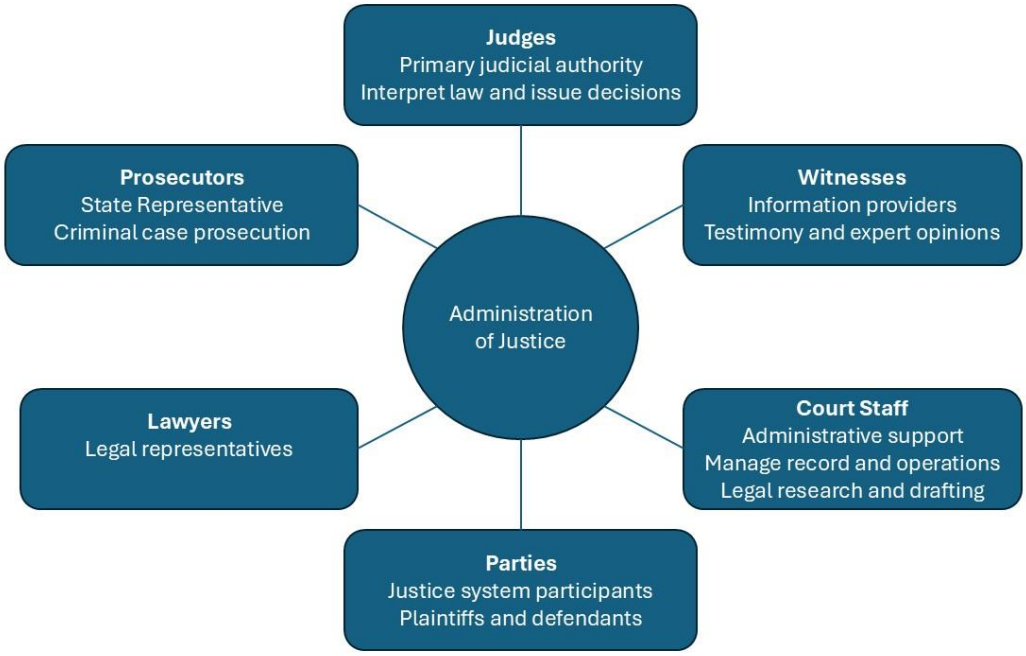


Figure 1: Key Actors in the Administration of Justice

2.3 Phases and Stages of Legal Processes

The judicial process comprises two sequential phases: adjudication and enforcement. The adjudication phase encompasses the initial filing of claims, followed by pre-trial procedures (including evidence gathering and preliminary motions). It culminates in the trial, where evidence is presented and judgment is rendered. The enforcement stage comes after the final judgment has been rendered and focuses on fulfilling the decision established by the court. In civil cases, this can be the requirement of a party to perform a specific act, such as paying a debt, delivering goods, or transferring property. Enforcement of criminal sentences ensures that the penalties ordered by the court, such as imprisonment, fines, community service, or probation, are effectively carried out.

Despite differences between the country's legal traditions, judicial processes generally have similar stages: filing the case, pre-trial hearings, instructions trials and judgment.

Non-criminal adjudication cases typically proceed as follows (Assumpção, 2024; Guilherme et al., 2016):

1. Petition: The plaintiff files a document to initiate legal proceedings outlining the facts, claims, and legal basis.
2. Summons: The court summons the defendant, notifying them of the lawsuit and allowing them to present a preliminary defence.

3. Conciliation or Mediation: Conciliation or mediation is often proposed during pre-hearing procedures to seek a mutually acceptable resolution.
4. Defence: The defendant submits their formal response or contestation to the claims made in the initial petition.
5. Challenge (or Impugnation): The plaintiff may challenge the defendant's arguments presented in their defence.
6. Case Structuring: The judge defines the scope of the dispute and prepares the case for the evidentiary stage.
7. Evidence Presentation: Both parties present evidence, including documents, witness testimonies, or expert opinions, to support their claims.
8. Trial and Decision: The judge delivers a final ruling based on the evidence and arguments presented

The criminal adjudication process is a structured sequence of legal proceedings designed to ensure justice and maintain due process in criminal cases. The following stages delineate the progression of a criminal case (Travis III et al., 2011):

1. Investigation: Legal criminal proceedings begin with an investigation following a formal complaint or the discovery of a crime. Law enforcement gathers evidence, interviews witnesses, conducts forensic analyses and identifies potential suspects.
2. Criminal Complaint: Once the investigation concludes, the police submit a report to the public prosecutor, who decides whether to proceed with filing charges and initiate a criminal complaint.
3. Preliminary Hearings, Detention, and Bail Setting: At this stage, suspects may be arrested and held if necessary. The court may schedule hearings to determine bail and pre-trial motions.
4. Trial and Evidence Presentation: The trial encompasses the prosecution presenting its case to prove guilt, while the defence may offer counter-evidence to create doubt or defend the accused. It includes opening statements, examination of witnesses, cross-examination, and closing arguments.
5. Judgement Trial or Jury: The final stage is when either a judge or jury determines the verdict based on the evidence presented. If the defendant is found guilty, sentencing follows, where the court determines the appropriate punishment.

In some countries, like Brazil, penal alternatives play a significant role in streamlining criminal proceedings[2]. Diversion avoids the filing of a criminal complaint by offering pre-trial solutions, while probation interrupts the trial process under certain conditions. Both measures are intended to reduce court caseloads and promote more efficient justice.

[2] This matter is governed in Brazil by Law No. 9.099/1995 and Law No. 13.964/2019.

3. E-JUSTICE

Many technologies have been used in the justice domain since the beginning of the 1980s, with the first applications to case tracking, scheduling and management (Cerrillo et al., 2008). By the 1990s, the focus had changed to the Internet, including information exchange and web portals (McKechnie, 2003; Sandoval-Almazan et al., 2020; Velicogna et al., 2006). Since the inception of e-Justice, we have watched the extensive growth of IT in justice organisations, addressing broad and complex issues.

Usually, e-justice is defined as the use of IT in the justice domain aiming for higher efficiency and effectiveness, increasing confidence in the judicial system and greater legitimacy of judicial power (Cerrillo et al., 2008). Ensuring transparency, openness, and accessibility of legal proceedings is also commonly associated with e-justice (Mykolenko et al., 2021).

Although the term e-justice is the most adopted in the literature, authors use many words as synonyms or with similar means. e-Court is also widely used, in part referring to a location where law matters are adjudicated by judges using any IT. e-Litigation, e-law, digital justice, internet courts, remote courts, remote justice, virtual justice, intelligent courts, online courts, e-judiciary and smart courts are also terms that can be found in the literature. Despite their different meanings, they are used interchangeably many times. Some of these expressions, like internet courts in China or e-litigation in Jordan, are derived from the formal normative act addressing IT adoption in these countries (Al-Naimat et al., 2021; Guo, 2021; Sung, 2020; Yu et al., 2020).

The European Union embraces the term cyberjustice as the use of IT to streamline the administration of justice. According to the European Commission for the Efficiency of Justice (CEPEJ, 2019), cyberjustice encompasses all IT applications used in or outside of court whenever technology is integrated into the dispute resolution process. The United Nations Development Programme (UNDP) understands e-justice as "an umbrella term that captures any effort to administer, deliver, strengthen, or monitor justice services using digital technologies" (UNDP, 2022, p.9). This concept also includes initiatives beyond public justice institutions.

3.1 Information Technologies Use in Justice

Court case management systems (CCMS) and courtroom technologies (CT) are the most cited technologies in the literature. Legal repositories (LR), electronic monitoring (EM), and online dispute

resolution (ODR) are also well mentioned. The following section describes these IT applications in more detail.

3.1.1 Court Case Management Systems (CCMS)

CCMS is considered the backbone or the heart of judicial operation and management of cases (Contini et al., 2015). Its origin is in the case tracking system, which mainly functions to locate the physical proceedings. In addition, the first CCMS principally support back-office and court staff work, including scheduling hearings and document management (Agrifoglio et al., 2013; McKechnie, 2003). By 2000, all European countries had CCMS, although their functionalities differed. In the 2000s, CCMS evolved to open their data to lawyers and parties, including administrative and judicial documents (Turner, 2002).

Nowadays, CCMS is a comprehensive system whose primary purpose is to handle judicial cases. It is also designed to allow electronic filing, electronic payment, citation of parties, indexing of cases, management of documents, and calendaring. CCMS supports all stages of the court process (Domino, 1997; Saman et al., 2013a; Velicogna, 2007).

CCMS permits the extraction of a wide variety of statistical data and allows the court's performance to be measured (Kitoogo et al., 2009; Saman et al., 2013a; Velicogna, 2007). CCMS constitutes a significant part of e-justice studies, comprising descriptive case studies of its adoption and accounts of success and challenges. e-Filing, e-Citation, and e-Payment systems are part of CCMS. They open courts to the user through information exchange and allow lawyers to do their work remotely.

Once CCMS is the central technology of the research, It will be further detailed In Chapter 4.

3.1.2 Courtroom Technologies (CT)

CT can be defined as the technology adopted mainly into the courtroom during hearings and trials to facilitate communication and enhance the quality of the court records and evidence display. Although the systems are mostly integrated, making them difficult to separate, three application types can be singled out: videoconferencing, courtroom electronic records, and evidence display.

Videoconferencing allows hearings and trials with participants not in the same place and not depending on a physical courtroom; it also involves interactive data, voice, and visual transmission (Anne Wallace et al., 2021). Videoconferencing is pointed out as having the potential to change the nature of litigation, court architecture and administration of justice (Donoghue, 2017; Fredric I Lederer, 1999). One of the

explanations for this disruptive potential is that "functional requirements, easily met in the oral face-to-face hearings, are difficult to replicate in videoconference-mediated hearings" (Contini et al., 2015, p. 7). By the beginning of the century, videoconferencing was an exception, mainly adopted for physical or sexual abuse children as witnesses of violent acts, as it allows children to testify without facing the criminal (Ali et al., 2019; Williams, 1998). It was also used for witnesses living in remote areas (Beyene et al., 2015), expert witnesses and people in custody for security reasons (Rattan et al., 2021; Rossner et al., 2021), and across an international border (Gray et al., 2013).

Gradually, courts worldwide started to adopt videoconferencing mainly due to the cost reduction related to transporting prisoners and witnesses (A. Wallace et al., 2009; Young, 2011). Besides the technology already available, videoconferencing deals with great resistance, mainly due to the fear that it will undermine the legitimacy of state authority since formality and court architectures are symbolic aspects helping to reinforce the gravity of the trial and judgment (Mcintyre et al., 2020; Young, 2011). Another concern is underestimating their impact on justice systems (Donoghue, 2017). Meanwhile, the COVID-19 pandemic elevated the importance of videoconferencing technology in courtroom functions. This technological shift allowed judiciaries to continue essential functions while prioritising public health during the crisis. Concerns, resistance, and hesitations had to be set aside as courts transitioned to online hearings and trials (Fabri, 2021; Mcintyre et al., 2020; Rattan et al., 2021; Sourdin, Li, & McNamara, 2020). Fabri (2021, p. 5) highlighted videoconferencing, the most demanded technology during COVID-19, as having both "potential and the weaknesses of such systems that need to be addressed."

Courtroom records are also part of the courtroom technologies group. Early literature first explored the transition from stenographic records to video or audio recording systems. (F.I. Lederer, 1996; Strand, 1991; Terry et al., 1986). It refers to computer-assisted transcription systems that transform oral content into text in real time, registering the speech of the judges, prosecutors, lawyers and witnesses. It records the whole hearing and trial process in audio and video format and allows their storage for preservation and retrieval (McKechnie, 2003; Saman et al., 2013a). Courtroom records provide evidence and other legal information necessary for informed decision-making and upholding the adversarial process. Additionally, they contribute valuable data to legal repositories, creating a comprehensive archive of court-produced information that serves both immediate procedural needs and long-term documentation requirements.

Evidence and information display constitutes the third group of courtroom technologies. They are means of drawing attention to particular aspects of the facts, emphasising certain parts of the evidence adduced, and "making visible specific facts that which otherwise might only exist as a mental picture formed when

an advocate or witness speaks the word" (Hamin, Othman, et al., 2012). It may allow, for example, computer-animated crime scenes.

3.1.3 Legal Repository (LR)

Legal repositories are becoming increasingly crucial as justice systems generate vast legal documentation daily. Judges and prosecutors often devote significant time to researching legal content to resolve disputes. Case law, legislation, and doctrinal works are stored in various databases, including legal libraries and court repositories. These resources are accessed by a diverse audience, including judges, lawyers, investigators, students, civil servants, researchers, and the general public. All contents are sources for judge activities that depend on accurate and up-to-date legal data (Velicogna, 2007).

Information retrieval plays a vital role in the effectiveness of legal repositories, as the ability to locate and extract recordings determines their practical value. Information retrieval is still a problem in the justice field, considering semantic issues and poor integration into CCMS (Fersini et al., 2013). However, advances have been made using Artificial intelligence, e.g., tracking reference relevance, managing the impacts of changing laws, managing data update priorities, and associating law keywords to related verses (Darawaty et al., 2010; Ferrand et al., 2013).

3.1.4 Electronic Monitoring of Defendants (EM)

The electronic monitoring of defendants (EM) is one of the first applied technologies police used. The primary purpose is to monitor individuals' locations. Formerly, electronic monitoring was a radio frequency detection system that operated over limited ranges (Murphy, 1995). Nowadays, these are GPS-based systems, primarily ankle monitors. They are commonly used in cases such as domestic violence—to verify whether the accused approached the victim— to monitor the work hours of convicted individuals and house arrest, among other applications.(Klátik et al., 2020). An emerging use for EM is mass monitoring. Recently, many cities have adopted visual surveillance technologies (Ferguson, 2020).

3.1.5 Online Dispute Resolution (ODR)

Online Dispute Resolution is mainly referred to in the literature as an out-of-court dispute resolution, which applies IT in processes such as conciliation, mediation and arbitration, often with self-represented litigants, with no judges or prosecutors (Hassan et al., 2016; Katsh et al., 2017; D. Reiling, 2017). It is mainly adopted in e-commerce and minor claims disputes and has the advantage of low costs, faster

resolution of disputes, fewer formalities and flexibility (Carneiro et al., 2014). Private e-commerce companies provide more ODR services. For example, the eBay system of ODR handles many cases, and it is considered a very successful case (Palanissamy et al., 2019). ODR is the most well-developed stream of research in e-justice and is considered "a field of its own" (Lodder et al., 2006, p. 14). Scholars have been studying ODR since the 1990s, and ODR-specific conferences have been conducted since 2000 (Susskind, 2017).

However, ODR can also refer to procedures within the court system where judicial involvement is minimal or absent, and the process is primarily conducted among the parties involved, potentially with the assistance of a conciliator or mediator. Yet this type of court-connected ODR is far less common than ODR processes that occur entirely outside the judicial system.

3.2 Emerging Technologies in Justice

Artificial Intelligence and blockchain represent transformative technologies that pervade multiple layers of judicial systems. These innovations influence various aspects, from case management and evidence handling to decision-making processes. Their implementation will likely reshape judicial operations by automating routine tasks, enhancing data integrity, and providing previously unattainable analytical capabilities through traditional methods.

3.2.1 Artificial Intelligence

Artificial intelligence can be used in various contexts in the justice domain. Unlike the other IT tools that predominantly support a specific judicial process, AI can permeate most of them. Judicial decision prediction is a highly discussed AI application that intends to formulate judicial decisions and evolve law article prediction, charge prediction and penalty prediction, automatically generating judgments (Muhlenbach et al., 2019; Schmitzj, 2019; Shi et al., 2021; Spitsin IN et al., 2020; Susskind, 2017; Ugwudike, 2020; Yao et al., 2021). Studies also report AI systems for similar cases push, litigation risk assessment, document-assisted generation, speech-to-text applications, risk prediction of accused, answering questions robots, emotion recognition and filtering systems (Rocha et al., 2022). In ODR, AI supports the disputants in finding court decisions that could potentially be related to their case description or give a default decision in arbitration proceedings (Fersini et al., 2013; Metsker et al., 2020; Schmitzj, 2019; Shi et al., 2021; Yu et al., 2020; Zheng, 2021).

The use of AI is just beginning in the judiciary. Still, it seems to have a promising future to help address the historical problems of justice, such as slowness and, therefore, the backlog of judicial cases.

3.2.2 Blockchain

Blockchain is a decentralised, peer-to-peer network with cryptographically linked records or blocks. Originally developed to support Bitcoin, blockchain technology has been applied to other domains. It ensures both user security and anonymity (Cohn, 2017). Blockchain is one of the emerging technologies that is supposed to influence court administration (Bhatt et al., 2024). Its most cited use in justice is related to the protection of digital evidence and digital forensics (Alqahtany et al., 2024; Anne et al., 2021; H. Zhang et al., 2024; Zou et al., 2024), but it also has the potential to improve the efficiency and transparency of judicial operations (Pimpalkar et al., 2023).

3.3 Information Technology Interaction and Applications in the Justice System

Figure 2 illustrates the primary technological components of e-justice systems and their interrelationships within the judicial framework. The diagram demonstrates the integration of Court Case Management Systems (CCMS) and Courtroom Technologies (CT) as central technological pillars of judicial operations. These systems maintain a symbiotic relationship: CCMS is the foundational platform containing comprehensive process information. CT generates and manages a significant part of critical documentary evidence that integrates into the CCMS.

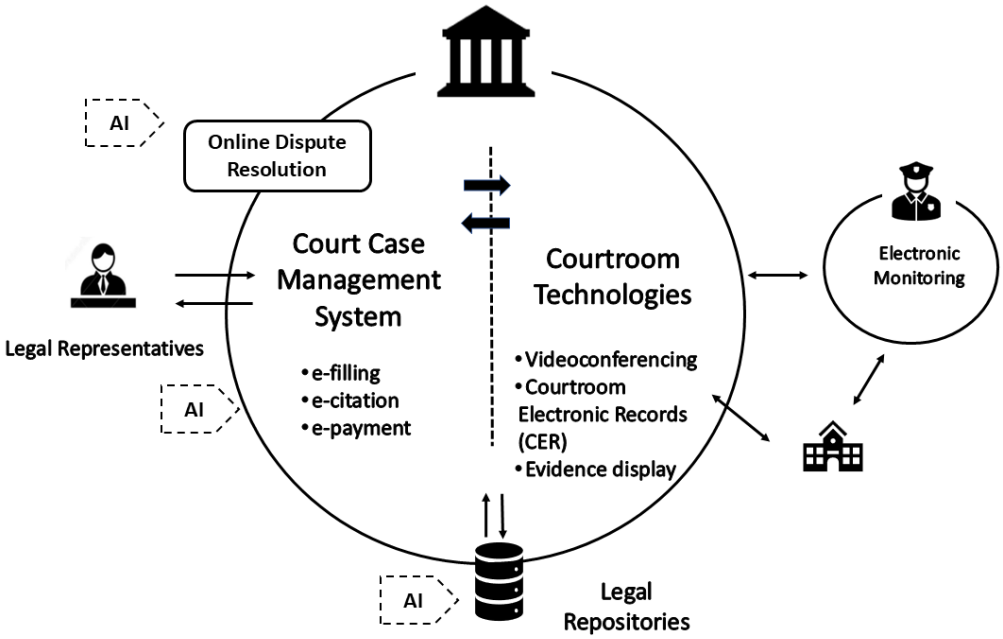


Figure 2: Main Groups of Information Technologies Used in Justice

The diagram identifies three key relationships. Relationship (1) represents the virtual exchange of communications and documents between legal practitioners, parties, and courts through e-filing and e-citation systems. Relationship (2) depicts the bidirectional flow between courts and Legal Repositories (LR), where courts contribute records while judicial clerks and judges utilise LR for legal research and document preparation. These repositories serve both internal judicial actors and external stakeholders, including legal practitioners, law enforcement, researchers, and the public. Relationship (3) emphasises the critical role of interoperability in e-justice systems, facilitating seamless data exchange among judicial institutions, law enforcement agencies, and other stakeholders. Online Dispute Resolution (ODR) is represented both as an internal court procedure and an out-of-court alternative to traditional judicial processes.

The diagram also illustrates the integration of emerging technologies. Blockchain technology provides security for evidence management and forensic procedures. At the same time, AI spans multiple domains, offering potential solutions across various aspects of judicial operations through the technological framework described in this research.

These information technologies incorporate specific functionalities for each stage of the judicial process. Based on Figure 2, Table 2 presents a matrix of current and potential technological applications across various proceeding stages considering non-criminal and criminal stages of procedural flow, as described in Chapter 2:

Table 2: Integration of IT Tools in Legal Proceedings

Law Subject	IT Tools / Proceedings Stages	CCMS e-filing, e-summon e-payment	CT videoconferencing courtroom records evidence display	LR law libraries caselaw court cases	ODR
Non-Criminal	Petition	x		x	
	Summon	x			
	Conciliation	x	x	x	x
	Defense	x		x	
	Challenge	x		x	
	Case Structuring	x		x	
	Evidence Presentation	x	x	x	
	Trial and Decision	x	x	x	
Criminal	Investigation			x	
	Criminal Complaint	x		x	
	Preliminary Hearings, Detection, Bail Setting	x	x	x	
	Trial, Evidence Presentation	x	x	x	
	Judgment, Trial Jury	x	x	x	

The table demonstrates how different technological tools are used or potentially applicable across various stages of legal proceedings, highlighting both the comprehensive integration of technology in the modern judicial system and the fundamental role of CCMS as a structural technology that supports the entire justice process.

As advocated by Susskind (2019), those IT applications favour the reimagining of the court as a service—one that delivers justice without necessarily requiring parties to gather in a traditional courtroom setting.

3.4 Specific Characteristics of e-Justice Compared to EGOV

e-Justice emerges as a particular field under EGOV (Cano et al., 2015; Kovalenko et al., 2018). Therefore, the expected benefits of e-justice are supposed to be the same as those of EGOV: more efficiency, better services to citizens, and improved democratic processes (Grönlund, 2002). Nevertheless, although e-justice originated from EGOV, it possesses distinct characteristics that warrant special attention and justify specific consideration (Kitoogo et al., 2009; Lesjak, 2010; Velicogna et al., 2013; Yu et al., 2020).

The first aspect that sets e-justice apart is that the participants in the justice system do not frequently encompass all citizens, as they are for EGOV, but only litigants (Yu et al., 2020). Although the citizens are the final beneficiaries of the justice system, lawyers play a central role as the primary operators of digital justice services, given their expertise in interpreting and applying laws, drafting legal documents,

and representing clients in disputes. In most cases, citizens do not engage directly with e-justice, which means their interactions with the justice system are mediated by public defenders or private lawyers. For example, the French e-justice systems have been developed, taking into consideration lawyers and law firms as their external users (Velicogna et al., 2011).

One second particularity of e-justice is its conservative culture and fragmented and decentralised organisation. Lawyers, judges and prosecutors are steeped in tradition and contained by precedent. They are used to be historically dependent, cautious, risk-averse, verbose, and old-fashioned (Lodder et al., 2006; May et al., 2006; Susskind, 2019). Despite the typical resistance to change observed in many organisations, justice seems too averse to change compared to other government sectors (Cerrillo et al., 2008). Thornton (2016) asserts that the legal academy has generally resisted replacing manual processes with technology, and scholars in this field advocate incorporating additional manual, human-based processes and oversight to streamline court activities. He affirms that more than conservative, the legal academy is generally hostile towards replacing manual processes with technology (p. 1824). Sourdin et al. (2020) state that it has been noted that both judges and courts are reluctant to innovate and may be inherently conservative. Susskind (2019) declares that e-courts[3] are fundamentally flawed, and their implementation should be opposed. This perspective is rooted in the belief that justice is best delivered in a traditional, physical courtroom setting, concluding that his "research elsewhere suggests that in the great pantheon of professions, certainly concerning technology, only the clergy are more cautious about change (p. 4)". Cerrillo & Fabra (2008) state that the administration of justice has traditionally been characterised by a longstanding resistance to change, often lagging behind other public administration sectors in adopting modern advancements. The avoidance of IT led to EGOV and e-justice not developing at the same pace as the public legal sector has been slow to adjust to technology, and IT development, deployment, and use was generally problematic (Al-Naimat et al., 2021; Cerrillo et al., 2008; F.I. Lederer, 1996; May et al., 2006; Schaad et al., 2005).

E-justice also differs from EGOV in the kind and complexity of public organisations and services offered (Yu et al., 2020). In addition to cultural differences, justice is highly complex and regulated and has peculiar features that make IT deployment hard. It is worth mentioning that among the many studies on EGOV, it is rare to find examples of e-justice as a research object. Velicogna et al. (2013) conclude that "the development of ICT in the justice field seems, once again, more complex than previously foreseen

[3] The author prefers the term online courts as “When people hear the term, everyone rightly senses that it has something to do with some of the work of the courts and judges being undertaken on-line rather than in physical courtrooms” (p. 5).

(p. 59)". Justice administrations are (and are part of) highly structured and regulated systems, marked by a high level of formality, relying on standardised procedures and practices to uphold the law and its associated rituals through justice services (Velicogna et al., 2016, p. 7). The interplay between law and technology can heighten complexity, potentially driving system development or usage to the brink of maximum manageable complexity (Lanzara, 2014). Contini & Cordella (2015) consider justice the "most regulated domain of the public sector" (p. 129). Large-scale IT projects in justice often present delays and high failure rates, probably stemming from the complexity of IT solutions and the interdependencies among hardware components, software applications, and procedural requirements. These systems must account for diverse judicial specificities and adapt to a complex network of organisations, legal frameworks, and stakeholder expectations (CEPEJ, 2022). Moreover, justice has a lower risk and error tolerance than conventional public services (UNDESA, 2022, p. 179).

3.5 Benefits and Threats of IT Use in Justice

The use of IT in judicial proceedings has generated numerous advantages, as documented in e-justice literature. Enhanced judicial efficiency and improved performance constitute the primary aim of e-justice implementation, encompassing the acceleration of judicial processes, reduction of case backlogs, expedited trial procedures, and diminished costs. Among the documented benefits, efficiency emerges as the most frequently cited and anticipated outcome in scholarly discourse. This emphasis on efficiency is exemplified by the European Commission's assertion that "Member States have deployed IT tools to improve the performance and efficiency of their judicial systems" (CEPEJ, 2016, p. 5). So, e-justice's central aim is to increase the efficiency of the justice system in dealing with the rising number of new cases and new kinds of demands brought by the complexity of actual digital society.

While the literature highlights multiple potential benefits beyond improved efficiency, these claims require methodological scrutiny. The scarcity of e-justice evaluation studies suggests that many cited benefits represent assumptions rather than empirically validated outcomes. This observation underscores the importance of distinguishing between anticipated advantages and systematically documented results in e-justice research. Table 3 presents the results of the review encompassing a decade of studies on Scopus, focusing on the potential and actual advantages of e-justice. Additionally, studies by the most recognised e-justice authors were included, even those published outside the ten-year timeframe. The 23 studies from the search, as well as the corresponding authors and publication years that addressed each benefit, are presented.

Table 3: Benefits of e-Justice - References from Literature

Benefit of e-justice	Authors/Year
Promoting efficiency (cost reduction, celerity increase, backlog diminishing and judicial work streamlining)	(Badía, 2024); (Povylius, 2024); (Saxena, 2024); (H. Zhang et al., 2024); (Doring Reiling et al., 2022); (R.K. Ahmed et al., 2021); (Al-Naimat et al., 2021); (Marycheva et al., 2021); (Romo et al., 2021); (Rozha K. Ahmed et al., 2020); (Chatfield et al., 2020); (Fedushko, 2019); (Susskind, 2019); (Contini et al., 2016); (Fersini et al., 2013); (Saman et al., 2013b); (Velicogna et al., 2013); (Contini, 2010); (Hamin & Othman, 2012); (Velicogna, 2007)
Broadening access to justice	(H. Zhang et al., 2024); (Romo et al., 2021); (Rozha K. Ahmed et al., 2020); (Chatfield et al., 2020); (Susskind, 2019); (Velicogna et al., 2013); (Contini, 2010)
Enhancement of justice service quality	(Purnomo et al., 2022); (Doring Reiling et al., 2022)
Enhancement of transparency and accountability	(Saxena, 2024); (H. Zhang et al., 2024); (Doring Reiling et al., 2022); (R.K. Ahmed et al., 2021); (Marycheva et al., 2021); (Rozha K. Ahmed et al., 2020); (Susskind, 2017); (Contini, 2010)
Increasing the security of court dockets and documents	(Al-Naimat et al., 2021); (Romo et al., 2021)
Reduction of corruption	(H. Zhang et al., 2024); (Fedushko, 2019)
Expanding confidence in the judicial system	(H. Zhang et al., 2024); (Romo et al., 2021); (Boscheinen-Duursma et al., 2019); (Fedushko, 2019); (Velicogna, 2007)

Beyond the benefits outlined, some scholars emphasise fundamental justice values such as access to justice and operational efficiency, which contribute to the timely resolution of cases. Additional benefits are indirectly tied to fairness through mechanisms that uphold integrity and transparency in judicial proceedings, improve the quality of judicial services, and reduce opportunities for corruption.

Despite the cited benefits and advantages of using IT in the judicial system, it presents risks. One primary concern is that using IT tools in justice may compromise judicial activities' foundational values. The pursuit of efficiency and expedited processes must not compromise essential judicial values, including access to justice, equality, impartiality, judicial independence and procedural fairness. While digital tools potentially offer improvements in judicial access and procedural streamlining, they must be implemented in a manner that upholds and reinforces the fundamentals of justice (Bannon et al., 2021; Contini, 2020; Donoghue, 2017; CEPEJ, 2016; Fabri, 2021; Ferreira et al., 2024; Guo, 2021; Marycheva et al., 2021; Olugasa et al., 2022; Schmitzj, 2019; Shi et al., 2021; Yeung, 2022).

Authors particularly mention the digital divide as a threat that impacts justice equality (Turner et al., 2022; Q. Zhang et al., 2024), the risks to the guarantees of due process of law (Amarini et al., 2023; Rubim et al., 2021; Ward, 2014), and threats to independence and impartiality (Cerrillo i Martínez, 2008; Doring Reiling et al., 2022; Shi et al., 2021).

The United Nations Development Programme-UNDP (2022), in a special e-justice report, suggests balancing risks and opportunities while planning and adopting e-justice. In addition to inequality, bias and misuse of surveillance technology, the organisation emphasises the risk of diminishing the quality of justice:

> *"e-justice driven by efficiency, time savings, or cost reductions runs the risk of obscuring quality standards and making it harder to identify and address rights violations and systemic inequalities" (p. 16).*

In summary, the benefits or potential advantages of e-justice are acknowledged in the literature. These include enhanced efficiency, access to justice, improved judicial service quality, increased transparency and accountability, strengthened integrity of court records, enhanced mechanisms to combat corruption, and expanded public confidence in the judicial system. However, scholars and justice organisations emphasise the potential risks associated with incorporating IT in justice. These risks include undermining fundamental justice values such as access, equality, independence, impartiality, and adherence to due process of law.

3.6 Assessing the Effects of IT Use in Justice: Research Questions

Considering the benefits that emerged from the literature, e-justice is expected to improve judicial systems' efficiency. In another vein, e-justice can promote access to justice, but at the same time, it can harm judicial values, threatening the legitimacy and fairness of justice outcomes.

The limited research on e-justice evaluation has primarily concentrated on website assessment, success factors and risks in e-justice implementation, user satisfaction studies, and the development of design principles and evaluation frameworks (Yavuz et al., 2022). Few empirical studies evaluate the outcomes of e-justice, even concerning efficiency, which is the main expected result.

Many scholars have highlighted the urge for empirical evaluation of e-justice. Fabri (2024), in a study of European judiciaries, affirms that there is information about different applications of European Union (EU) countries available on the official websites, but

> *"... there is still not any empirical evaluation as to the operational functionality of the applications reported in these databases. They are simple descriptions by the various justice institutions (i.e. Ministry of justices, judicial council, stakeholder agencies, etc.), but nothing is referenced about how well the various applications function, or whether they contribute significantly to improving court or judicial efficiency" (p.7).*

Concerning the assessment of e-justice influence on judicial values, for instance, the Commission of Efficiency of Justice of Council of Europe (CEPEJ), in a toolkit to support changes toward cyber justice, advises:

> *"... it must be acknowledged that the challenge of incorporating information and communication technologies (ICTs) into the justice system without distorting its underlying purpose and values is still an area that has been too little documented. In particular, the development of justice information systems should not call into question the basic principles that underpin judicial activities" (CEPEJ, 2019).*

This study seeks to address this research gap by examining the outcomes derived from e-justice systems' actual use rather than evaluating the development and implementation processes. The research focuses on assessing the concrete effects of e-justice on judicial practices and results. While efficiency remains a key consideration, the investigation extends to analyse the broader impact on fundamental justice values, including access, equality, impartiality, independence, and adherence to due process of law.

The research questions that the research intends to answer are:

1 - *What is the impact of the actual use of IT on justice efficiency?*

2 - What are the effects of the actual use of IT on justice values?

To address these questions, the study develops the following research activities:

- Examine the impact of Court Case Management Systems on justice efficiency.
- Analyse the effects of Court Case Management Systems on justice values, including access to justice, equality, independence, impartiality, and due process of law.
- Investigate the mechanisms through which these effects occur.
- Identify additional, unforeseen effects of e-justice that may emerge.
- Explore, as a secondary objective, the impact of videoconferencing and AI-based systems on justice.

By answering the research questions, the study will provide valuable insights into the practical implications of e-justice systems. Specifically, it will shed light on whether and how the actual use of IT enhances or undermines justice efficiency and key principles such as access, equality, independence, impartiality, and adherence to due process. Furthermore, the investigation will help clarify the mechanisms driving these impacts and uncover any unanticipated effects of IT implementation.

The research addresses aspects that fit the construct of 'Net Impacts'' of the Information System Success Model of Delone and McLean. According to it, the authors affirm:

> *''The most meaningful measures of success for managers, designers, and users are the measures that capture the ultimate outcomes of a system's deployment and use. The ''Net Impacts'' construct measures the system's outcomes and is therefore, inevitably compared to the system's purpose'' (DeLone et al., 2016, p. 59).*

The net impacts represent a context-specific dimension in information systems evaluation, varying significantly across different settings and applications. These impacts can be assessed through diverse methodological approaches, encompassing multiple levels of analysis - from individual users to broader societal effects. It is challenging to measure EGOV initiatives as the desired outcomes are related to social values (DeLone et al., 2016).

Chapter 4 examines the case of Brazil as one of the global leaders in the judicial use of IT, following an overview of e-justice implementation rates across various jurisdictions.

4. Court Case Management Systems in Justice Institutions: The Case of Brazil

This research draws on data from Brazil, focusing on Court Case Management Systems as the key IT tool in the judiciary. This chapter first highlights the central role of CCMS in judicial operations, then provides an overview of their adoption worldwide, and examines Brazil's case in detail.

4.1 The Essential Role of Court Case Management System for Judiciaries

Among all the technologies adopted and used by justice organisations, CCMS stands out due to its structural role. Considered the backbone or the heart of judicial operation, CCMS are IT platforms that support the main processes in courts and are used to handle court cases from the moment they are submitted until they are sentenced and filed. They operate similarly to Enterprise Resource Planning (ERP) systems for the private sector, streamlining and automating core business processes. They facilitate the exchange of legal documents between case participants and judicial organisations, the online payment of fees, and the notification of parties. CCMS is crucial for dealing with court information, generating court statistics, populating computer-based judicial repositories with legal content, and supplying essential input for promising artificial intelligence applications in justice-related organisations. The CCMS includes data on usage and other factors that determine court performance and efficiency indicators. CCMS is expected to improve efficiency by automating several tasks, providing easy access to documents, and facilitating communication among those involved in court cases: lawyers, judges, prosecutors, court clerks, litigants, witnesses, bailiffs, and others (Rozha K Ahmed et al., 2020; Alwidian et al., 2017; Breuker et al., 2009; Contini et al., 2016; Kitoogo et al., 2009; Mykolenko et al., 2021; Saman et al., 2013b, 2013a; A. Wallace, 2008). Some authors include videoconferencing as an intrinsic feature of the CCMS (Yu et al., 2020).

Despite studies focusing on AI in the judiciary growing exponentially, studying CCMS remains fundamental and urgent. Many judiciaries worldwide have not yet fully implemented CCMS, and where systems are deployed, their impacts are often inadequately evaluated. This creates a critical knowledge gap, as without quality structured information from well-functioning CCMS, developing reliable, intelligent systems becomes impossible. Attempting to develop AI systems based on incomplete or problematic data may lead to injustice. As explained in Chapter 3, judiciaries are one step behind other public organisations in

this regard, having not appropriately investigated the impact of existing CCMS deployments. Therefore, considering their foundational importance for judicial operation and future technological advances, this study focuses on CCMS to investigate their effects on justice efficiency and core judicial values.

4.2 Global Overview of IT Uses in Justice

The degree of deployment and use of IT tools in justice vary among countries worldwide. However, it is still difficult for many countries to identify the level of actual use of IT tools in the judiciaries. For the European Member States, for example, until 2022, it was not possible to identify the IT use level in the judiciaries and the data used to show the presence of the application and not their actual use. Only in 2024 did the Commission on the Efficiency of Justice (CEPEJ) begin to evaluate how often they are used in practice (CEPEJ, 2024, p. 146).

For example, Table 4 shows the level of IT use in the European Member States (CEPEJ, 2024, p. 156). The category "digital access to justice" is related to the possibility of submitting a case electronically, carrying out communication exchanges within the various phases of a case between the court, parties, lawyers and other professionals, the existence of online specialised procedures, videoconferencing and recording of hearings, "case management" includes interoperability, active case management and statistics functionalities and administrative management tools, and "decision support" is related to court database and writing assistant tools.

Table 4: Statistics on IT Use in European Member States by Category (Based on CEPEJ, 2024)

	Digital Access to Justice	Case Management	Decision Support	Total
Average	2,08	5,65	2,50	3,55
Median	1,69	5,27	2,29	3,35
Minimum	0,00	0,00	0,00	0,00
Maximum	5,98	9,79	6,92	7,60

In calculating the index, each technology identified from a questionnaire administered to Member States is weighted based on three criteria: the tool's significance, the functionalities it supports, and the percentage of its use. A scale ranging from a minimum of 0 to a maximum of 10 was established, with 10 representing the highest possible score (CEPEJ, 2024, pp. 153–154). The table shows that the digital total overall use index is low, and access to justice, which includes the ability to file documents, access

data, and communicate with key actors in justice service provision electronically, is very low, with an average of 2.08 and a median of 1.69 out of 10.

Concerning the law matters, Table 5 indicates the level of IT use in European Member States:

Table 5: Statistics on IT Use in European Member States by Matter (Based on CEPEJ, 2024)

	Civil	Administrative	Criminal	Total
Average	3,85	3,56	3,21	3,55
Median	3,55	3,55	3,03	3,35
Minimum	0,00	0,00	0,00	0,00
Maximum	7,88	7,91	6,94	7,60

The use of IT tools in criminal matters is somewhat lower than in non-criminal matters. The CEPEJ Evaluation Report also shows that some states with high deployment scores seem to perform comparatively low in terms of IT use, suggesting that many factors can influence the use of IT systems (Venkatesh et al., 2003).

Among non-European countries, Singapore, China, and South Korea stand out as leaders in the deployment and actual use of IT in judiciaries. These nations have implemented advanced digital solutions to enhance the efficiency, accessibility, and transparency of their justice systems. Singapore has pioneered "Smart Courts," integrating AI and online dispute resolution; China has developed an extensive online litigation and mediation platform; the "Internet Courts" are innovative, leveraging AI and blockchain to streamline judicial processes; and South Korea has created an entirely digitised e-Court system (Gramckow et al., 2016; Sung, 2020; Tan et al., 2012; Yu et al., 2020; Zheng, 2021).

An interesting case in South America is Brazil, which has been steadily expanding its use of IT in the judiciary since 2006. Today, Brazil is a global leader in e-justice concerning its IT level of use, with 100% of judicial cases being submitted, analysed, and filed digitally. Unlike many other countries, Brazil's long-standing implementation of digital systems and the availability of judicial data provide a unique opportunity to assess the practical effects of IT in the justice sector. This is particularly significant given the global scarcity of comprehensive data and the generally low degree of adoption of e-justice systems in many regions, as previously discussed. For these reasons, the research investigates the case of Brazil to evaluate the effects of CCMS on justice efficiency and core values.

4.3 The Brazilian Judiciary

Brazil is a large and diverse country with 217 million inhabitants, encompassing profoundly different realities. Like most continental European countries, Brazil's legal system is grounded in the tradition of civil law. Nearly 100% of all judicial cases are digital. Unlike many jurisdictions where digitalisation is limited to electronic filing or partial adoption of IT solutions, Brazilian courts conduct proceedings entirely in digital format. Once a case is filed, the entire judicial process - from initial pleadings to final judgment - is handled digitally through mandatory usage by all judicial actors, including judges, clerks, lawyers, and court staff (CNJ, 2013). This goes beyond electronic availability or adoption rates; it represents complete digital integration where all procedural acts, documents, and decisions exist within the digital environment. The CCMS accommodates videoconference hearings as the default method, though parties retain the right to request physical presence. Only a few specific cases (such as custody hearings for prisoners, sensitive testimonies by children and adolescents and jury sessions) follow their own rules and are conducted in person. This comprehensive digital approach means that a case initiated in the CCMS remains digital throughout its lifecycle until its conclusion, with all judicial actors required to perform their respective roles through the system, making Brazil's system an example of full digital justice implementation, with actual use, rather than partial or hybrid digitalisation.

The route to this e-justice achievement began with the enactment of Law nº 11.419/2006, which aimed to enhance efficiency in civil justice. This legislation marked the beginning of a new era in procedural justice nationwide, changing the paradigm from the physical paper-based format to the digital one while safeguarding all legal precepts. The Law explicitly addresses the informatisation of judicial proceedings, presenting general rules on adopting electronic means for judicial acts. From them, the electronic process has become the standard. Although the initial emphasis was on civil justice, the scope expanded to include all legal matters. Today, several CCMSs with similar functionalities are operational across Brazilian states (Yeung, Silva, and Osse, 2020). Over time, CCMS became mandatory as they proved suitable for specific court types, instance levels, or legal matters (Bartolazi et al., 2021).

The reasons that make Brazil a notable case are the following:

- Widespread Use: The percentage of CCMS use in Brazil significantly exceeds that of traditional paper-based proceedings. The rate of actual use is 99,8%[4]In other words, only 0.2% of lawsuits are filed and

[4] Brazilian Judicial Statistics Panel. Available at https://justica-em-numeros.cnj.jus.br/painel-estatisticas/. Accessed on 01/18/2025.

conducted on a paper-based basis. Of Brazil's 27 states, 24 have 100% of new cases filed and handled electronically. This widespread actual use shows Brazil's commitment to modernising its judicial system and provides a unique opportunity to study the impacts of digital transformation at a national scale.

- Extent and Volume: Brazil handles a substantial volume of cases digitally. In 2023, courts in the country judged 33,2 million cases. 253,3 million new cases have been filed in electronic format since 2008 (CNJ, 2024, p. 239). The Brazilian ability to manage a massive volume of court cases digitally is relevant for other countries facing similar challenges with large caseloads.
- Comprehensive Coverage: The systems are used across all areas of law. In other countries, e-justice encompasses specific sectors, e.g., family, youth courts, or civil matters. In Brazil, the use is widespread and encompasses all legal subjects, including civil, criminal, and administrative proceedings. Studying Brazil's approach allows for an analysis of digital case management across diverse legal contexts.
- Open-Data Availability: Brazil has the National Digital Platform of the Brazilian Judiciary (DATAJUD), a highly detailed justice database that enables the public to monitor judicial activities, allows higher judicial bodies to assess performance, supports the planning of future projects, promotes public policies for judiciary reforms, and facilitates expert evaluations of the justice system.
- Long-term Implementation: Brazil has been systematically deploying CCMS since 2006. Unlike other countries, Brazil not only reports on the dissemination of digital judicial tools but also provides data on their actual use[5]The longitudinal data offer an opportunity to evaluate the impact of its use, which is not possible in other cases due to data unavailability or low quality.

  Figure 3 indicates the historical series of the percentage of new cases submitted electronically in Brazil:

[5] See footnote 1.

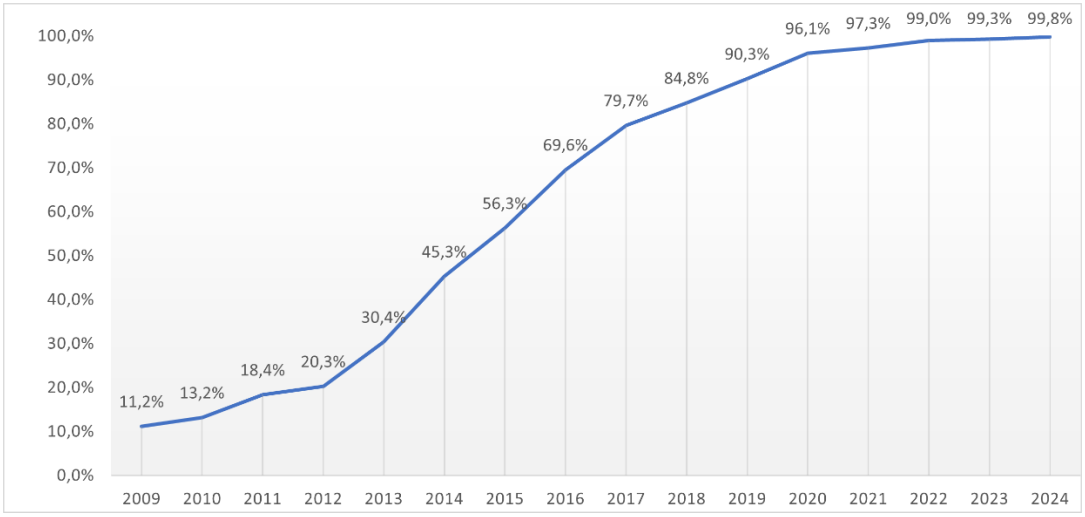


Figure 3: Historical Series of the Percentage of New Electronic Cases in Brazil (Based on CNJ, 2024)

The sheer size of the country and the differences between Brazilian federal states might cast doubt on the Brazilian case, as it seemingly treats the legal frameworks of different states as similar. However, this argument is flawed, as the country has a stable and standardized set of federal legal norms, including procedural laws that provide all states with the same core rules and rites, enabling court proceedings to be evaluated on comparable bases.

4.3.1 The Brazilian Judicial System

Brazil is a Federative Republic composed of the union of 26 states and the federal district. Brazil has adopted a civil law system. The judiciary comprises five segments: three specialised branches deal with electoral, military, and labour matters, and the ordinary justice is divided into state and federal justice. Federal courts judge the cases in which the government is a party to the litigation. State justice is present in all 27 Brazilian federal units and encompasses many judicial cases. Small claim courts deal with less complex civil matters, small claims, misdemeanours, and less offensive crimes whose maximum sentence does not exceed two years.

There are approximately 14.800 judicial units (courts) in Brazil, with approximately 18.000 judges and 266.000 clerks working. Like the other branches, state justice is divided into lower courts (first instance) and courts of appeal (second instance). Figure 4 depicts the structure of the Brazilian judiciary:

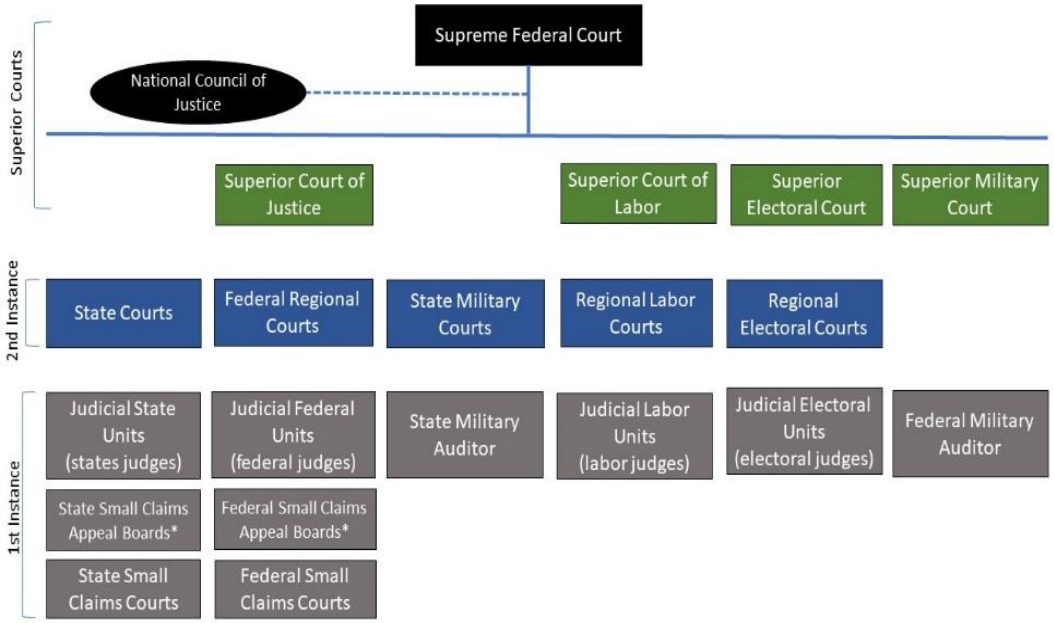


Figure 4: Structure of the Brazilian Judiciary System

4.3.2 Brazilian e-Justice Normative Framework

In examining the role of IT in the interplay between law and technology, Contini & Cordella (2015, p. 125) and Cordella (2015, p. 125) affirm that there is a "growing relevance of the regulation needed to deploy technology in this domain." Ex-ante regulation alone is inadequate, as improvements to the solution can only be made through daily organisational practice. This highlights the need for new requirements that will lead to post-regulation, addressing the issue and ensuring a fair trial.

The cornerstone of the Brazilian electronic process was the enactment of Law nº 9800/99, which enabled the parties to use a facsimile system of data and image transmission to carry out procedural acts that previously would have been done by written petition (Albergaria Neto et al., 2021). Next, Law nº 10.259/2001 authorised courts to organise services for summoning parties and receiving petitions electronically (Rabelo, 2019). In 2001, the institution of Brazilian Public Key Infrastructure (ICP-Brasil in Portuguese), which guarantees the authenticity, integrity, and legal validity of documents in electronic form, became an essential technical enable for the EJP deployment (BRASIL, 2001). There were reactions against using ICP-Brasil for e-Justice activities, mainly by the Brazilian Bar Association. The main opposition was political and intended to prevent the Brazilian Judiciary from being technically subordinated to a system based on an executive initiative (Filho et al., 2008). The controversy was solved only in 2006 with a specific regulation approved by the Legislative branch. The judiciary then created a

Certification Authority of Justice, which was subordinate to the Brazilian root certification authority (Romagnoli et al., 2015).

In 2004, the "Pact in Favour of a Fast and More Republican Judiciary" had special political importance once it was signed by the chief of the three state branches. It was followed by Amendment N° 45/2004 of the Federal Constitution of Brazil. Both addressed the changes that would come into force during the following years. The first one recognised that:

> *"Few national problems have so much consensus regarding diagnosis as the judicial question. The slowness of judicial processes and the low efficiency of its decisions slow down national development, discourage investments, favour indebtedness, generate impunity and undermine citizens' belief in the democratic system" (BRASIL, 2004).*

Judicial Reform was instituted by Constitutional Amendment N° 45/2004 to make the justice system swifter and more efficient. The guarantee of "reasonable duration of the process" has been provided in the Brazilian Constitution. The National Council of Justice (NCJ) was created on the same occasion and established in 2005. NCJ plays a relevant role in judicial policy and management. Among its attributions are the issuance of normative acts and recommendations, establishing targets and strategic plans, and controlling statistical data on the courts (Supremo Tribunal Federal, 2020). The Electronic Judicial Process, as CCMS is called in Brazil, would not have been possible without the creation of the NCJ, which coordinated the deployment of e-justice in Brazil. In 2006, Law N° 11.280 allowed courts to regulate the practice and official electronic communication of procedural acts.

Law N° 11.419/06, called "Law of Electronic Judicial Process", completed the normative judicial reforms of the Brazilian Judiciary. This regulatory framework changed the paradigm from the physical paper-based format to the digital one while safeguarding all legal precepts. The law explicitly addresses the informatisation of judicial proceedings, presenting general rules on adopting electronic means for judicial acts. From them, the electronic process has become the standard. Three innovations are worth mentioning:

i. The change of proceedings from paper-based to digital format is applicable indistinctly to civil, criminal, and labour proceedings, as well as to special courts at any level of jurisdiction.
ii. Summonses, subpoenas, and notifications can be performed electronically.
iii. Electronic official publications are created to disclose administrative and judicial acts, replacing other means of disclosure for all legal purposes.

The Brazilian justice suffered a fundamental paradigm shift brought by this Law, mainly due to the new establishment of deadlines with access up to 24 hours a day and the service of subpoenas and summonses by electronic means (R. P. M. Sousa et al., 2017). As stressed Rabelo (2019):

> *"The electronic subpoena was an excellent legislative innovation since it created a new subpoena in addition to the traditional one already served by electronic justice. The subpoena via the system or its portal is also worth mentioning, which can be done without even publishing it in the official gazette" (p. 276).*

Finally, modifying the Brazilian Code of Civil Procedure in 2015 granted the primary regulation of electronic judicial proceedings to the National Council of Justice. It also authorised electronic practices that, until then, were experimental (Tavares et al., 2016). Figure 5 summarises the chronology of normative changes that provided the basis for electronic justice in Brazil:

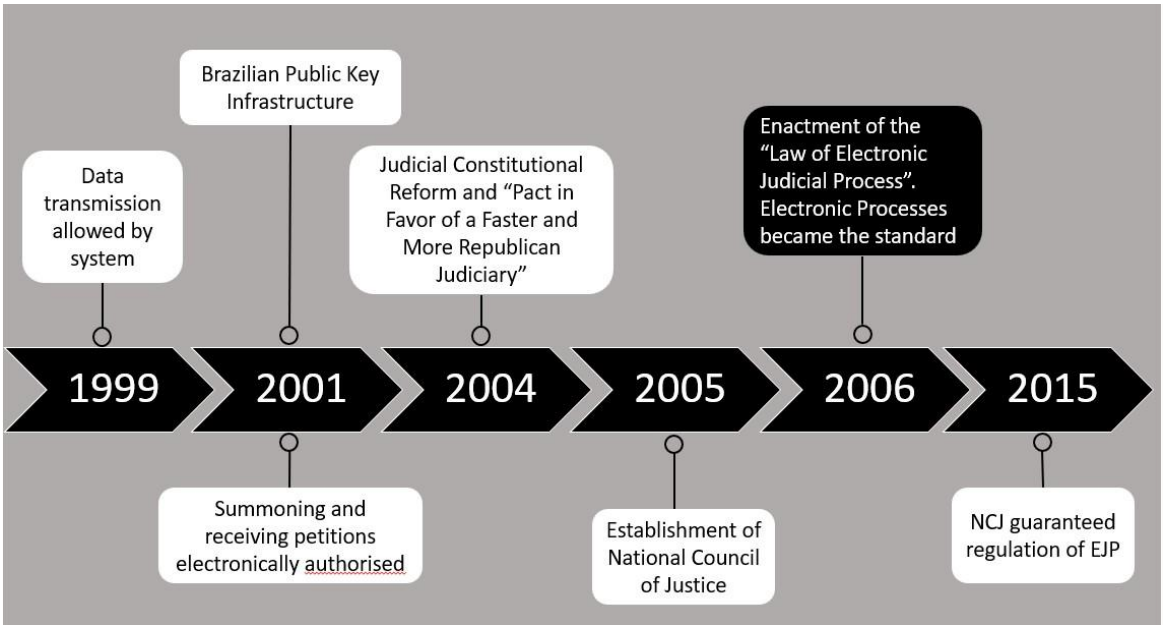


Figure 5: Chronology of the Normative Basis for Brazilian e-Justice

This chronological progression of Brazil's e-justice legal framework laid the essential foundation for the country's digital transformation of court operations. The following section examines how these normative changes translated into practical implementation, highlighting the technical and organisational challenges encountered during Brazil's CCMS deployment process.

4.3.3 Brazilian CCMS Deployment Process

The initial phase of electronic judicial processes in Brazil was characterised by administrative decentralisation. Courts began developing or outsourcing the development according to their realities. These initial applications did not always meet the necessary common prerequisites of usability, interoperability, and availability (Andrade et al., 2012; Moreira, 2015). Until that moment, there was no obligation to use electronic processes. Only in 2010 did the NCJ, in its Strategic Plan, define the year 2014 as the deadline for all lawsuits to be filed in digital form (Andrade et al., 2012).

A groundbreaking initiative, "Electronic Process" (e-Proc), was one of the earliest systems (introduced in 2003) used in the country by the Federal Regional Court of the 4th Region (Southern Region of Brazil). Developed by public servants from the IT area as open-source software, it saved the cost of purchasing licenses. It was the first court to authorise the replacement of paper-based proceedings with electronic ones (Gonçalves et al., 2020; Guimarães et al., 2011).

In 2007, some initiatives marked a pivotal transition toward a unified national electronic system. Taxonomic and terminological standardisation of classes, matters, movements, and procedural documents were established by the "Unified Procedural Tables". Started by the NCJ and adopted by the entire Brazilian Judiciary, the tables were one of the bases for Electronic Judicial Process deployment and posterior judicial data management (CNJ, 2007).

In 2009, the NCJ created the Model Requirements for System Computerised Process Management and Legal Documents (MoReq-Jus). It aims to ensure the observance of minimum requirements for the various systems adopted in the electronic process, ensuring reliability, authenticity, and accessibility of documents managed in the different existing electronic process platforms (Porto, 2017).

Due to the numerous applications used in the country, NCJ initiated an attempt to launch a national platform for the Brazilian Judiciary, aiming to adopt a unified electronic process. Until then, the multiple systems developed for the same purpose, even within a single autonomous judiciary unit, were limited in scope and effectiveness due to an absence of coordination and integration (Andrade et al., 2012, p. 540).

The Electronic Digital Process (PROJUDI in Portuguese) was NCJ's solution for procedural handling. The system was freely distributed among courts, and 19 of the 27 Brazilian states got to use the application. From this point onwards, courts adapted the PROJUDI system to their existing working processes in an automated manner. Changes in working processes and routines were kept to a minimum to avoid judges' resistance to using the system (Andrade et al., 2012). The PROJUDI was modified extensively, considering

the diverse court characteristics. In 2010, NCJ abandoned the PROJUDI initiative. The primary issue stemmed from the high degree of freedom granted to each court to develop its version of the system.

After the challenges with PROJUDI, the NCJ assumed control over the coordination and standardisation of the Electronic Judicial Process (EJP). The goal was to create a unified national system that could accommodate the unique needs of different courts while ensuring consistency across the judiciary. The envisioned benefits included eliminating redundant procedures, increasing procedural speed, generating productivity indicators, enabling comparisons between judicial bodies, facilitating communication between different entities, optimizing the use of physical spaces, and supporting telework initiatives.

The envisioned system aimed to address the longstanding issue of procedural delays and improve resource efficiency (Barbosa, 2013; Moreira, 2015). Based on the system developed by the Federal Regional Court of the 5th Region (North-eastern Region of Brazil), the NCJ developed the system which the entire country would then adopt. According to Tavares & Mota (2016), the system's key functionalities include:

- Case Management: filing, numbering, validation, registration, and distribution of cases;
- Judicial Proceedings Support: management of hearings, subpoenas, payments, calculations, and certificate issuance;
- Workflow Configuration: the ability for courts to define and customise their procedural flows;
- Security Controls: options to set secrecy and confidentiality levels for documents and proceedings;
- Document Creation: capability for judicial staff, parties, and attorneys to produce digital documents;
- External Interoperability: connection with institutions such as the Brazilian Bar Association, Public Prosecutor's Office, and Office of Attorney General.

In 2014, the NCJ took a significant step by training the first cohort of software developers from State Courts, enabling them to contribute to the coding of the EJP system. This initiative aimed to decentralize the development process previously concentrated within the CNJ's technical team. The CNJ sought to foster collaboration and distribute the workload more effectively by involving state courts. By 2016, the CNJ launched EJP version 2.0, marking a major technological upgrade. This version introduced a revised architectural model designed to enhance sustainability and facilitate continuous evolution. Key improvements were noted in the system's usability, which became more lightweight and intuitive for users. Shortly after, version 2.1 was released, incorporating modern software development standards,

particularly the adoption of microservices. This shift allowed for modularization, distributed computing, and cloud-based operations, paving the way for greater flexibility, availability, speed, and cost reduction. The system began evolving into a platform architecture, enabling more agile development and scalability (CNJ, 2025).

Subsequent updates enabled access via mobile devices and live-streamed proceedings. (Rabelo, 2019). The latest version of the EJP was released in October 2024.

Officially, the system was established in 2013 by Resolution nº 185 of December 2013, which granted a gradual and planned deployment, determining all courts to develop a plan and a schedule in compliance with its precepts (Hino et al., 2020; Rover, 2019; Santanna et al., 2018). It is worth mentioning that face-to-face service rooms are mandatory(Rabelo, 2019). The EJP became the only system accepted in Brazil for creating, developing, contracting or implementing a system or electronic judicial process module. Due to security protocols and economic considerations, the deployment of alternative electronic judicial processing systems was not permitted. Many years after its official deployment, the EJP faces difficulties and severe criticisms, mainly from lawyers and Regional Bar Associations (Moreira, 2015).

> *"Even though the Brazilian Courts are governed by the same legal agenda and are meant to comply with similar procedures and rules, each court has its own identity, values and culture, leading it to develop different workflows, sometimes far removed from workflows addressing a similar process in another court" (Andrade et al., 2012, p. 541).*

Therefore, different platforms are still used among State Courts, Labour Courts, and Federal Courts (Santanna et al., 2018). The state justice system uses eight electronic systems besides the EJP (Hino et al., 2020). The idea of a single system has not yet been achieved. In 2020, the NCJ, under pressure from some courts that resisted adopting the EJP, launched the National Digital Platform of Brazilian Judiciary (DATAJUD), affirming that EJP is the priority system for Brazilian courts and allows the maintenance of other systems. These other court systems must meet three conditions: compliance with interoperability requirements, commitment to collaborative development practices, and contribution of all new modules and enhancements to the National Platform for judiciary-wide use (CNJ, 2020).

Even with problems to be solved, the EJP brought undeniable and unprecedented progress to the justice system.

The main benefit is the statistical data for the administration of justice (Santanna et al., 2018). The DATAJUD centralises and stores procedural data and metadata relating to all courts' (few) physical or

electronic, public or secret proceedings. It allows information to be made available through a public Application Programming Interface-API, safeguarding the secrecy and confidentiality of the information following procedural legislation and the General Data Protection Law (CNJ, 2023).

Data generated from standardisation and EJP's actual use also permitted many Brazilian states to use artificial intelligence (AI) systems to enhance court performance. For example, the Federal District and Territories Court uses an application to assist in the classification and distribution of tax enforcement (Rabelo, 2019). Currently, there are 140 AI judicial tools in use or under development in Brazil (CNJ, 2023).

Beyond examining the implementation of the EJP in Brazil, this research seeks to assess its tangible effect on justice. The following chapter presents a comprehensive review of academic literature regarding the effects of information technology on justice.

5. Existing Research on the Effects of the Court Case Management Systems on Justice

This chapter presents a literature review on the effects of IT use' on justice. Academic literature evaluating the deployment or use of IT in the justice administration focuses on diverse IT tools in different ways. It is worth noting that most studies in e-justice are descriptive, analysing single cases that contribute to understanding the complexity of IT deployment and operation in justice. They depict various aspects of the design, implementation, and use of IT in justice (Cerrillo et al., 2008; Fabri, 2009; Lupo et al., 2014; Poullet, 2008; Rosa et al., 2013). Those studies result in lessons learned and challenges to be faced. Research evaluating the impact of IT's actual use is scarce (CEPEJ, 2022; Fabri, 2024, 2021; Lupo, 2016).

This review focuses exclusively on empirical studies. Rather than concentrating on the success of IT development or deployment projects, it emphasises the practical outcomes of IT use within the justice system.

The review is structured around two main objectives, explained in the following sections.

5.1 Studies Evaluating the Effect of CCMS on Judicial Efficiency

The allegation that e-justice reduces the length of court proceedings and thus improves the court's efficiency is frequently made, but it has little or no empirical support. Often, efficiency gain is taken for granted. More cautious claims state that e-justice "can," "has the potential," or is "believed" to improve court efficiency. As an example of how the subject is underappreciated, 17 European Union Member States acknowledge that they do not measure the impact of e-justice on areas such as court processes, court workload, costs, or human resources (CEPEJ, 2022, p. 117).

The review focuses on empirical research evaluating the relationship between e-justice, especially CCMS, and court efficiency. The search included efficiency-related words like performance, productivity, efficacy, effectiveness, or celerity of courts. Studies exclusively addressing online hearings and trials, artificial intelligence tools, and Online Dispute Resolution[6] were excluded as they fell outside the scope of this review. Research lacking substantial evidence to support the relationship under investigation was also

[6] Online Dispute Resolution (ODR) was excluded as often refers to the use of technology, as an out-of-court process, typically including methods like negotiation, mediation, and arbitration conducted through digital platforms.

excluded. Additionally, studies based on perceptions of the future were excluded. For instance, research using questions like 'Can e-justice reduce the duration of proceedings?' despite relating e-justice and efficiency, do not evaluate the actual outcomes of e-justice but instead explore its perceived potential (Frade et al., 2020; Sousa et al., 2022).

The search was updated in January 2025 and included English, Portuguese, and Spanish studies published in journals, conferences, and book chapters available in Scopus and Web of Science databases for all years. Due to the scarcity of literature, many references were found by citation analysis. After an extensive search, only 11 studies were selected to be reviewed. They are from diverse areas of study: law, economics, information systems, e-government and accounting sciences, and present significant diversity in their research focus, law domains, and jurisdictional levels. While some studies examine specific types of courts, such as labour, religious, or criminal courts, others encompass multiple legal subjects across different court hierarchies. Despite these variations in scope and context, all studies share a common topic: they empirically evaluate the practical results of electronic justice systems, focusing on CCMS and examining their influence on court efficiency.

Table 6 summarises the literature review results:

Table 6: Empirical Studies on e-justice and Court Efficiency

	Author/Year	Based on	Investigation Focus	Type of courts/Region	Results on Efficiency
1.	(Povylius, 2024)	Perceptions of judicial professional	Advantages and disadvantages of remote proceedings	"_"/Lithuania	Positive
2.	(Djamaludin et al., 2023)	Perceptions of judicial professional	Effectiveness of e-court	Religious and district courts/Biak Numfor, Indonesia	Positive
3.	(Castelliano et al., 2023)	Court statistical data	Efficacy of courts	Labour courts/Brazil	Positive
4.	(Yeung, 2022)	Court statistical data	Efficiency of courts	State courts/Brazil	Negative
5.	(Marques Filho et al., 2021)	Court statistical data	Impact of electronic judicial process on court congestion rate[7]	Labour courts/Brazil	No impact
6.	(Tenório et al., 2021)	Court statistical data	Managerial factor influencing justice efficiency	State courts/Brazil	No impact
7.	(Ahmed et al., 2020)	Perceptions of judicial professional	Areas of Improvement due to IT integration	Sulaimaniyah Appellate Court - Iraq	Positive

[7] The congestion rate is calculated by dividing the total number of cases resolved by the sum of new and pending cases. It is designed to measure the court's capacity to handling the cases assigned to it.

8.	(Sousa et al., 2018)	Court statistical data	Relation between resources, innovation and court performance	Labour courts/Brazil	No impact
9.	(Procopiuck, 2018)	Court statistical data	Comparison between the duration of the case filed traditionally and electronically.	Federal courts/Brazil	No impact
10.	(Xu, 2016)[8]	Government reports and document analysis	Examination of pilot e-court system	"_"/ Jilin Province, China	Positive
11.	(Fauvrelle et al., 2016)	Court statistical data	Determinants of judicial efficiency	State courts/Brazil	Negative

The following analysis details these studies' specific findings, methodologies, and contexts.

In Lithuania, remote criminal courts were assessed by a survey of judges, prosecutors and lawyers to identify advantages and disadvantages. The main advantage addressed is time-saving, beyond money and other resources. Time-saving is linked to the ability to avoid travelling to courts and to access cases more quickly. Additionally, videoconferencing was associated with efficiency (Povylius, 2024).

The IT adopted in Jilin Province of China encompasses payments, filing, submitting and exchanging evidence, making petitions online, and videoconferencing. Based on governmental reports, the author claims that efficiency has been tangibly achieved through a significant reduction in the average time required to adjudicate online cases compared to traditional ones due to the online submission and exchange of documents and the online payment of judicial fees, which save time for litigants (Xu, 2016, p. 65).

In the Sulaimaniyah appellate e-court in Iraq, a study based on structured expert interviews analysed areas of improvement in court efficiency. The study concluded that the use of IT resulted in better internal daily operation and case management, supported by the reduction in time spent managing processes, exchanging information, and notifying parties (Ahmed et al., 2020).

A quantitative study found a negative relation between the cases electronically filled in state courts of Brazil and judicial productivity growth from 2009 to 2014 (Fauvrelle et al., 2016).

A study in a specialised tax enforcement court comparing cases filled in a traditional paper-based manner with cases filled in through a digital counterpart showed no impact on the duration of cases (Procopiuck, 2018). The relation between innovation represented by the electronic process index and investment in IT and performance in Brazilian labour courts from 2003 to 2013 did not reduce court inefficiency (Sousa

[8] The study presents two case, but only one was elegible to the review due to the system characteristics.

et al., 2018). No relation was also found between the index of digital cases and court efficiency in Brazilian state courts from 2015 to 2019 (Tenório et al., 2021). Another study of Brazilian state courts adopted a comparative approach, concluding that IT harmed the court's efficiency in Brazilian state courts from 2017 through 2019 (Yeung, 2022). The effect of electronic case processing on court efficacy of the adjudication phase and enforcement phase in Brazilian labour justice was associated with increased productivity and clearance rates and reduced disposition time (Castelliano, Grajzl, and Watanabe, 2023). The impact of e-court in Indonesia positively affected the judicial process's efficiency, as end users found it efficient, user-friendly, reliable, secure, and satisfactory (Djamaludin et al., 2023).

Another study in the Brazilian Labour Courts concluded that the primary foundation for using the electronic process failed as efficiency was not proven (Marques Filho et al., 2021).

Brazil emerges as a frequent object of study in the reviewed literature, reflecting its sustained long-term use of e-justice systems and the consequent availability of longitudinal data for analysis.

The literature review confirms the research gap and highlights the importance of further analysing IT effects on court efficiency. Despite existing attempts to correlate e-justice and efficiency in justice systems, the outcomes remain controversial. Several methodological and analytical distinctions can contribute to the existing knowledge base.

It is worth noting that studies based on perceptions found positive results, while those based on court statistical data are controversial. Previous quantitative studies based on statistical data from judiciary efficiency indicators have primarily focused on specialised courts, such as labour courts, with particular procedural rulings or specific case law types, such as tax enforcement in federal courts. These studies cannot comprehensively analyse the efficiency of the justice system as a whole. Additionally, research focusing on all legal matters in state courts, which serve as the primary entry point for the justice system, remains limited. Brazilian state court studies have examined shorter time ranges and lower IT use rates. In contrast, the current analysis considers more extended periods with a nearly 100% IT use rate(CNJ, 2024) in the judicial system, potentially yielding more consistent results.

5.2 Studies Evaluating the Effects of CCMS on Justice Values

The review explores the impact of e-justice on core justice values. While these values—such as access to justice, equality, independence, impartiality and due process of law —are fundamental concerns for justice institutions and professionals, they have been far less studied. The concern is that, despite its efficiency gains, e-justice could inadvertently undermine these critical principles.

Many e-justice scholars emphasise that when introducing and applying a new system to promote cost-efficiency in justice, it is crucial to move beyond merely 'objective' measures like timeliness. Greater attention should be given to other aspects of justice that lack clear economic value or measurable metrics, including justice values (Bannon et al., 2021; Donoghue, 2017; Procopiuck, 2018; Reiling et al., 2022; Rubim et al., 2021). Although technology may benefit the core values of justice, the authors highlight the need to evaluate its influence. Meanwhile, despite academic concerns, little research has been conducted in this area.

In contrast to the review of studies centred on justice efficiency, the review of judicial values included studies not limited to CCMS. Limiting the review to CCMS-specific studies resulted in only three studies. Assessing the effects on justice values proved more challenging due to the existing literature's even more fragmented nature and scarcity. The concept of justice values has variances and overlaps that hinder choosing and analysing the studies. Consequently, this review adopts a broader scope, considering studies of various IT applications in justice systems, with more flexible criteria regarding empirical evidence supporting the research results. It also includes a broader range of IT applications rather than CCMS, resulting in twelve studies. The majority of literature, although analysing the effects of IT on justice values, is traditional legal research with a normative and doctrinal approach, focusing on examining legal norms, principles, and rules, suggesting how law should be and usually involving theoretical frameworks, thus not empirically assessing e-justice influence on justice values (Marycheva et al., 2021; Mukhtar et al., 2023; Shevchuk et al., 2024; Sibarani, 2023; Stepanov et al., 2019; Zhang et al., 2024). This review, however, aims to identify and analyse studies that empirically evaluate the relationship between IT and access to justice, moving beyond theoretical assumptions to provide verified insights.

The review included English, Portuguese, and Spanish studies published in journals, conferences, and book chapters available in Scopus and Web of Science databases for all years. The search terms include "e-justice, " each justice value, and related words. The findings are systematically presented, focusing on access to justice, equality, independence and impartiality, and due process of law. Table 7 presents the results of the research, followed by a description of each one:

Table 7: Empirical Studies on e-justice Effects on Justice Values

	Author/Year	Justice Value	Technology	Based on	Type of Court/Region	Type of Effect
1.	(Oliveira et al., 2023)	Access to Justice	Videoconferencing	Perceptions of mediators and conciliators	State courts/São Paulo, Brazil	Positive
2.	(Djamaludin et al., 2023)	Access to Justice Equality	CCMS/ Videoconferencing	Perceptions of judicial professionals	Religious and district courts/Biak Numfor, Indonesia	Positive
3.	(Valle et al., 2023)	Access to Justice	AI System	Analysis of case law	Supreme Court/Brazil	Negative
4.	(Nir et al., 2022)	Access to Justice	Videoconferencing	Students documentarians	State courts/Northeastern United States	Negative
5.	(Foussard et al., 2023a)	Access to Justice	Videoconferencing	Perceptions of judges	"_ "/worldwide	Negative
6.	(Povylius, 2024)	Access to Justice	Videoconferencing	Perceptions of lawyers	"_"/Lituania	Negative
7.	(Reiling et al., 2022)	Independence and Impartiality	CCMS	Comparative analysis of e-justice platforms	Not applicable	Negative
8.	(Shi et al., 2021)	Independence and Impartiality	AI systems/CCMS	Analysis of the major technological entities in the 'Informationalisation' process of courts	"_"/China	Negative
9.	(Contini, 2020)	Independence and Impartiality	AI systems	Case study analysis	Not applicable	Negative
10.	(Rossner et al., 2021)	Equality	Videoconferencing	Mock study	Not applicable	Positive
11.	(Papagianneas et al., 2023)	Due Process	AI systems/CCMS	Document analysis	Supreme Court/China	Positive
12.	(Refaie et al., 2023)	Due Process	Videoconferencing	Perceptios of judicial professionals	"_"/Chile	Negative

Researchers commonly assert that access to justice is improved by enabling online filing, exchange of judicial documents and videoconferencing, thus making justice more accessible (Kuhimbisa, 2024; Saxena, 2024). Enhancing access to justice is often treated as a foundational premise in adopting e-justice applications and is frequently presented in the literature as a self-evident benefit. Five empirical studies investigate the effects of IT on access justice.

Videoconferencing was evaluated through 50 questionnaires administered to judicial conciliators and mediators during the COVID-19 pandemic from São Paulo state Justice in Brazil. The findings indicate that the most frequently emphasised positive factor the conciliators and mediators identified was the ease of access to conference sessions, which offered greater convenience for all participants (Oliveira et al., 2023). Djamaludin et al. (2023, pp. 11–12) assessed user satisfaction among 100 respondents in the Religious and District Courts of Biak Numfor, Indonesia. The study found that the e-court system is easy to access (93%), provides accurate and comprehensive information (98%), facilitates the judicial process (99%), and ensures equal access to information and services (95%). A study of Brazil's Supreme Federal Court (STF), which uses an AI system (named Victor) for classifying appeals by themes of General Repercussion, found that the AI automated classification could potentially prevent legitimate appeals from reaching proper judicial review, especially in cases where simplified General Repercussion Themes[9] do not fully capture the complexity of the original decisions. The authors emphasise that without adequate human oversight and transparency in its decision-making process, Victor's automation of this procedural step could inadvertently restrict citizens' constitutional right to access justice (Valle et al., 2023). Studying the defendant's rights, Nir et al. (2022) analysed the 44 student documentarians who observed virtual courtroom proceedings. The author concludes there is a restriction in access as defendants with less access to digital platforms and incarcerated individuals are disproportionately impacted during COVID-19. Evidence based on judges' perceptions worldwide reveals significant challenges in access to justice, particularly for children and youth during COVID-19, suggesting that while electronic justice assures court access during COVID-19, it simultaneously creates new obstacles mainly due to impaired access to counsel for these groups of vulnerable people (Foussard et al., 2023b). Based on the perceptions of Lituanian's lawyers, a study concludes that remote criminal proceedings can harm access to justice by negatively affecting the relationship between the defendant and the defence attorney. Two

[9] General repercussion is a constitutional requirement for Extraordinary Appeals to Brazil's Supreme Court, demanding that the case presents relevant economic, political, social, or legal questions that extend beyond the parties' interests. Upon judgment, the Court issues a thesis summarizing the key elements of the decision, which becomes binding precedent.

critical issues arise: the lack of confidentiality in their communication and the reduced effectiveness of the defence. These problems are particularly pronounced when the defence counsel and the defendant are located in different places during the proceedings, leading to difficulties in ensuring a fair trial and undermining the core principles of justice. This underscores the need for caution and protective measures when implementing digital or remote solutions in criminal justice processes (Povylius, 2024).

Concerning independence and impartiality, Reiling et al. (2022), comparing three e-justice platforms, concluded that the expansion of e-justice platforms encroaches on judicial discretion through the interpretation of procedural rules by software developers, taking some interpretative power away from judges and compromising judicial independence and, consequently, fairness. Analysing the case of the smart courts in China, Shi et al. (2021) reinforce this risk for judicial independence and impartiality. Legal prediction services are concentrated in seven major legal technology companies. They argue that when a few private entities control the algorithms and data that analyse and predict legal outcomes, they gain considerable indirect influence over judicial decision-making. Their proprietary algorithms create standardised interpretations of laws and precedents, which may subtly pressure judges to conform to predictions rather than exercise independent judgment. Contini (2020) analysed four case studies—two involving traditional IT applications and two focusing on AI-based systems—to demonstrate the sensitivity of judicial processes to the interaction between law and technology. Regarding predictive justice, he emphasises that predictions generated by these systems are "far from being similar to judicial decisions," as judicial decisions must meet a minimal standard of justification based on assessing relevant facts and applicable regulations (p. 3). Specifically addressing AI, he warns that judicial independence and impartiality may be at risk due to the potential overreliance on system-generated suggestions.

Equality was investigated by Rossner et al. (2021). They conducted a mock study concerning videoconferencing and concluded that a well-designed distributed court[10] could communicate a sense of equality and shared experience among remote participants in a criminal hearing.

Due process of law may be at risk, according to Refaie et al. (2023), who interviewed justice stakeholders to assess the implications of IT for justice values. The results showed that technology has limited governance of ready-to-use technologies for online hearings, which threatens due process of law.

[10] They define distribute court as a unified virtual space where all participants interact, rather than connecting separate physical locations. This virtual courtroom provides full audio-visual access to all participants, including options for public observation either in-person or through video streaming (Rossner et al., 2021, p. 4).

Papagianneas et al. (2023) analysed a series of different documentary sources from China's Supreme People's Court. They concluded that it is reasonable to interpret the China smart courts as a mechanism to enhance due process and ensure judicial accountability. They included consistency in the concept of due process of law, affirming that it has been achieved in many ways (p. 7). In Chile, research from interviews with key stakeholders from the judiciary system provides evidence of risks to due process of law related to the use of videoconferencing.

The analysis of empirical studies shows that videoconferencing dominates research (seven studies), followed by AI systems (four studies), with CCMS appearing in only three studies, often combined with other technologies. While effects are predominantly adverse (eight) studies), particularly regarding access to justice and judicial independence, this may reflect researchers' focus on traditionally sensitive areas already identified as potentially problematic in previous non-empirical literature. Positive effects mainly relate to improved accessibility through videoconferencing and CCMS. A research gap exists in isolated CCMS impact studies, as most research examines videoconferencing, AI systems, or multiple technologies simultaneously along with CCMS.

Reviewing the existing empirical research on Court Case Management Systems' effects on judicial efficiency and core justice values reveals the scarcity of empirical studies in this domain and their contradictory findings, particularly regarding efficiency outcomes. Additionally, the limited investigation of CCMS effects on fundamental justice values underscores the need for comprehensive research that examines both dimensions. The following chapter presents the research design adopted to evaluate these effects.

6. RESEARCH DESIGN

The research questions, as presented in Chapter 3, are:

1 - *What is the impact of the actual use of IT on justice efficiency?*

2 - What are the effects of the actual use of IT on justice values?

The subjects of the research questions are complementary. In the first case, judicial efficiency can be measured, as the Brazilian National Council of Justice (NCJ) provides data on efficiency indicators that enable this quantitative assessment. However, evaluating the effects of CCMS on justice values presents challenges for quantitative measurement due to the complex and subjective nature of these values. Therefore, a qualitative approach is more suitable for investigating these effects.

6.1 Effects of CCMS on Justice Efficiency

The following sections 1) detail the research model and hypothesis to assess the relationship between CCMS use and efficiency metrics in judicial systems; 2) describe the data sources, sample selection, and statistical methods used to test these hypotheses, ensuring a rigorous and systematic approach to the analysis. These subsections provide a comprehensive guide to the quantitative research design applied in this part of the study.

6.1.1 Research Model and Hypothesis

The research model is designed to demonstrate the possible relationship between the actual use of CCMS and judicial efficiency. Figure 6 presents the research model.

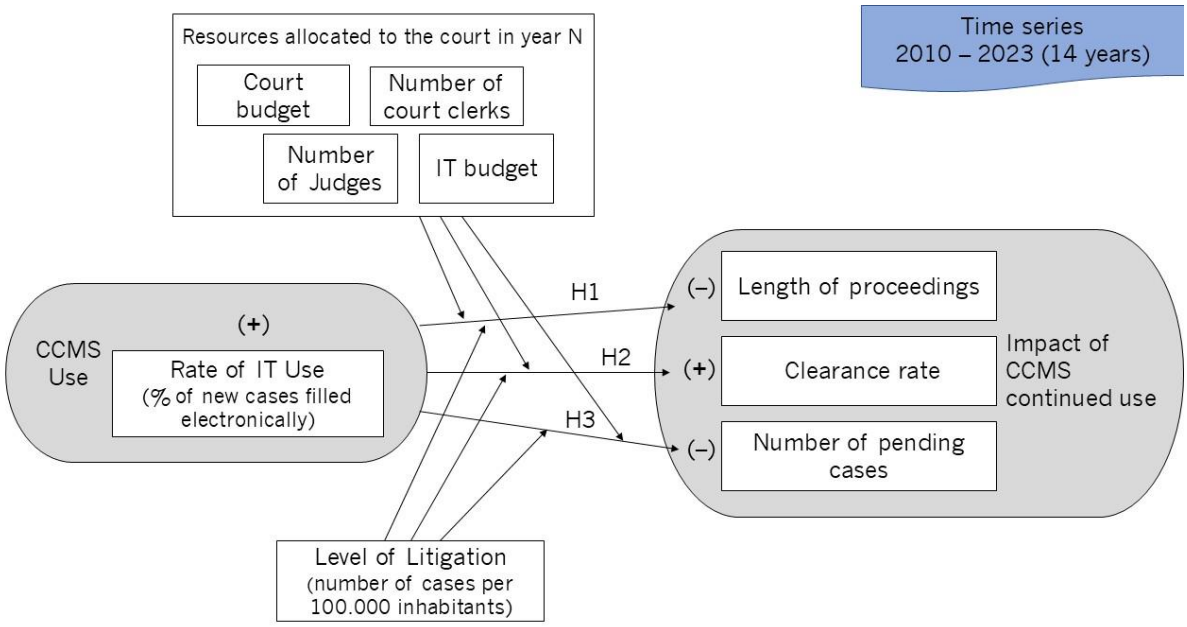


Figure 6: Research Model

The rate of IT use in courts, measured as the percentage of new cases filed electronically, is the independent variable of the model. Once filed electronically, the case remains in electronic format throughout its entire lifecycle. It is likely that as the rate of use of technology increases, efficiency will also increase.

Although efficiency is better known as an economics concept, it is a cross-disciplinary term used in different areas of study. Concerning justice administration, productivity, measured as the number of sentences and the length of court proceedings, is commonly used to value efficiency (Voigt, 2016).

The present model includes three dependent variables reflecting judicial efficiency: the length of proceedings, the clearance rate, and the number of pending cases. The indicators are part of the European Commission (EC) efficiency measurement methodology, which results from more than ten years of accumulated experience and studies and relies on the cooperation of many individual and institutional European judicial actors[11].

Five control variables that can affect the dependent variables were selected. Their inclusion increases the precision of the model, allowing the relationship between the independent and dependent variables to be observed without interference from other factors. Four control variables are related to resources: court

[11] Another recognised institution, the International Consortium for Court Excellence (ICCE), composed of international judicial institutions with expertise in court and judicial administration, also sets the duration of case processing, clearance rate, and case backlogs as core measurements of court performance.

budget, IT budget, number of court judges, and number of court clerks allocated for each year. Since increased resources could contribute to improved court performance, failing to account for them might lead to erroneous conclusions, such as attributing efficiency gains related to other variables to IT. Studies have related them to the performance of courts (Fauvrelle et al., 2016; Nissi et al., 2019; M. Sousa et al., 2018; Tenório et al., 2021).

The level of litigation is our fifth control variable, representing the number of new cases per 100.000 inhabitants. Where the demand for justice is high, justice is more efficient (Castro et al., 2014; Dimitrova-Grajzl et al., 2012; Nissi et al., 2019). The five control variables help to reduce potential confounding effects.

Three main hypotheses are being considered:

- Hypothesis 1. (H1) The rate of IT use is negatively associated with the length of proceedings.

The rate of IT use in courts is measured as the percentage of new cases filed electronically. The length of court proceedings is the time required to resolve a case, from its initial filing to the final decision, including all procedural steps such as hearings, evidence review, and judicial rulings. Increased IT use in courts is supposed to streamline case management, reduce administrative delays, eliminate manual paperwork, speed up document processing, and facilitate communication, potentially reducing the time taken to conclude a judicial case. The hypothesis is that as more processes are conducted digitally, the duration of the processes is reduced.

The length of proceedings is the first most cited variable related to the court's efficiency in the literature (OECD, 2013; Rosales-López, 2008; Tenório et al., 2021; Voigt, 2016; Yeung et al., 2020). The duration time of the proceeding directly impacts costs and drives citizens away from justice (Yeung et al., 2020). Therefore, the reasonable time of proceedings goes far beyond operational efficiency. It constitutes a fundamental right as a core component of a fair trial. The legal maxim "justice delayed is justice denied" resumes the "reasonable time" principle. The duration of the process is also associated with an essential measure of court performance: confidence in the judicial system (OECD, 2013).

- Hypothesis 2. (H2) The rate of IT use is positively associated with the clearance rate.

The clearance rate is the ratio of resolved cases against incoming cases. It informs about the court's capacity to clear cases at least equivalent to the number of new cases. If the indicator remains above 100%, the court decreases the number of pending cases. On the contrary, the backlog expands if the indicator is below 100%. CCMS allows for faster case processing, improving the number of decisions given by judges. The hypothesis is that the use of CCMS contributes to the rise of clearance rates.

- Hypothesis 3. (H3) The rate of IT use is negatively associated with the number of pending cases.

The number of pending cases indicates the backlog of unresolved cases remaining at the end of a specific period. Pending cases continue to improve in many countries, which is a severe challenge for the justice administration (EC, 2022). The backlog is expected to reduce as more cases are held digitally.

6.1.2 Data and Empirical Methodology

The analysis uses annual secondary data from the "Justice in Numbers" report, the official annual report of the Brazilian judiciary (CNJ, 2024). The data covers 14 years, from 2010 to 2023.[12]

The analysis focuses on adjudication first instance-level data of state justice, which is present in all 27 state units and encompasses most Brazilian judicial cases (78%)[13].

Enforcement proceedings were excluded from the research, as they present many difficulties to implement that are unrelated to possible inefficiency of the justice system. For example, in cases involving fraud or embezzlement, the defendant may have hidden assets in offshore accounts or transferred them to third parties to avoid seizure, or a debtor may be unable to pay a court-ordered judgment due to insolvency or bankruptcy proceedings, among others. In these situations, the delay in concluding cases is likely unrelated to potential court inefficiency. Criminal and non-criminal cases are analysed separately as the complexities and rites of the respective processes differ substantially concerning the law applied, the degree of participation of institutional actors from outside the justice system, the sentential force and several other aspects that can pose different results referring to the impacts on efficiency indicators. The distinction helps to understand if the dynamics of the impact change according to the law subject, whether criminal or non-criminal.

The judicial appeal level was excluded, as the data available does not allow us to discriminate between criminal and non-criminal justice. The analysis also distinguishes data from ordinary and small claim courts. Small claim courts deal with less complex civil matters, small claims, misdemeanours, and less offensive crimes whose maximum sentence is at most two years. Small claim courts are designed to be faster and easier to solve a law case. The intention is to identify potential differences in the impact of IT use behaviour compared to ordinary courts.

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[12] The exception is the variable length of proceedings, to which data is only available from 2016 onwards. Therefore, the coverage period for this variable is eight years and not fourteen years. The length of proceedings is calculated in calendar days, from the day a case is presented before the court until the day the court adopts its decision and is filed.

[13] Other first-instance cases are filed before the federal or specialised courts.

The combined time series and cross-sectional dimensions led us to use a Data Panel to verify our hypothesis.

6.2 Effects of CCMS on Justice Values

The investigation of the effects of CCMS on justice values is based on interviews.

This study adapts Lupo' (2016) values-based approach, which proposes a framework for evaluating e-justice systems through seven core values: independence, accountability, impartiality, equal access, transparency, privacy, and legal validity.

In this research, "equal access" has been divided into "access" and "equality," as adopted by the (Council of Europe - Venice Commission, 2016). Transparency is classified as access to judicial information. Additionally, "due legal process" is used in a narrower sense, replacing "legal validity" to emphasise compliance with established legal procedures and norms—a term widely adopted In the Brazilian context. While privacy and accountability are essential for all organisations, they do not hold the same foundational importance for justice as values like the above mentioned. Thus, they were excluded from the scope of this investigation. Moreover, while not classified as a judicial value, decision quality is a way to evaluate fairness in judicial systems. This inclusion addresses concerns that an excessive focus on productivity might compromise decision quality. Along with efficiency, the justice values under inquiry are access, equality, independence, impartiality and due legal process. Quality of decision, as an output of judges' work, representing one aspect of fairness, is also the focus of the investigation.

The research model to evaluate the effects of CCMS on justice values is presented in Figure 7.

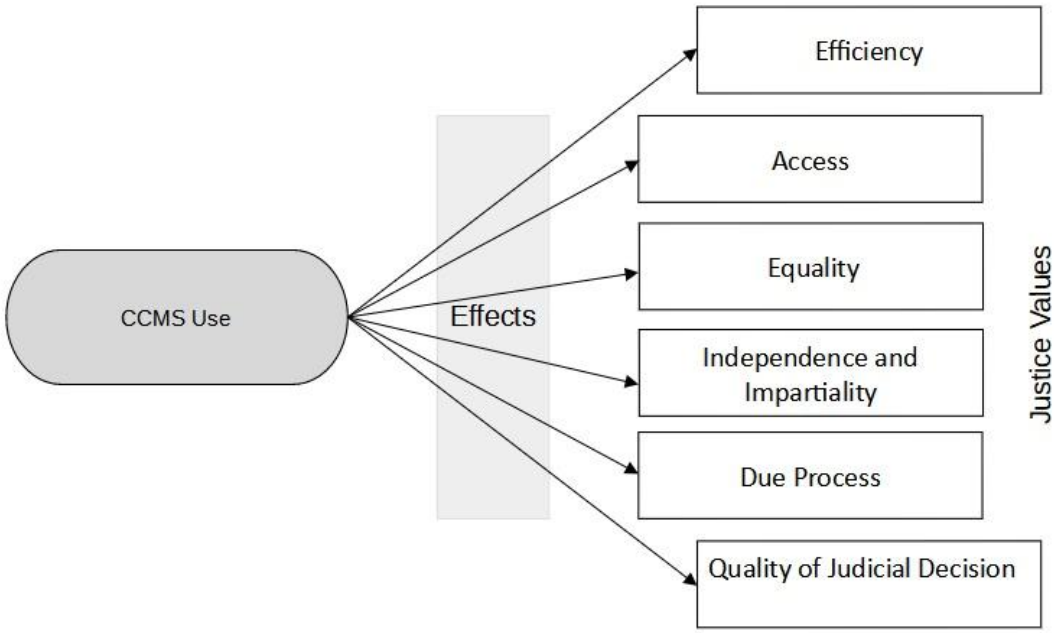


Figure 7: Research Model

Semi-structured interviews were selected as the primary data collection method to explore participants' personal experiences with the subject. Their flexibility facilitates follow-up questions and enables a deeper understanding of interviewees' perspectives on the interaction between IT and justice values. In-depth interviews were further complemented by documentary analysis.

6.2.1 Interviews Process

The in-depth interviews were based on the work of Rubin et al. (2012), following the approach of the responsive interview, which is designed to be adaptable and expects the interviewer to adjust questions based on the information being gathered (p. 7). This model promotes adaptability, encouraging researchers to pivot and explore new directions when new information emerges, allowing for a comprehensive exploration of unexpected insights. The interviewer is assumed to be an active participant in the research, and their knowledge, experience, and other characteristics impact the quality of work.

I. *Interview Script*

The interview script has two parts. The first five questions relate to the demographic characteristics of the participants: type of professional, Brazilian region of work, gender, age, and time in career. The second

part addresses questions related to the effects of the CCMS on the values of justice. Eight questions integrate the semi-structured interview. The script is available in Appendix I. The first question pertains to efficiency and aims to investigate the interviewees' perceptions of potential improvements in judicial efficiency. The results from the first part of the study were not disclosed during questioning to avoid influencing participants' responses,

The second question addresses the quality of judges' decisions, a core aspect of fairness. It seeks to determine whether the availability of productivity data provided by the CCMS influences the quality of judicial decisions[14]. While the other questions focus on the direct impact of CCMS on justice values, this question examines its indirect effect through the publication of productivity indicators.

The third question aims to identify values not included in our script, which was presented earlier to uncover significant values absent from the study. Questions 4 to 7 focus on the relationship between CCMS use and its effects on the pre-identified justice values.

Questions 1 through 7 collectively address the effects of CCMS use. In contrast, the eighth question shifts focus, exploring the potential effects of two other technologies—videoconferencing and artificial intelligence—on justice values, complementing aspects related to CCMS use. While video conferencing is a technology closely connected to CCMS, though not an intrinsic part of it, artificial intelligence applications benefit from CCMS data. CCMS's influence on each predetermined justice value was examined in detail, with one question per value. In contrast, the question regarding videoconferencing and AI was broader and less in-depth, considering its complementary approach.

Table 8 summarises the interview structure, highlighting the subject of inquiry and its objectives.

Table 8: Interview Structure

Demographic Characteristics of the Participants
1. Type of Professional
2. Brazilian region of work
3. Gender
4. Age
5. Time in career

[14] Quality of judicial decision as an outcome of judge's work, that should be well-reasoned, legally sound, and based on the case's merits.

Effects of CCMS on Justice Values	
Justice Values	**Objective**
1 - Efficiency	To identify the effects of CCMS on the efficiency of justice.
2 - Decision Quality	To determine whether the availability of productivity data provided by the CCMS impacts the quality of a judge's decision.
3 – Other Justice Values	To identify justice values that may be affected by CCMS that are not included in the study.
4 - Access	To identify the effects of CCMS on access to justice.
5 - Equality	To identify the effects of CCMS on equality of justice.
6 -Independence and Impartiality	To identify the effects of CCMS on judges' independence and impartiality.
7 - Due Process	To identify the effects of CCMS on due process.
Effects of Other Technologies on Justice Values	
8 - Videoconferencing and AI	To explore the effects of videoconferencing and artificial intelligence on justice values.

The research script was tested in an interview with a judge in January 2024. Following the interview approach, the questions were not always presented and discussed with interviewees in the order shown in Table 8. Follow-up questions were used whenever necessary to learn about specific concepts, explore an event or theme, or investigate inconsistencies. Probes were also used to encourage the interviewee to give examples or to detail their reasoning (Rubin et al., 2012).

II. *Interviewee Sampling Strategy*

In qualitative research, the number of interviews is less important than the quality of sampling decisions on which the results depend. The emphasis should fall on the significance of which cases to select and what they represent or why they are chosen (Flick, 2009, p. 31).

To gain a deeper understanding of the phenomenon, Saldaña (2013) recommends conducting between 20 and 30 interviews. This number of interviews allows for various perspectives and sufficient data saturation, meaning that the collected data becomes repetitive, and new information is unlikely to emerge. Considering that the CCMS is the IT tool at the centre of the study, the interview is directed at the predominant group of justice professionals who use the system most frequently and regularly. They are judges, prosecutors, lawyers, and judicial staff.

An important observation concerning the absence of final users of justice, the litigants, among the interviewees, must be reiterated. Lawyers prevail in the legal system, mainly overriding self-representation. Although self-representation is permitted in some cases, the court system assumes that representation is present and desirable.

Beyond professional roles, geographic representation across Brazil's diverse regions was another criterion. Given the country's vast size, representation from all five regions was essential to capture different regional perspectives. The initial plan aimed to interview one professional from each category—judges, prosecutors, lawyers, and clerks—from each region, totalling 20 interviews. However, it was not possible to interview a judicial clerk from the North Region. Additionally, two judges were interviewed beyond the original plan. The first not only validated the interview script but also offered valuable insights that merit consideration. The second was an IT coordinator judge from one of the Brazilian state courts, whose unique position offered a distinctive perspective compared to other interviewed judges.

Aligning with the criteria for evaluating the impact of CCMS on justice efficiency presented in Section 6.1.2, all interviewees work on ordinary first-instance state justice. The ordinary state and small claim courts are the most significant set of courts[15], considering the number of cases addressed in the Brazilian judiciary (CNJ, 2024). The first instance (the lower or trial court) is the initial level of the judiciary, where cases are heard and decided for the first time. Therefore, the first instance level is responsible for most judicial cases, which is why the research addresses first-instance courts. The selected participants all possessed significant qualifications to evaluate CCMS impacts. Each had over ten years of experience in the Brazilian Justice System, working with both paper-based and digital systems. This dual experience enabled them to effectively compare these two moments and assess the changes brought by CCMS. Their lengthy service included work with criminal and non-criminal cases, supporting this study's goal to examine CCMS effects across all types of legal proceedings. Most participants also had direct experience with the adjudication phase of legal proceedings. This comprehensive background qualified them to assess how the introduction of CCMS has affected core justice values.

The sampling strategy was designed to capture a meaningful spectrum of perspectives within the broader judicial context while acknowledging that these participants do not represent the entire universe of judicial professionals (Mason, 2002). Table 9 presents the interview sampling strategy:

[15] A "set of courts" refers to courts handling specific cases as established in the legal judicial structure of the country.

Table 9: Interview Sample Strategy Summary

Description	Requirements	Sample
Number of interviews	At least 20	21 professionals
Justice professionals	Professionals who use CCMS regularly	Judges, prosecutors, lawyers, and judicial clerks
The geographic location of the professional	Each of the five Brazilian regions	Four from the North region Four from the Northeast region Five from the Centre-West region Four from the Southeast region Four from South region
Set of court	Most demanded courts	Professional from the Ordinary State Justice courts and Small Claim Courts (70,11% of Brazilian new cases)
Justice Instance	Most demanded instance	Professionals from the first instance level (83,18% of State Justice cases)
Length of time working in the profession	Professional with experience in both paper-based and electronic judicial processes	Professionals with over ten years of work experience
Law subject	All law subjects	Professional with experience in both criminal and non-criminal matters.
Case Type	Case type with less external influences on justice values	Professionals with experience in adjudication cases

Five demographic descriptive attributes classified the interviewees. Table 10 demonstrates the final number of interviewees and their characteristics:

Table 10: Sample Characteristics

Attribute Profession: profession of interviewees	
Judge	7
Judicial clerk	4
Lawyer	5
Prosecutor	5
Attribute Gender: gender identification of interviewees	
Female	7
Male	14
Attribute Region: Brazilian region of work	
Center-West	5
North	4
Northeast	4
South	4
Southeast	4
Attribute Age: age of interviewees	
31 to 40 years old	5
41 to 50 years old	8
51 to 60 years old	7
Over 61 years old	1

Attribute Time in Career: years of professional experience.	
10 to 19	10
20 to 29	6
30 to 39	5

III. *Interview Steps*

Contact with potential participants was made via WhatsApp to arrange interview dates and times. This was followed by a formal email containing research details and the Informed Consent Form (Appendix III).f The interviews were scheduled for March 2024. Interviews via Microsoft Teams lasted an average of

35.15 minutes. Participants joined from work or home. First, the interviewer Introduced herself and her PhD program affiliation, followed by an introductory explanation of the study's purpose. The informed consent to participate, already sent by email, was verbally obtained from all interviewees at the beginning of the interview. Before starting the interview, authorisation to record was requested. Then, the interviewer assured participants of anonymisation during the interview. Basic demographic data was collected from each participant: gender, age, region of work, and length of service (see Table 10). After each interview, participants were asked if they would like to receive the research results. Figure 8 outlines the complete interview process.

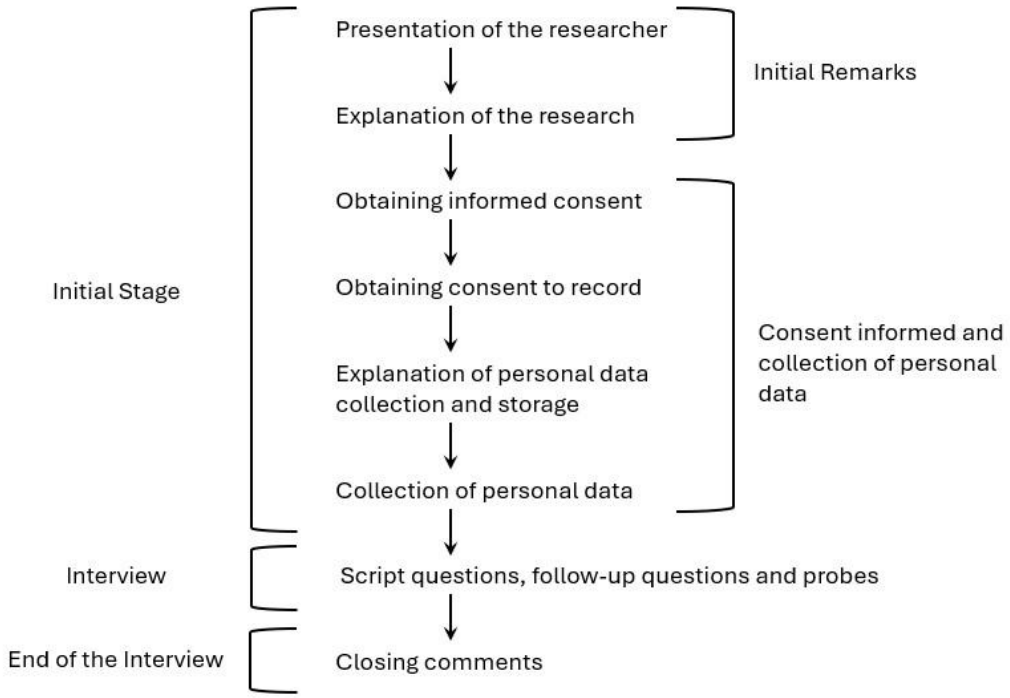


Figure 8: Summary of Interview Steps

The transcription process involved multiple steps. Microsoft Teams generated initial automated transcripts of the interviews. These drafts were then refined through repeated listening of the recordings to ensure word-for-word accuracy. This refinement process included:

- Adding missing words;
- Correcting transcription errors;
- Adjusting sentence structures;
- Clarifying acronyms;
- Filling transcription gaps;
- Removing identifiable references to maintain anonymity.

The qualitative data analysis software NVivo (Release 14.23.3(61)) was used for text indexing and retrieval. Each interview transcription was uploaded to NVivo as a separate file case. To ensure fresh recall of the conversations, most interviews were coded within five days of being conducted.

IV. *Quotations*

Analysis of each justice value presents many selected quotations and examples as evidence to support our findings (Weiss, 1995). All the quotes have been translated from Brazilian Portuguese, as the research is written in English. The translation is not literal, as the meaning of certain words, although they may have direct English equivalents, can carry different connotations depending on the context. In order to check the accuracy of the translation, it was translated into English and then translated back into Portuguese. The quotations were revised, ensuring the original meaning was maintained (Rubin et al., 2012, pp. 185–187).

The original transcripts were adjusted whenever necessary to normalise the statements, certifying that they did not affect the respondent's meaning. These include eliminating repeated or unnecessary words, sentences, and conversational spacers. Other changes were intended to make the text more coherent, as the respondent sometimes interrupts the sequence of reasoning and concludes it later. The objective was to regularise the speech to present a readable and understandable excerpt (Weiss, 1995). Some explanations have been placed in brackets to clarify excerpts of the interviews or maintain the sequence of the interviewee's reasoning. When the participant's thought sequence was interrupted and then resumed, ellipses (...) were used between sentences or expressions to enhance context comprehension. The same quotation may appear twice in the text when related to different contexts.

In the quotations, the Electronic Judicial Process (EJP), the expression most used in Brazil to refer to the court case management system used to handle cases, was used as an equivalent for CCMS. Whenever possible, one quotation from each professional category was included to present the diversity of the interviews. Notable quotations were chosen to represent the general idea of the subject. Repeated words are maintained when they indicate emphasis.

As all Interviews were anonymised the judges are referred as J1, J2, J3, J4, J5, J6 and J7; judicial clerks as C1, C2, C3 and C4; lawyers as L1, L2, L3, L4 and L5; and prosecutors as P1, P2, P3, P4 and P5.

6.1.1 Coding

The content was initially read and categorised using preliminary codes derived from the literature review and research questions. The seven established initial code categories are efficiency, decision quality, access, equality, independence and impartiality, due process, and other justice values related to CCMS use in judiciaries. An eighth code was created for videoconferencing and AI technologies' effects on justice values (see Table 8).

Concepts, events, and themes were identified and linked to each code. As interviews progressed, a better understanding of how participants addressed concepts, examples, and themes was gained. The files were then re-read and re-coded where necessary. Through comparison, data were aggregated by similarity, from which sub-codes emerged.

Two types of data-driven codes arose: a) Codes that classified CCMS influences as positive, negative, or neutral on justice values; b) Codes that grouped similar explanations for CCMS's influence on each justice value.

These influence factors vary among different justice values. For example, factors that explained increased access to justice differed from those explaining increased justice equality. Figure 9 presents the general codebook of the content analysis, and Table 11 provides an example of data coding:

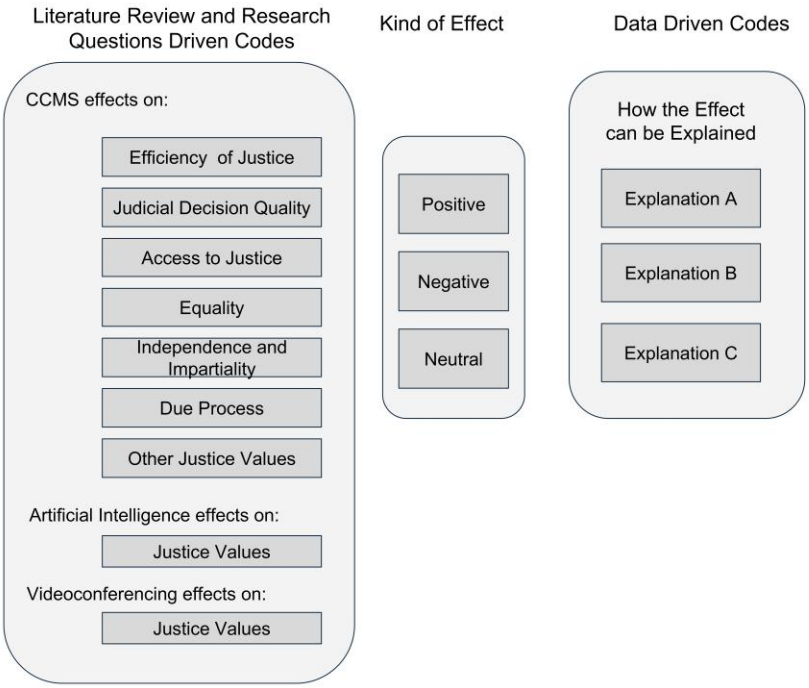


Figure 9: Codebook Diagram

Table 11: Example of Coding

Interview Excerpt:		*A judicial proceeding, which was previously only accessible in the courts, is now made available in real-time to the parties who are the most interested. *J4*
Literature Review and Research Question Driven Codes		· CCMS effects on **access** to justice.
Kind of Effect		· Positive.
Data-Driven Codes	How the effect can be explained	· By providing broad and simultaneous access to judicial information.

The research employs two methods to effectively address the problem and align with the research objectives and questions. The quantitative aspects focus on measuring judicial efficiency through official indicators such as case clearance rates, average case duration, and backlog statistics. These metrics can provide objective insights into justice, so adjusting to the research purpose.

The qualitative approach better assesses the effects of CCMS on justice values due to its ability to capture nuanced participant perspectives, subjective experiences, and contextual complexities that quantitative metrics cannot adequately measure.

6.2.2 Approval at the Ethics Committee for Research in Social and Human Sciences of the University of Minho

The research was submitted to the Ethics Committee for Research in Social and Human Sciences at the University of Minho in January 2024 and received approval in March 2024 (Annex I). The approval process involves analysing ethics issues related to the research's execution, including the specifics of the participants, their selection and recruitment, the interview process, the interview script, confidentiality aspects, and any potential conflicts of interest for the researcher and her advisors. The interview records, transcriptions, and personal data collected were kept in the MS Office 365 interviewer's cloud and aligned with the General Data Protection Regulation and the EU Data Protection Law Enforcement Directive.

The terms of the Informed Consent to Participate in the Study were also subject to analysis and approval for submission to the participants (Appendix II).

7. IMPACT OF COURT CASE MANAGEMENT SYSTEMS ON JUSTICE EFFICIENCY

This Chapter presents the results of the data analysis collected to test the hypothesis of the impact of CCMS on justice efficiency. As explained in Chapter 6, three hypotheses are being tested, considering the rate of IT use as the independent variable:

- Hypothesis 1. (H1) The rate of IT use is negatively associated with the length of proceedings.
- Hypothesis 2. (H2) The rate of IT use is positively associated with the clearance rate.
- Hypothesis 3. (H3) The rate of IT use is negatively associated with the number of pending cases.

7.1 Descriptive Analyses of Variables

The dependent variables are related to three different aspects of court efficiency: the length of proceedings, the clearance rate, and the number of pending cases. The independent variable, which relates directly to H1, H2, and H3, is the rate of IT use (*procel*), measured as the percentage of new cases filed electronically. Five control variables were also included:[16]

- The Court Budget, measuring the total state expenditure on the maintenance and payment of active staff (*dpjio*);
- The IT Budget, measuring the expenditure on the IT structure maintenance as a ratio of the total budget (*dinf*);
- The ratio of Judges to the total court staff, excluding those on leave (*mag*);
- The ratio of Court Clerks to the total court staff, excluding those on leave (*sajud*);
- The Level of Litigation: measured as the number of new cases per 100.000 inhabitants (*ch*).

Table 12 shows the descriptive statistics of the variables, which are already disentangled in terms of type of court and justice.[17]

[16] To avoid high correlations between the control variable and multicollinearity issues in the estimations (i.e., large variance inflated factor values) and to make sure that four of the controls are not all capturing court size, the IT budget is measured as a ratio of the total budget and the number of judges and court clerks as ratios of the total staff (i.e., judges plus clerks).

[17] A "1" is added to the variable's name when it refers to first instance ordinary courts and "je" when it refers to small claims courts. Analogously, "crim" is added when the variable refers to criminal courts, and "ncrim" to non-criminal courts.

Table 12: Descriptive Statistics of Variables

Variable Type	Variable	Description	Unit of Measurement	N	Mean	Standard Deviation	Min	Max
Treatment	procel1	Percentage of cases filed electronically, to the total number of cases filed in the ordinary 1st level instance in the base period.	%	378	58,7	0.420	0	100
	procelje	Percentage of cases filed electronically to the total number of cases filed in small claim courts in the base period.	%	378	81,3	0.300	0	100
Dependent	iadccrim1	Clearance rate: ratio of adjudication solved cases to the total of new cases in 1st instance of criminal ordinary courts in the base period.	Ratio	378	1.164	0.545	0.323	5.201
	iadccrimje	Clearance rate: ratio of solved cases to the total of new cases in 1st instance of non-criminal ordinary courts in the base period.	Ratio	378	1.090	0.247	0.402	2.127
	iadcncrim1	Clearance rate: ratio of adjudication solved cases to the total of new cases in 1st instance of non-criminal ordinary courts in the base period.	Ratio	378	1.512	4.186	0	78.857
	iadcncrimje	Clearance rate: ratio of solved cases to the total of new cases in 1st instance of criminal small claim courts in the base period.	Ratio	378	1.092	0.383	0.424	6.232
	tpsentc1m	Length of proceedings: duration of adjudication cases judged in 1st instance of ordinary courts between the date of filing and the day of sentence in the base period	The mean number of days	239	766.31	480.21	75	6989
	tpsentcjem	Length of proceedings: duration of cases judged in small claims courts between the date of filing and the day of sentence in the base period	The mean number of days	239	303.37	174.22	75	1999
	cpccrim1	Pending cases: pending cases in 1st instance of criminal courts at the end of the period.	Number of cases (in thousands)	378	162.58	220.95	1.39	1699.97
	cpcncrim1	Pending cases: pending cases in 1st instance of non-criminal courts at the end of the period.	Number of cases (in thousands)	378	576.35	804.75	10.89	4488.06
	cpccrimje	Pending cases: pending cases in small claims criminal courts at the end of the period.	Number of cases (in thousands)	378	35.59	70.66	0	523.42
	cpcncrimje	Pending cases: pending cases in small claims criminal courts at the end of the period.	Number of cases (in thousands)	378	135.54	165.85	0	852.82
Control	dpjio	Court Budget: total state expenditure on the maintenance and payment of active staff (excludes expenditure on inactive staff and work)	Brazilian Real R$ (in 1.000 million)	378	1.547	1.966	0.095	13.970
	dinf	IT budget: total state expenditure on the maintenance and payment of active staff (excludes expenditure on inactive staff and work)	Ratio of the total court budget	378	0.026	0.015	0	0.087
	mag1	Number of judges in 1st instance ordinary courts, excluding leaves.	Ratio of the total court staff	378	0.067	0.016	0.029	0.131
	magje	Number of judges in small claims courts, excluding leaves.	Ratio of the total court staff	378	0.019	0.009	0.004	0.048
	sajud1	Number of court clerks in 1st instance ordinary courts, excluding leaves.	Ratio of the total court staff	378	0.771	0.082	0.538	0.944
	sajudje	Number of court clerks in small claims courts, excluding leaves.	Ratio of the total court staff	378	0.143	0.081	0	0.383
	ch1	Level of litigation: number of new cases in 1st instance ordinary courts	Number of cases per 100,000 inhabitants	378	4724.56	1800.20	1589.83	13893.94
	chje	Level of litigation: number of new cases in small claim courts	Number of cases per 100,000 inhabitants	378	2263.45	1193.71	472.97	6360.70

7.2 Analysis and Results

The analysis uses panel data methodologies to estimate the relationship between IT use and the three judicial efficiency dimensions, including fixed and random effects models. Those can be analytically represented by equation (1):

$$JudicialEfficiency_{i,t}=\beta_0+\beta_1 procel_{i,t}+\rho X'_{i,t}+\lambda'_t+\mu_i+\varepsilon_{i,t} \qquad (1)$$

where *i* stands for a given court and *t* for a given year, *JudicialEfficiency* represents one of the three considered measures of judicial efficiency, the length of proceedings, the clearance rate, and the number of pending cases, *procel*, either at first instance or small claims courts, is the main dependent variable, as explained above, *X'* represents the set of five control variables mentioned above, λ' stands for time effects, which in this study are captured by a set of year dummy variables, and μ represents either court fixed effects or a random element specific for court *i*, depending on the estimated model. Finally, β_0, β_1, and ρ or vectors of coefficients to be estimated and $\varepsilon_{i,t}$ is the error term.

Considering the distinction between ordinary and small claim courts and criminal and non-criminal cases, ten regression models were estimated. Each model was estimated by fixed and random effects, and the Hausman test was used to assess which was more appropriate. As the fixed effects can control for unobserved heterogeneity at the individual level, while the random effects, being the most efficient of the two, cannot, the Hausman test is a valuable tool to evaluate the consistency of the random effects estimator, which, when consistent, can be preferable due to its efficiency.

Table 13, Table 14 and Table 15 display, respectively, the outcomes of our regression analyses for the dependent variables related to the length of proceedings, clearance rate, and pending cases. Therefore, the coefficients associated with the *procel* variables of Table 13 directly relate to H1, the ones in Table 14 to H2, and the ones in Table 15 to H3.

Starting with the results for the length of proceedings, Table 13 presents, in column 1, the results for first instance courts, and in column 2, the results for small claims courts. These results do not support H1, both in the first instance and small claims courts, as the coefficients associated with the *procel* variables are never revealed to be statistically different from 0.

Table 13: Results for the Length of Proceedings

Variable	Description	(1) tpsentc1m/100 duration of adjudication cases judged in 1st instance of ordinary courts	(2) tpsentcjem/100 duration of cases judged in small claims courts
procel1	Percentage of cases filed electronically, to the total number of cases filed in the ordinary 1st level instance in the base period.	-1.690 (1.656)	
procelje	Percentage of cases filed electronically to the total number of cases filed in small claim courts in the base period.		0.621 (1.220)
dpjio	Court Budget: total state expenditure on the maintenance and payment of active staff	0.187 (0.189)	-0.029 (0.026)

dnif	IT budget: Ratio of the total court budget	0.278 (15.527)	-13.707 (10.716)
sajud1	Ratio of clerks on total court staff	-2.374 (4.650)	
sajudje	Ratio of clerks on total court staff		1.192 (1.655)
mag1	Ratio of clerks on total court staff	2.956 (31.404)	
magpje	Number of judges in small claims courts, excluding leaves.		48.375*** (9.959)
ch1	Level of litigation: number of new cases in 1st instance ordinary courts	-0.001** (0.000)	
chje	Level of litigation: number of new cases in small claim courts		-0.0003* (0.0001)
Observations		239	239
R-squared		0.127	0.184
Model		RE	RE

Notes: All the models were estimated, including a constant and year dummy variables; robust standard errors in parenthesis; the regressions were estimated using the Random Effects (RE) or Fixed Effects (FE) model, depending on the Hausman test results; the dependent variables were divided by 100 to make the reading of the coefficients easier; statistical significance: *** p<0.01, ** p<0.05, * p<0.1

Table 14 presents the results for the clearance rate. Column 1 shows the results for criminal justice in first-instance courts, column 2 for non-criminal justice in first-instance courts, column 3 for criminal justice in small claims courts and column 4 for non-criminal justice in small claims courts. As in H1, the results do not support H2, suggesting any influence of IT in courts' clearance rates as the coefficients associated with the procel variables are never revealed to be statistically different from 0. The only case in which there is very marginal evidence of a statistically significant relationship between IT in courts and clearance rates is in the model of column 3 for criminal justice in small claims courts, in which the procel coefficient is nearly statistically significant at 10%.

Table 14: Results for the Clearance Rate

Variable	Description	(1) iadccrim1 clearance rate for adjudication cases, 1st instance of criminal ordinary courts	(2) iadcncrim1 clearance rate for adjudication cases, 1st instance of non-criminal ordinary courts	(3) iadccrimje clearance rate for adjudication cases, criminal small claim courts	(4) iadcncrimje clearance rate for adjudication cases, non-criminal small claim courts
procel1	Percentage of cases filed electronically, to the total number of cases filed in the ordinary 1st level instance in the base period.	-0.127 (0.231)	-0.030 (0.086)		
procelje	Percentage of cases filed electronically to the total number of cases filed in small claim courts in the base period.			0.563 (0.385)	-0.106 (0.156)
dpjio	Court Budget: total state expenditure on the maintenance and payment of active staff	0.029 (0.020)	0.011*** (0.004)	0.009 (0.035)	0.003 (0.006)

dnif	IT budget: total state expenditure on the maintenance and payment of active staff (excludes expenditure on inactive staff and work)	-0.847 (1.857)	-0.607 (1.092)	-8.281 (5.774)	-3.353** (1.690)
sajud1	Number of court clerks in 1st instance ordinary courts, excluding leaves	0.339 (0.462)	0.032 (0.249)		
sajudje	Number of court clerks in small claims courts, excluding leaves.			-1.415 (1.308)	0.298 (0.464)
mag1	Number of judges in 1st instance ordinary courts, excluding leaves.	3.677** (1.826)	-1.282 (1.324)		
magpje	Number of judges in small claims courts, excluding leaves.			-20.198 (15.919)	-3.314 (3.231)
ch1	Level of litigation: number of new cases in 1st instance ordinary courts	-0.00002 (0.00003)	-6.20E-06 (0.00001)		
chje	Level of litigation: number of new cases in small claim courts			-0.0002 (0.0002)	-0.0001* (0.00003)
Observations		378	378	378	378
R-squared		0.079	0.090	0.046	0.089
Model		RE	RE	RE	RE

Notes: All the models were estimated, including a constant and year dummy variables; robust standard errors in parenthesis; the regressions were estimated using the Random Effects (RE) or Fixed Effects (FE) model, depending on the Hausman test results; statistical significance: *** p<0.01, ** p<0.05, * p<0.1

Finally, Table 15 presents the results for pending cases. As in Table 14, column 1 shows the results for criminal justice in first-instance courts, column 2 for non-criminal justice in first-instance courts, column 3 for criminal justice in small claims courts and column 4 for non-criminal justice in small claims courts. Once again, the results suggest that IT use in the courts has no statistically significant relationship with judicial efficiency, as captured by the number of pending cases. Therefore, H3 is not supported. Regarding the other variables, in this case, the results strongly suggest that a higher budget is associated with higher efficiency in first-instance courts.

Table 15: Results for the Pending Cases

Variable	Description	(1) cpccrim1/100 pending cases in 1st instance of criminal courts	(2) cpcncrim1/100 pending cases in 1st instance of non-criminal courts	(3) cpccrimje/100 pending cases in small claim criminal courts	(4) cpcncrimje/100 pending cases in small claim non-criminal courts
procel1	Percentage of cases filed electronically, to the total number of cases filed in the ordinary 1st level instance in the base period.	0.144 (0.218)	-0.394 (1.062)		
procelje	Percentage of cases filed electronically to the total number of			0.043 (0.217)	0.027 (0.450)

	cases filed in small claim courts in the base period.				
dpjio	Court Budget: total state expenditure on the maintenance and payment of active staff	-0.680** (0.320)	-0.633*** (0.158)	-0.212 (0.224)	-0.083 (0.219)
dnif	IT budget: total state expenditure on the maintenance and payment of active staff (excludes expenditure on inactive staff and work)	6.172 (3.751)	21.486* (10.662)	0.727 (1.987)	5.027 (7.520)
sajud1	Number of court clerks in 1st instance ordinary courts, excluding leaves	-1.145 (0.904)	-0.830 (1.886)		
sajudje	Number of court clerks in small claims courts, excluding leaves.			0.151 (0.432)	0.037 (1.700)
mag1	Number of judges in 1st instance ordinary courts, excluding leaves.	1.277 (3.202)	18.287* (10.071)		
magpje	Number of judges in small claims courts, excluding leaves.			0.119 (3.056)	-3.580 (5.772)
ch1	Level of litigation: number of new cases in 1st instance ordinary courts	-0.00002 (0.00004)	0.0002 (0.0001)		
chje	Level of litigation: number of new cases in small claim courts			0.00008 (0.00006)	0.0002** (0.0001)
Observations		378	378	378	378
R-squared		0.636	0.585	0.277	0.012
Model		FE	FE	FE	FE

Notes: All the models were estimated, including a constant and year dummy variables; robust standard errors in parenthesis; the regressions were estimated using the Random Effects (RE) or Fixed Effects (FE) model, depending on the Hausman test results; the dependent variables were divided by 100 to make the reading of the coefficients easier; statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

7.3 Robustness Tests

Several tests were carried out to address the robustness and sensitivity of the main results described in the previous subsection. They include using alternative empirical methodologies, variables, and models' specifications.

As some of the dependent variables had a few observations with abnormally high or low values that largely deviated from their distribution means, the first test was to estimate the regressions, removing the outlier values of the dependent variables. The identification of outliers was done through the Stata outdetect procedure, and the number of identified outlier observations ranged from 0 to 22, depending on the

variable being analysed. The results confirmed that H1, H2 and H3 are not supported. They also revealed that a higher court budget is associated with higher clearance rates and fewer pending cases.

Three sensitivity tests were implemented. First, to address the possibility of IT in courts taking some time to affect judicial efficiency, the regressions were estimated using one period (i.e., one year in this case) lagged independent variables. The findings did not provide evidence of a statistically significant relationship between the *proce/* and the dependent variables. Second, the regressions were estimated using the number of new cases instead of the level of litigation as a control variable. The level of litigation can remain steady even if the number of new cases fluctuates, which justifies this test. The analysis essentially confirmed the main results described in the previous subsection. However, there were two minor exceptions: the coefficient associated with the *proce/* variable was revealed to be positive and marginally statistically significant in the regressions for the clearance rate for criminal justice in small claims courts and pending cases for criminal justice in small claims courts. Third, additional regressions were estimated using alternative measures for budget (*dpjio*) and staff variables (*sajud1, sajudje, mag1, magpje*): court budget per case, IT budget per case, number of judges per case, and court staff per case. These alternative specifications would provide more comparable metrics than the original variables. The evidence from these alternative specifications confirmed the main findings presented in Tables 13, 14, and 15, providing further evidence that our conclusions are robust to different measurement approaches for these control variables.

The dependent variables related to the number of pending cases are count variables and are not normally distributed. Therefore, the regressions in which they are the dependent variables were estimated through a more specific method for modelling count data, the Poisson regression for panel data. As in Table 15, the coefficients associated with the *proce/* variables were not revealed to be statistically significant.

The results suggested that IT in courts do not affect judicial efficiency. Still, all the reported results are average, which does not explore the possibility of differences in the impact of IT in courts in judicial efficiency along the conditional distribution of the dependent variables. Since the possibility cannot be ruled out that the impact of IT in courts varies across different levels of proceeding length, clearance rates, and pending cases, quantile regressions were estimated for all dependent variables using the same set of controls as in Tables 13, 14, and 15. These were estimated using Machado et al.'s (2019) approach for quantile regressions in a panel data setup for quantiles 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, and 0.9. The coefficient associated with the variable that measures IT in courts was not statistically significant in any quantiles, confirming the main results: H1, H2, and H3 were not supported.

7.4 Discussion

The regression results deviated from the expectations and were somewhat surprising, considering the rationality behind the introduction of IT in the justice domain, its common-sense efficiency gain, and the judicial-specific empirical studies that have already shown results indicating efficiency gains in justice, as detailed in the literature review section. On the other hand, the findings are aligned with other quantitative findings that did not find a relation between technology and court efficiency.

It is noteworthy to mention the differences in research methods of previous studies. Studies that found positive effects of IT use on judicial efficiency primarily relied on perception-based approaches (Rozha K Ahmed et al., 2020; Djamaludin et al., 2023; Povylius, 2024; M. Sousa et al., 2022). In contrast, most studies based on statistical data from courts found no effects or even adverse effects. It seems that the perceptible benefits of reducing time spent filling a case (eliminating manual handling, transportation, storage, and others), the simultaneous access by lawyers, clerks, judges, and prosecutors to the caselaw, the realisation of online notifications, and virtual hearings and trials clearly suggest that IT optimises case handling, resulting in efficiency gains. It has improved judicial case management, eliminated the time travelling to the court, and reduced bureaucracy, which may explain why studies based on perception found the same outcomes. The increase in efficiency is visible; however, it is observed at specific stages in the trial flow of a case.

Conversely, previous quantitative analyses based on official statistics from courts are aligned with the results found, pointing out that IT is unrelated to increased efficiency considering judicial case stages as a whole (Fauvrelle et al., 2016; Procopiuck, 2018; M. Sousa et al., 2018; Tavares et al., 2016; Tenório et al., 2021). Only one quantitative study has confirmed a positive relationship between IT and efficiency in Brazilian courts, specifically in labour courts[18,19] (Castelliano et al., 2023). This finding gains additional context from recent data: the Brazilian National Council of Justice reports that labour courts' productivity increased by 20.1% from 2022 to 2023, significantly higher than the 6.9% increase across all courts (CNJ, 2024). This rate suggests that labour courts' specific legal framework and institutional characteristics may make them more responsive to performance-enhancing factors, including IT, compared to other Brazilian courts.

[18] They avoid the term efficiency due to its economic concept and use efficacy as the capacity to satisfy the demand for justice.
[19] They use the total digital caseload rather than newly filed digital cases, which could justify different results. However, adopting the percentage of new digital cases does not disqualify our analyses. The low current rate for paper-based proceedings demonstrates that new cases filed electronically are reflected in solved cases (currently, a rate of 96% solved digitally).

It is interesting to note that some studies have even found a negative relationship between IT and performance indicators. Fauvrelle et al. (2016, p. 22) found a reduction of approximately 0.22% in judicial productivity considering the informatisation of justice. According to Sousa and Guimaraes (2018), investing in IT contributes to increasing inefficiency. A study by Yeung et al. (2020, p. 27) indicates that technology harmed efficiency indicators. They warn of the need for a deeper investigation of this controversial result.

One question that arises is whether the results based on perceptions, which found positive effects of IT on justice efficiency, contradict the results of quantitative analysis upon statistical data, which did not find the same outcome. The best answer is that they are complementary. Information Technology has brought efficiency gains to parts of the judicial process, mainly for administrative manual tasks, reducing the need for physical court appearances and improving communication between courts, prosecutors, lawyers, and parties. However, other factors are likely to constrain the improvement of the overall judicial process.

An explanation for the unexpected results found in previous studies is the learning curve (Fauvrelle et al., 2016; M. Sousa et al., 2018). The novelty may impact people, who will take time to adapt to the new technology. However, this interpretation is unlikely to apply to the case since Brazil has more than fifteen years of IT use, the slowness of the initial learning phase has been overcome, and the skills needed to use the system are already well established and easily applied. In addition, despite not being digital natives[20], 75% of judges in Brazil are up to 55 years old, and 83,1% of court clerks are up to 45 years old, relatively young people who have been exposed to technology from the beginning of their judicial careers and are excluded for the group considered to have more difficulties with IT (CNJ, 2023).

Once the explanation based on the learning curve has been discarded, others should be considered.

Procedural legal deadlines can help explain the research results. Although IT has expedited many phases of the judicial process, statutory time limits remain fixed by law; they are non-compressible, and procedural acts must respect them. In other words, concerning justice, it is not possible to accelerate some judicial steps.

Another factor about Brazil is that according to Brazilian Law no 11.419/06 (Law of Electronic Judicial Process), the deadline for undertaking a judicial action was extended by ten days for all actions compared to paper-based justice. So, considering the procedural context applied to the case, the proceeding can be delayed ten days, often whenever an act is carried out during the procedural phases. However, this

[20] Millennials (born between 1981-1996) and Gen Z (born between 1997-2002) are considered digital natives.

explanation is only valid if these ten days exceeded the time previously required for judicial notifications, which traditionally involved physical mail delivery and processing time in the court secretariat.

Another justification is the increase in the number of court appeals. Some protracted appeals have no grounds or arguments and are used strategically to delay the natural progress of the case (Yeung et al., 2020). This mechanism has always existed, but considering the ease of filling a petition digitally, in opposition to the difficulty of moving to court physically, it is now over-adopted, adding steps to the judicial procedure and contributing to minimising efficiency gains of IT use. Procopiuck (2018) emphasises that such methods can be part of a legitimate prosecution and defence strategy but can also be misused, influencing the timing of legal cases.

Thus, while IT implementation may foster judicial efficiency, some detrimental concurrent factors also benefit from IT improvement, diminishing possible efficiency gains. Moreover, the ease brought by IT favours abusive litigation and an excess of dilatory measures (Melnikova, 2023). One more contributing factor to this scenario is the adoption of automated filing systems by law firms in Brazil. These firms are using software robots to file large-scale cases, which may have lowered the practical barriers to initiating legal proceedings.

Other concurrent systemic factors unrelated to IT may neutralise or diminish its potential benefits. Specifically, during the adjudication phase, factors such as the unnecessary judicialisation of evidence collection, jurisprudential instability, insufficient sanctions for bad-faith litigation, and the excessive use of dilatory measures serve as examples of these challenges (Castelliano et al., 2024). The Brazilian context presents additional challenges that exacerbate these issues. The low cost of filing claims, combined with a strong 'culture of judicialisation' and an unusually high number of lawyers per capita, creates an environment where the volume of proceedings consistently undermines efficiency improvements (Castelliano et al., 2024). While technology supposedly improves efficiency, it cannot solely ensure reasonable case durations. Responsibility for fair trials and timelines rests with judges and other judicial actors (Ferreira et al., 2024).

Lastly, the CCMS did not considerably affect the intellectual work of judges. Although advancements in efficiency from the point of view of the judge's work have been achieved through streamlined case searches, access to caselaw and the elimination of travel time for certain court appearances, the fundamental tasks of constructing legal arguments and rendering judicial decisions remain practically unchanged. These tasks are time-demanding as they require careful analysis, thorough reasoning, and high precision, underscoring the importance of judicial decision-making in ensuring fairness. While some stages of the judicial process have benefitted from these efficiency gains, the decision-making phase

continues to act as a bottleneck, often causing cases to be held up and contributing to a significant workload for judges.

8. Effects of Court Case Management Systems on Justice Values

This chapter presents the findings of the analysis of how CCMS affects judicial efficiency and core justice values. As previously explained in Chapter 6, the analysis is based on qualitative data from interviews with justice professionals. The fundamental justice values under evaluation are access, equality, independence, impartiality, and due process of law. Attention is given to how CCMS influences the quality of judicial decisions. As explained in Chapter 6, despite not being classified as a judicial value, the concern that an excessive focus on productivity might compromise decision quality justifies its inclusion. The qualitative approach to efficiency involves evaluating whether the perceptions align with the quantitative study's findings.

Before presenting the effects of CCMS on justice values, Section 8.1 explains participants' perception of CCMS as a core technology that connects with many others, making it difficult to establish clear boundaries between them. Section 8.2 demonstrates the effect of CCMS on the essential organisation of information and work due to the automation of judicial activities. Section 8.3 analyses the effects of CCMS on efficiency before presenting the results for effects on justice values. Section 8.4 reveals an unexpected finding: the likely role of CCMS in increasing the volume of new judicial cases. The chapter concludes by exploring in Section 8.5 how these effects interrelate.

8.1 Scope of CCMS

Although the interviewer explicitly clarified during the interview explanation that the research aimed to examine the effects of the CCMS on justice values, it became evident from the first interviews that participants struggled to differentiate the effects of CCMS on justice values from other technologies used in judicial proceedings. This challenge was particularly pronounced regarding the use of videoconferencing. Judicial professionals often treat videoconferencing as an intrinsic part of the CCMS, perceiving virtual hearings as a consequence of its use. This is not the case, as holding a hearing in person within the CCMS and conducting it via videoconference in a paper-based court case is possible. Although they rationally understand the differences, these two technological tools are closely intertwined and frequently perceived as single entities. Following the COVID-19 pandemic, virtual hearings became widely adopted in Brazil and are now closely associated with CCMS. Information Systems scholars have previously examined participants' observed difficulties in isolating one technology from another. Chatterjee et al. (2017) emphasise that in a context of widespread technological diffusion, technology

often becomes invisible, making it challenging to identify the IT artefact distinctly. Focusing on IS's socio-technical characteristics, Orlikowski et al. (2001) suggest that technology is constituted by how it is enacted in practice, not just by its design or functions.

So, at some point in the interview, more than half of the participants indicated the effects of the Electronic Judicial Process (EJP)[21] on specific justice values, referring to videoconferencing effects. The participants had difficulty differentiating between the effects of one and another. The statements below demonstrate that:

> *Today, for example, the EJP has made it possible to hold virtual hearings. *P3*
>
> *I must add that virtual hearing resulted from the EJP... the virtual hearing didn't exist before the EJP. But one thing doesn't depend on the other. *J1*
>
> *People already understood that the process is electronic and that they will participate, for example, in an electronic hearing. *J3*

When asked specifically about the effects of CCMS on justice values, A1, A3, J1, J2, J3, J5, J6, J7, P1, P2, P3, P4 and P5, at some point, present ideas related to videoconferencing as an intrinsic feature of the CCMS. The excerpts below exemplify this understanding:

> *It made access to the courts much easier. The parties can be heard in their homes. The witnesses can testify even outside the country, which has improved greatly to speed up justice and give more access. *A1*
>
> *But suppose you look at the inequality and lack of technological access in some states. In that case, this inequality will exist because the party cannot access and have the same technology [of others] to follow a hearing. *J5*

In addition to videoconferencing, interview participants highlighted using Virtual Desk Services[22] and WhatsApp messages, applications perceived as related to the CCMS effects, mainly on access to justice. The excerpts that follow exemplify:

[21] The Electronic Judicial Process is the name of the primary Court Case Management System used in Brazilian Courts.
[22] The Virtual Desk Services are online services of judicial counters, the administrative unit tied to court processes and filings.

*The EJP also demanded more accessible office routines for citizens. Today, citizens can easily access virtual counters. Why? Because this was a result of the EJP. The courts moved to prevent citizens from travelling to make it easier for the parties. *J1*

*No doubt about it [increase in access] ... It's much better that way. Today, as well as having an EJP, you have other mechanisms, such as the virtual counter created in the judiciary. So the parties can get in touch with the court. It's a chat. What's more, some units - mine, for example - create QR Codes, which you can access. I create QR Codes, which give you access to information about the case and the hearings. So, we created a series of mechanisms that make it much easier to issue summonses via WhatsApp; we can already do everything via WhatsApp here. *J7*

*Today, for example, there is the WhatsApp or email subpoena. [Before] Sometimes, you had to send a letter of request to the state of [ ]. Yes, it took a long time. Even Years. *L3*

Although CCMS is the central and most widely used technology, part of the analyses in the rest of this section may present, albeit small, effects of using videoconferencing and other technologies together with the CCMS. Despite carefully separating the two subjects when conducting analyses, participants' difficulties in distinguishing between these technologies may slightly mix the effects of the analysis.
Regarding videoconferencing technology, the idea was to explore its influence on justice values as a complementary question, as it is not an intrinsic part of CCMS and, therefore, not the primary IT focus of the investigation. However, participants mentioned it several times, indicating that videoconferencing is likely to influence justice values significantly. Given the substantial content linking videoconferencing and justice values, Chapter 9 details the topic as a complementary approach to the CCMS analysis.

8.2 Basic Organisation of Information and Work

A notable aspect of using the CCMS in Brazilian judiciaries is the enhanced organisation of work and information compared to the paper-based era, encompassing the automation of tasks, the elimination of unhealthy environments, the increase in the integrity of judicial files, and the improvement of the quality of information on court cases and performance. Those aspects illustrate how CCMS has changed the court environment and daily routines, improving the overall organisation of work and information.

Although the basic organisation of work is linked to efficiency, I addressed it separately because participants described it as a foundational improvement that preceded efficiency gains.

- Automation of tasks: The tasks were manual and time-consuming. Judicial clerks spent significant time searching, numbering, copying, registering, receiving, and sending judicial files. This issue was especially evident in judicial desk services (counter services) and secretariats.:

> *[For example] Search for the petition and file: You must crouch down and go from file cabinet to file cabinet. At the time, it was separated by number. Then, you go to the first number digit. Then you look for It, I do not know, [search in] 20 files to find the case. You separate the case. Then, you add the petition. Move it into the [internal] system. Send it to the conclusion. Analyses the petition. Then send it. It was an archaic way of doing things, manually numbering petitions and files ... was a very archaic process ... *C3*

> *For example, in the flow of an investigation, a physical case, the judge would order it to be sent to allow time for the Public Prosecutor's Office to consult the case file. So, the case would go to the Secretariat; the Secretariat would forward it, and it would make a file forwarding this case physically. This went to a central office that condensed the receipt of these cases and forwarded them to the Public Prosecutor's Office. This physical process came to a new physical centre here [at the Public Prosecutor's Office], where they were classified and separated. Several people worked on this and then forwarded them to the prosecutor. So, ... between the judge's order and arrival here, it sometimes took 20 or 30 days for a case to arrive from two blocks away ... the minimum was 15 days. *P3*

- Elimination of Unhealthy Environment: Court cases last years, so the size and age of the court files led to the accumulation of dust, mould and mites. People working with those documents have experienced health problems. From the use of CCMS, this is no longer an issue. The excerpts of C2 and C3 exemplify how the workspace used to be in a judicial desk service:

> *Those files were horrible because they got mouldy over time. Working on them caused allergies, and it was more challenging to go through everything. *C2*

*I had many problems with dust in paper processes. It affected me in such a way that I almost asked to leave the sector so that I would not have to work with paper processes. It was too dusty and mitey and gave me allergies. Some ladies even worked with gloves and masks to avoid contact. So, it was a very archaic thing that has now gone electronic. Not having to work with it has really improved our quality of life as civil servants. *C3*

- Increased Integrity of Judicial Files: Another important aspect is that the justice's old routines favour the loss of individual documents or even entire physical law cases. The loss of documents or case files affects the fairness of judgment and the length of procedures. Most participants refer to this integrity issue during interviews. The following excerpts demonstrate how the judicial case file integrity was threatened before CCMS:

*... there are stories of people picking up the case file, and suddenly, a page disappears. *C2*

*Everything is there with the EJP. There is no possibility of any document being removed; everything is registered. *J5*

*There are even anecdotal cases in which the lawyer ate the check [the evidence] from inside the case and swallowed the check from inside the case. So, there are no more cases like this. *P4*

*Back in the days of physical files, they went missing and finding them was hard. The lawyer would pick up the case, and we had to call them to return it, and [the judge had] to issue a search and seizure warrant for the case file. *C1*

*I had to repeat an entire rape instruction. Because the file had been misplaced. Nobody knew where the case file was. *J2*

*It was very common for these cases to be lost for reasons A, B or C. They were lost, and no one knew where they were. Search and seizure proceedings: my God! I had to restore about ten search and seizure cases ... with an injunction to seize the car. So [now] it is good that the case doesn't get lost. *J2*

*Something so shocking is a colleague who disappears with a case, especially extrajudicial cases. For example, the prosecutor would start a criminal investigation, and the case would take some time. Another colleague would come in, and that case disappeared. *P1*

- Improved Quality of Information on Court Case Status and Performance: Professionals also reported that worksheets were commonly used to control individual statistics in the court. Performance indicators, deadlines, and other essential information were recorded manually, a process prone to a high probability of errors. After CCMS, the control of judges' work indicators improved, helping them to manage tasks and time. Table 16 presents the before and after perceptions quotation of J2 that clearly illustrate the two moments:

Table 16: Comparison of Court case Information and Individual Performance Control Indicators Before and After the CCMS

Respondent	Before CCMS	After CCMS
Judge 2	*At the time, it was just paper; I didn't even know exactly how many cases I had in the registry office. So, it was very difficult. Everything was manual, the control ...* *It was filling in worksheets: how many judgments did you make? Then, you wrote down each case law number... The court clerk had to fill in how many warrants were issued that month, how many arrest warrants were issued that month... The person was arrested, and we had to get the file to see if it was really right: 'Is this guy really supposed to be in jail?' ... There's no way to work with justice in this way.*	*Then, the courts also started implementing BI dashboards. Then I started to control. In the last unit I was in, I controlled the backlog on a daily basis, how much I had done, whether I was reducing the backlog, and whether I wasn't. What was the demand? What did I need to do to speed things up?*

The information provided to high-judicial bodies, such as judicial controllers and oversight authorities, has also improved. This consolidated data is essential, as it offers a comprehensive overview of legal activities, enabling these bodies to conduct more thorough reviews, identify patterns, and address inconsistencies

or irregularities. Participants noted that before the CCMS, data quality was often compromised due to errors in manual entry or the unethical omission of information. The excerpts of J3 and P1 presented in Table 17 illustrate:

Table 17: Comparison of Consolidated Court Case Information and Performance Indicators Before and After the CCMS.

Respondent	Before CCMS	After CCMS
Judge 3	*We used to fill in some reports manually in the system we used. It was terrible because you had a considerable variation ... The controller's office had a report that we filled in manually.*	*Now, you pull it out of the system, and there it is.*
Prosecutor 1	*It used to happen frequently, for example, that physical processes were omitted from the controller's office to pretend that the work was in order.*	*Today, the electronic system is entirely transparent, and we have gained a lot in terms of measuring public service and how it is actually provided.*

Tables 16 and 17 provide evidence of how CCMS granted conditions to monitor and control court information, improving aspects of the courts' work and control, individually or by high bodies.

Figure 10 summarises the aspects cited by interviewees concerning the basic organisation of work and information on court cases and performance:

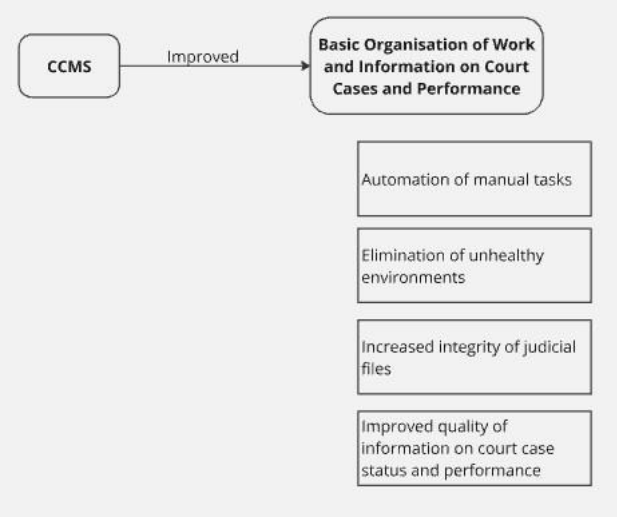


Figure 10: Key Aspects Improved by the CCMS in Court Work and Information on Case Status and Performance as Cited by Participants

A previous study states that the e-court initiative has greatly enhanced court workflows and records management, with most core court functions now automated and supported by advanced technologies (Saman et al., 2013b). Improved security aspects, transparency, and internal daily operations were also results of the study of Rozha K Ahmed et al., (2020).

8.3 Effects of CCMS on Efficiency

The analysis begins by examining the effects of CCMS on judicial efficiency for two key reasons. First, efficiency represents a universal organisational value distinct from the justice-specific values investigated in this research. Second, efficiency was previously analysed in the quantitative phase of this study. The aim is to identify if the perceptions align with the results of the quantitative study presented in Chapter 7.
As mentioned in Section 3, efficiency is the primary rationale behind the deployment of IT in courts. In the initial part of this research, efficiency was defined as stated by the European Commission (EC), "[an] efficient justice system manages its caseload and backlog of cases and delivers its decision without undue delay" (EC, 2022, p. 20). In light of this statement, three justice efficiency indicators—length of proceedings, number of pending cases, and clearance rate—were used to assess efficiency. The results are presented in Chapter 7.
Analysing participants' perceptions of the efficiency improvements brought by CCMS to justice reveals differing interpretations that are not always aligned with the definition in the first part of this research. For example, they exemplify efficiency by the possibility of working from home and the extra time saved by not having to travel to the court. Efficiency is associated with minimising unnecessary effort, maximising time, saving costs, and simplifying processes.
Efficiency analysis can be divided into two aspects that emerged from interviews. First, it considers the efficiency observed in specific stages of the judicial proceedings. Second, it considers the overall efficiency of the justice, taking into account measures of judicial efficiency.
All participants affirm that CCMS improved justice efficiency. They all refer to efficiency improvement in particular stages of the judicial proceedings. Enhancing efficiency is associated with a) practising judicial acts at any time, b) eliminating the need to travel to the court, c) having ease in exchanging documents, communicating, and managing a case, leading to celerity in routine and communications, and d) the possibility of searching for information on similar cases.
The following excerpts exemplify, to specific stages of the judicial proceedings, what participants say when asked about CCMS improvement of efficiency:

*I believe so [justice became more efficient] ... The magistrate and his assistants can develop, sign, register and correct [a procedural document] at any time. This really has a bonus. Very favourable. .... In the past, you had to travel and do all the logistics in a country like ours, which is extremely continental ... I've worked in courts where the distance between assignments was 580 km. This led to the need to travel. *J6*

*Today, lawyers rarely go to courthouses, which is a good thing. You may access the whole process in your office. *L4*

*Filing a claim with the courts is much easier, and distribution is easier. You don't have to leave the house and go there to file it. The person files from home. *C1*

*Many procedures that used to be very manual have become very fast. *J2*

*Communication speed between the parties and other aspects are very positive. For example, the parties' subpoenas. The notary's office's work has been greatly eased with the automation of subpoenas and procedures. In this respect, yes, it has been speeded up. *P4*

The following excerpt highlights the search for information on similar cases, which can significantly reduce the time and effort needed to produce judicial documents and conduct research.:

*It certainly [increased efficiency]. For example, if you face a judicial issue, you'll get another judicial issue just like it. Using technology makes it easier for you to use the same arguments regarding the explanation ... One of the crucial points is the possibility of immediately researching extra-record issues, which is not in case files but can help you judge. *C4*

The above-cited aspects consider the efficiency improvement in specific stages of the judicial proceedings, a consensus among interviewees. Divergently, considering public justice organisations globally and the judicial process as a whole, there is no common agreement on improving judicial efficiency.

Two key themes regarding positive effects on efficiency emerged from the interviews. First, CCMS supports more effective human resource management through the generation of judicial management indicators based on records created by CCMS:

> *[Before] We could not draw these statistics or even measure the need to structure an organisational unit. To know if the body is really overloaded through objective criteria. It was a political issue when the prosecutor came to ask for more judicial clerks ... We realised that the problem was not the lack of structure; it was other issues. So, the system has also given us the efficiency of better allocating human resources within the Public Prosecutor's Office. *P1*

Secondly, some participants perceive CCMS reduces the duration of proceedings as a whole rather than just at certain stages. Perceptions are that the length of court proceedings has been reduced:

> *It contributed too much to the efficiency of the process. It has benefited the speed of the process because sometimes, what used to take two years for a simple case, nowadays, in six months, it is already judged in a maximum of six months or even less. *C3*

> *Absolutely, absolutely [the CCMS contributed to rising efficiency in justice]. So, this is a basic value. I could talk about other values, such as procedural speed and reasonable length of proceedings, a principle of justice that has been elevated to the category of a fundamental right provided for in the Constitution. The length of proceedings has become faster. *J1*

The efficiency results concerning the total length of court proceedings were controversial. Some perceive an improvement in the celerity of court cases, as mentioned above, while others perceive no celerity gain, concluding that CCMS was neutral in this respect. Some participants believe there is little or no evidence of the speed of proceedings. Those perceptions are aligned with the findings of the first part of the research, presented in Chapter 7.

It is particularly noteworthy that the lawyers, who represent the beneficiaries of justice, are the only group to perceive no improvement in the speed of judicial processes. They also express concerns about taking on tasks previously executed by court services, such as registering and classifying cases. They believe that the time saved by transferring these functions to lawyers should lead to more substantial efficiency gains in justice organisations. L5 and L4 manifested disappointment with the expected positive of CCMS' effects on efficiency:

> *We hoped it would [increase efficiency], but it did not really happen, and it did not happen that much. Nor was there a more explicit way to understand why your process*

*is not moving forward. It is not moving. It simply continues with the same story. Is the process digital? Yes. However, the case continues to stall if I do not go to the courthouse and tell them a lawyer is there to find out what is up. So, the judge's primary justification is the same. He's got a lot of work; he can't handle all the cases in the queue. So, my case waits. Having said that, what then? The real advance? It's tough for us lawyers to understand the actual progress. It is difficult. *L5*

*The CCMS system is often inefficient and does not produce the speed with which decisions should be handed down ... The lawyer is working more on the case itself. In the past, the initial tasks of filling a new case were done by the administrative staff of the courts. The lawyers doing this work should allow proceedings to be more agile. Unfortunately, they're not. *L4*

Figure 11 summarises how participants understand the effects of CCMS on the efficiency of justice:

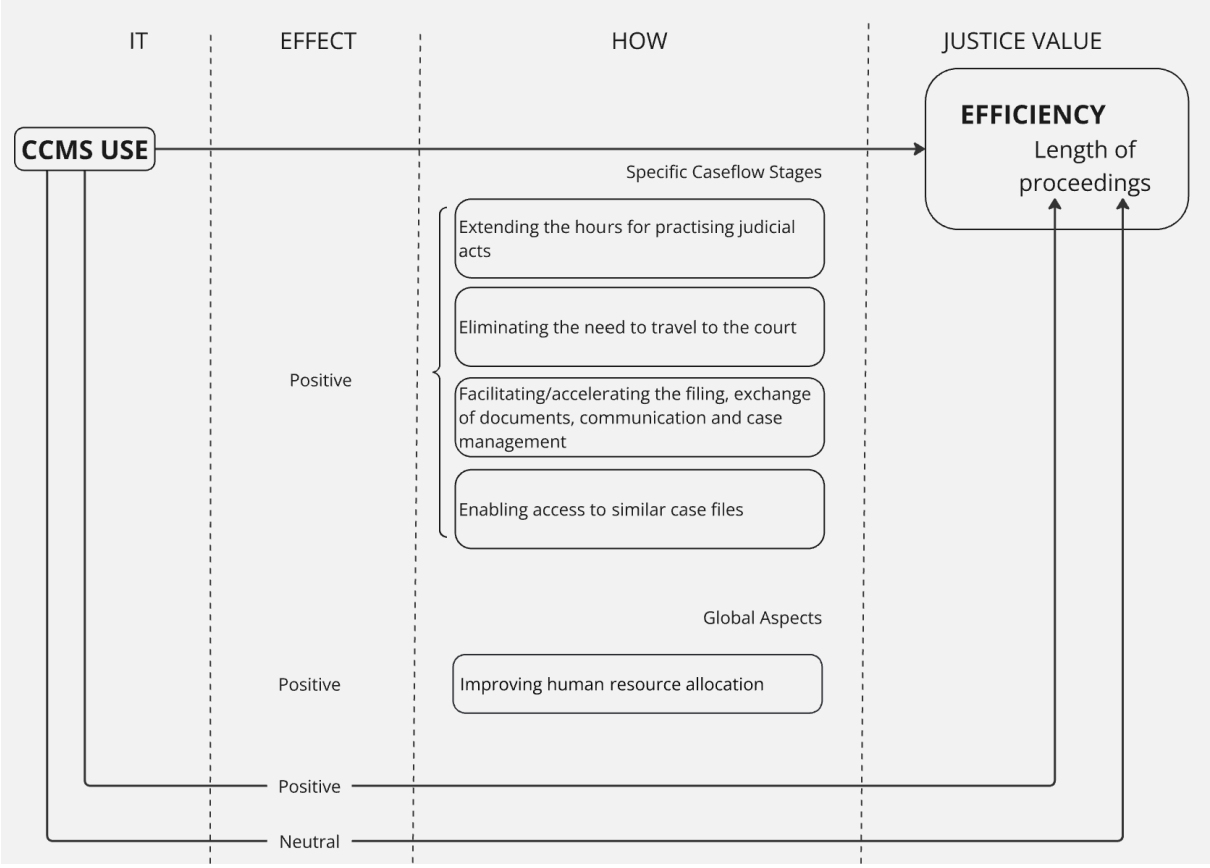


Figure 11: Perceived Effects of CCMS on Justice Efficiency[23]

[23] Participants who affirmed there is a positive effect of CCMS on efficiency did not specify the reasons for this effect.

Regarding CCMS's effects on efficiency, it is possible to assert that:

- The perceived effects of CCMS use on the efficiency of justice are positive concerning specific stages of judicial proceedings. This was achieved by a) extending the hours for practising judicial acts, b) eliminating the need to travel to the court, c) facilitating the filing and exchange of documents, communication and case management, d) accelerating routines and communication, and e) enabling access to similar case files.
- The perceived effects of CCMS use on justice efficiency globally are both positive and neutral. The positive effect is attributed to the improved allocation of human resources. As a key measure of global judicial efficiency, the length of proceedings is perceived differently: some perceived a reduction in the duration of court proceedings, indicating improved efficiency, while others perceived no change, suggesting no efficiency gains.

It is essential to analyse the results concerning the length of proceedings, which is one of the efficiency indicators presented in the first part of this research. In Chapter 7, it was statistically demonstrated that CCMS did not alter the length of proceedings using data from 14 years of Brazilian state courts. The hypothesis that an increase in the rate of technology use leads to a decrease in the length of proceedings was rejected.

The qualitative analysis reveals that some participants perceived that CCMS did not affect the length of the proceeding, which aligns with the results of the first part of this thesis. Nevertheless, others affirmed that the duration of judicial cases had been reduced. One explanation is that the data used in the regression analyses are from all first-instance state cases, disregarding legal matters or specific law subjects, as the intention was to measure the efficiency of the first-state courts globally. This does not imply that the duration of court proceedings may not have been reduced in certain judicial courts that have been more directly and significantly impacted by IT. Corroborating this argument, J1 answered when asked if the CCMS has reduced the length of proceedings:

> *It depends on the area. It depends. *L1*

Another explanation is that subjective perceptions do not always correspond to measurable improvements in efficiency indicators. The perception can be shaped by other factors that end up disconnecting the users' feeling that the system is an improvement from the reality of only a minimal or null gain in terms of efficiency. Already, Davis (1989) emphasised that "people may overrate the performance gains a

system has to offer" (p 335). He advocates more studies to explain why people's beliefs often contradict reality.

8.4 Effects of CCMS on Justice Values

This Section presents the results of the analyses of the effects of CCMS on access to justice, equality, independence, impartiality, due process of law, and the quality of judicial decisions.

8.4.1 Effects of CCMS on Access to Justice

Access to justice is a core value of justice, as discussed in Chapter 2, and the absence of access effectively nullifies the administration of justice itself. All 21 participants discussed access to justice, and "access" was the most cited value among participants (196 mentions). All participants highlighted that access to justice has increased through CCMS. This is demonstrated by short excerpts of statements from all the participants, presented in Table 18. The intention of including excerpts from all participants is to provide evidence of consensus on this perception. Many of the statements were accompanied by expressions of emphasis made by participants to underline the dimension of the assertion. They are highlighted in bold for a better visualisation of this result:

Table 18: Improvement in Access to Justice - Short Excerpts from All Participants

Respondent	Excerpt
L1	*It has **greatly** facilitated access for citizens, lawyers and magistrates.*
L2	*Access to justice is widespread. It's **very** good.*
L3	*Among the values linked to justice enhanced by digitalisation, the first was access to justice.*
L4	*It has **certainly** become easier.*
L5	*... so it's better for the parties because they have easier access.*
C1	*The CCMS has broadened.*
C2	*...you have access to everything there (information).*
C3	*... what has changed is the **ease** of access (Information).*
C4	*... [the technology] also facilitates access to justice, **which is great**.*
J1	*The democratisation of access to justice [which was one of the values positively] **greatly** impacted.*

J2	*It has had a positive impact...*
J3	*It has increased.*
J4	***Certainly,*** *the electronic process has contributed* ***a lot*** *to the values of transparency and access to justice.*
J5	*It's easier today [to participate in the digital process].*
J6	*It contributes* ***a lot, a lot****.*
J7	*The fact that we can allow access to justice from anywhere, at any time ... is* ***extremely*** *positive.*
P1	***Of course*** *... you have expanded access to justice.*
P2	*Access to judicial services has* ***greatly*** *increased, and access to information has* ***greatly*** *increased, both for the legal profession and the public.*
P3	*Yes [access has increased].*
p4	*Yes, that's* ***for sure****.*
P5	There has been easier access to justice.

While most participants in the excerpts broadly refer to access to justice, C2 and C3 refer to access to judicial information.

The word "facilitated" was the most cited when participants referred to the positive effects of CCMS on access to justice. Table 19 demonstrates all expressions used when participants refer to the effects of CCMS on access to justice and how many times the effect was mentioned in the files. The expressions "major access" and "more access" were classified as "increased." The expressions "in any moment" and "instantaneous" were classified as "expanded."

Table 19: Effects of CCMS on Access to Justice – Mention Frequency

Effect of CCMS	Number Mentions
Facilitated	*18*
Increased	*9*
Expanded	*8*
Democratised	*3*
Improved	*3*
Positively influenced	*2*
Contributed to	*2*

Enhanced	*1*
Disseminate	*1*

Access to justice through CCMS can be understood by analysing how interviewees' perspectives are aligned with the dual dimension previously established in the conceptual framework. Two main themes were identified in the interview data that directly correspond to the definition adopted: procedural accessibility (how courts and legal remedies can be reached) and informational accessibility (how judicial case information and caselaw can be accessed). These dimensions, previously defined based on Dinamarco (2013) and the International Consortium for Court Excellence (2020), can be used as a structured framework for analysing CCMS effects on access to justice. Although this differentiation is not clear-cut, since access to ongoing cases and access to reach the court are intertwined, it is helpful to systematise research findings.

In many passages, it became clear that citizens' access to the court increased. Two changes were responsible for the improvement. A remarkable shift was the possibility of filing lawsuits from anywhere. It has saved time and costs for lawyers, thereby broadening access to legal counsel. In a country with a significant dimension like Brazil, this results in a considerable improvement in access. By widening access to the lawyer to file a new case, the citizens' access to justice increased:

> *... lawyers who are ... an essential function of justice have had more access to any court anywhere in the country. So they don't have to travel to represent any cause. *J1*

> *It allowed us to work in more places. Not to be dependent on the physical part of the bureaucracy. *L2*

> *Sometimes, to analyse a petition, the lawyer had to leave the countryside to go to the capital to look at a case ... [sometimes] for a view, [to consult] one page, for example, ... to express his opinion on the opposing party's petition. *C3*

> *You can have the poorest person ... We're talking about people who need some income or something to exist in our society. So, when these people come to the Public Defender's Office ... the electronic process helps a lot because it allows the Public Defender's Office to provide further attention ... carry out this work electronically, which the traditional process wouldn't allow. *J4*

One second relevant change was extending the hours for receiving judicial petitions beyond the court's opening hours. Indeed, the Brazilian Code of Civil Procedure, Law nº 13.105/2015, provided the legal basis for CCMS, allowing petitions and procedural documents to be filed electronically at any time of day, even outside of court hours (See Section 4.3.2). This eliminated the time constraints previously imposed, allowing for greater flexibility and accessibility. Procedural deadlines are counted in working days, and electronic filing can be carried out until 11:59 p.m. on the last day of the deadline, making it easier for lawyers to meet deadlines:

> *Today, we can send a file by 11:59 p.m. We can send it on the day of the deadline. *L3*

> *I had to come here and pick up the entry documents. I had office hours, which were in the morning. I couldn't do that in the afternoon ... There's no judge on duty here, and it's only in the city 80 km away ... The CCMS has an on-call service, so... the judge on-call could see me on the same day. *L1*

> *In the past, a lawyer couldn't file an appeal near midnight. It was until the court closed. Why was that? Because he had to hand in a piece of paper, and the court only worked until 7 p.m. Today, the lawyer's deadline is almost midnight. He can work at any time. He can file a petition at any time. *J1*

Access to ongoing judicial cases is directly and positively affected by the continued use of CCMS. Under CCMS, access to information is timely and simultaneous, meaning that whenever a new document is added to a case file, all authorised individuals can view the updated file online at any time. This system has streamlined the previously costly procedures of travelling for consultations and obtaining copies, making access faster, easier, and more affordable. Previously, if one party's lawyer, for example, had the case file, other involved parties could not access it and had to wait for its return to make inquiries or submit petitions. In addition to being simultaneous, CCMS brought the possibility to court cases 24 hours, seven days a week :

> *A judicial proceeding, which was previously only accessible in the courts, is now made available in real-time to the parties who are the most interested. *J4*

> *Currently, if all the parties are registered, it is possible to grant broad access. The magistrate grants it and decides, and you can start working on your pleading. I can*

*already start working on my pleadings because access is instantaneous ... Today, it's instant. The electronic view. View for the party. And then there's the summons, which is obviously electronic. *J6*

*The information is now instantaneous. So, as soon as there is a move-in case, I already receive an email ... especially in the evening when the emails arrive. I see if the judge has handed down a sentence; if not, if the other party has filed a petition contesting the case. Before, we had to go to the courthouse to consult the case, see it, and make notes. Now, we don't. Everything is available at our workplace, even by cell phone. See the cell phone? I follow, I see. *L1*

*Sometimes [as a lawyer], I had to leave my city and go to the capital to get one copy, spending a whole day on gas and travelling to get a copy. *C3*

Regarding those for whom CCMS has broadened access to justice, it has increased access to judicial information for citizens, parties, lawyers, judges, judicial clerks, and prosecutors. Regarding the types of information accessible through CCMS, users have integral or partial access to specific case files (depending on user access level and case type) and access to case progress and judgments. The comments below illustrate the interviewee's statements concerning the kind of judicial information they are talking about:

*The parties have access. They can access the link and periodically monitor all the [case] stages in the system. *C4*

*Today, anyone can access the CCMS and see the cases. You can clarify things better for people. [For example] Someone comes into the prosecutor's office asking how my case is, and you realise it's from another district. You can access it quickly and give that person information. *P4*

*An external user who is a party to a case or seeks information about it can access the CCMS through a public consultation page, provided the case is not confidential. Still, in a slightly more limited way, not all the documents are available there. [But] The main ones, at least the judge's decisions, are available there. *P3*

*The lawyer has the password to the case file ... and broad access to everything in that case file. *P1*

The negative aspects, although little mentioned, were present. Digital exclusion, also known as the digital divide, was cited as a limitation to access to justice. The digital divide refers to the gap between individuals who can access and effectively utilise information technology (IT) and those who cannot. It creates two distinct groups: those with ready access to these technologies and the knowledge to use them effectively versus those without such access or skills. The disparity encompasses multiple barriers, including physical access to IT, IT skills and support availability, and a lack of adequate attitudes toward technology use. This divide appears within countries between different socioeconomic groups and regional groups-rural areas versus urban areas (Cullen, 2001). The digital divide does not directly hinder access to justice, but it indirectly interferes with access to justice through IT access.

Judicial professionals are concerned about digital literacy, particularly the challenges faced by older populations in using technology and citizens with limited access to education. They also cited the weak Internet infrastructure in some Brazilian locations and the economic barrier to accessing a cell phone or paying for Internet access:

> *I also often feel that older lawyers have a lot of difficulty with technology. *P4*
>
> *It's great to have the tool, but if you don't know how to use it, so it's no use. If you're not educated ... Access is a lie. It's an access like this: "Hei people, it's here. Whoever wants to use it." However, the person doesn't know. *L2*
>
> *I worked in this district in the metropolitan region [the state's capital]. In some places, the internet didn't work ... That's right next [the capital]. I can imagine that in a state like [ours], Brazil's largest number of municipalities. 823 municipalities, if I'm not mistaken. Access to the virtual environment is still not 100%. *J5*

Although some participants pointed out the digital divide, it was stressed that technology had not hindered access since it did not exclude the conventional in-person channels:

> *It hasn't restricted access because the physical door is still there. People who need it and don't know how to use technology go to the forum. *J2*

Indeed, Brazilian regulations ensure the continued provision of in-person services despite the availability of virtual alternatives. Electronic services serve as an additional access channel rather than a replacement, allowing both options to coexist and thereby ensuring broader access to justice.

One last aspect cited by participants that is not related to technology but limits its benefits is the complexity of justice rites and language. The participants assert that technological advancements in legal systems face inherent limitations due to this complexity. Despite the technological capability enabling citizens to monitor their legal proceedings, they typically abstain from doing so due to the difficulty in comprehending the technical and procedural aspects of legal documentation and processes. This phenomenon highlights a gap between technological accessibility and practical utilisation in the legal domain, where the sophisticated nature of legal terminology and procedures creates a barrier to direct and effective citizen participation, regardless of the technological infrastructure in place. Parties, although having access to the system, do not understand what is in there and need professional counsel:

> *Even with the password, they [parties] find it difficult to understand what's happening and the order of things. Even though they have access, they find it very difficult ... It involves even knowing the minimum ... But they don't know the minimum. About the stages, what would happen. ... It's not; it's not that accessible. *L2*
>
> *I don't see the parties accessing their cases in practice. What can happen is that the party has an acquaintance or relative who is a lawyer, and they access the file for them. *L3*
>
> *For people who already had a certain difficulty understanding, I think it's still the same. It's only gotten better because, for example, we started using WhatsApp during the pandemic, and it ended up becoming a means of contact between the unit and people. So, people seek information through WhatsApp a lot. *C2*
>
> *Accessibility for people who are lay people, who lawyers represent ... it's still quite difficult. *J2*
>
> *It's not enough to provide and expose information. People need to understand the information provided and know how to locate it. *J3*

In summary, despite improved access to information through CCMS, the complexity of judicial procedures and language remains a significant barrier to access to justice for citizens and parties, a challenge that technology alone cannot overcome. Digital exclusion and the lack of technological infrastructure in some areas of Brazil may make access to justice difficult in some cases. However, the continued availability of

physical judicial structures helps mitigate this negative impact. Figure 12 summarises the perceived effects of CCMS on access to justice:

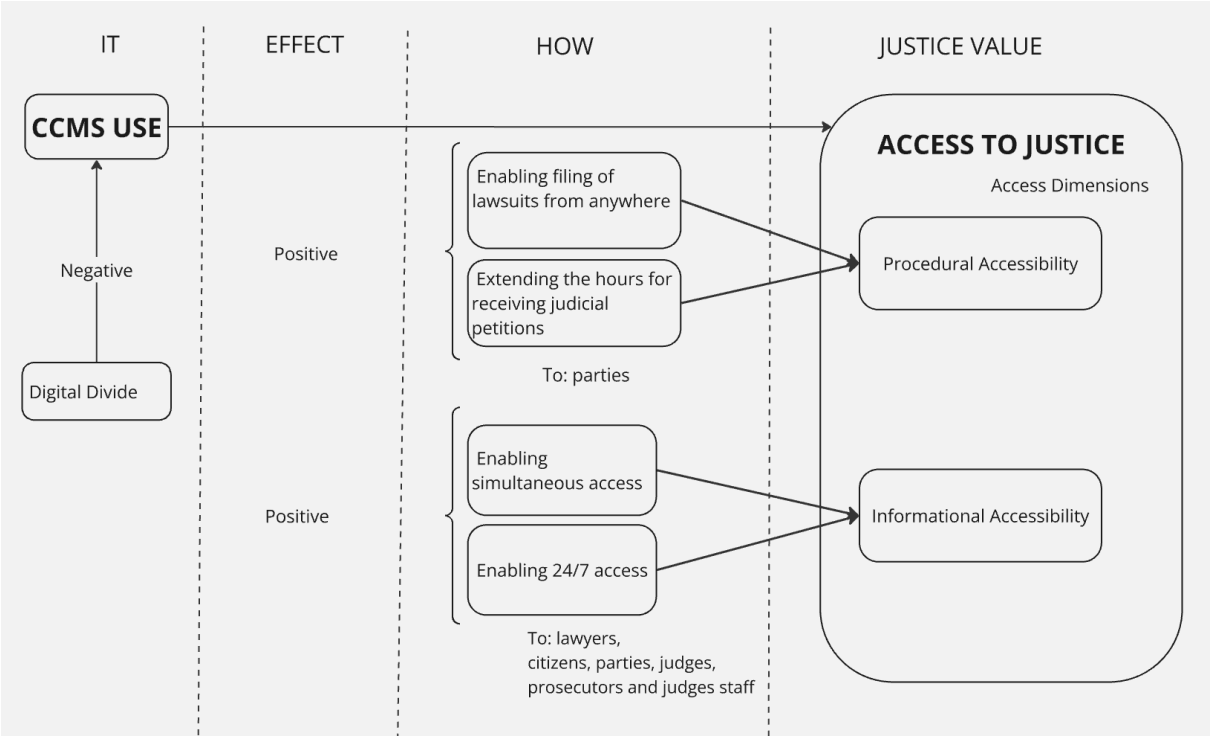


Figure 12: Perceived Effects of CCMS on Access to Justice

Regarding CCMS's perceived effects on access to justice, it is possible to assert that it is positive: a) by allowing the filing of lawsuits from anywhere and extending judicial hours to receive judicial petitions, which help citizens directly or through their representatives to get to the court, so improving procedural access, and b) by allowing simultaneous and 24/7 access to ongoing court case information, improving informational access. The access was broadened to lawyers, citizens, parties, judges, lawyers, prosecutors and clerks.

The digital divide negatively affects the effective use of CCMS due to low digital literacy, age issues, insufficient internet infrastructure, and economic barriers, which indirectly hinder access to justice.

8.4.2 Effects of CCMS on Equality

As defined in Chapter 2, equality refers to the principle that all individuals are entitled to the same legal rights and treatment under the law, regardless of their personal characteristics or economic, cultural, or social status. This section presents participants' perceptions of the CCMS's effects on justice equality.

It is worth noting that Brazil is a country marked by deep social inequalities, which are reflected in access to justice—posing a significant and well-recognized challenge for the country's legal institutions.
Many participants perceive a positive influence of technology on equality. Firstly, improvement is seen as a consequence of enhancing access to justice in a broad sense. Access to justice is often directly linked to advancements in equality within the justice system. Regardless of their socioeconomic status, geographic location, or other potentially limiting factors, more individuals can benefit from the legal system when access to justice is expanded. This increased accessibility reduces barriers that previously marginalised certain groups, thus fostering a more equal environment where legal rights and protections are more uniformly upheld. As J7 states:

> *... as access increases, it may have improved and impacted this principle and this value [of equality]. *J7*

The second issue embraced in overall access to justice is that providing broad and simultaneous access to ongoing case information promotes equality. Participants affirmed that broadening access to judicial information improves the justice value of equality mainly because all judicial actors have the same access and can access court cases simultaneously. Before CCMS, some parties used to have more access to case files than others, which was likely to result in inequality and disadvantage for one side. One participant state that the Public Prosecutor's Office, before the CCMS implantation, had advantages in access to information unavailable to lawyers. The quotations below evidence how access to case files has contributed to justice equality:

> *It has contributed [to equality] in the same way because of the issue of viewing the case for the two or three parties: the complainant, the defendant and the judge. So this makes life easier for all involved. *C3*

> *It is very positive for equality ... Let's say I need to talk to the plaintiff's lawyer because he wants to talk to me. There's no problem. I talk to him in person, record the conversation and put it on the CCMS. That way, the other party knows I've spoken to him ... Nothing is done inside the office anymore ... Everyone has access to what is being talked about and what is being consulted. What I find most interesting is that if we put the decision there, we don't even need to publish it. Everyone knows the process has been decided when you make a decision there. That's it. *J3*

*In terms of access, yes. It is very democratic. Everyone has access. The Public Prosecutor's Office has access. The other litigants have access. They are equal... It wasn't just the economic issue [that promoted inequality]. Working conditions were limited. So, in the case of the Public Prosecutor's Office, they had more elements. They had access to things. In contrast, lawyers had to chase things down. So, the prosecution had an advantage over the defence. *L1*

Automating manual tasks was cited as a factor contributing to promoting equality. The digital summoning and control of deadlines by CCMS eliminated representatives' favouring of one party, which used to occur when proceedings were paper-based. Some discrepancies were previously observed due to some litigants having access to decisions before others despite having equal deadlines. Automation has also eliminated unbalanced treatment, favouring public judicial institutions to the detriment of private lawyers, particularly concerning deadlines. The Public Prosecutor's and Public Defender's Office were reported to have extended non-official deadlines, while private lawyers did not. From the automation of the court proceedings, CCMS controls the deadlines, and it is impossible to set different deadlines that may benefit one party. The following excerpt demonstrated that CCMS strengthened equality by reinforcing due process[24]:

*I think so [it contributes to equality] because the system summons the parties. The deadline for the parties is the same ... The summons is served jointly. How was it in the physical process? The judge issued a decision. He summoned both parties. The lawyer came to the office. He would load the case file; that is, he would pick up the physical file and take it to his office. He could keep the files for a certain period. Many stayed even longer. In the meantime, the other party's lawyer has no access to the case or the decision. Then, the lawyer returns, files a petition and returns the case. Then another lawyer comes. He picks it up and takes it away. Now, you have equal concomitant access to decisions and can petition. *C4*

The electronic process has given us parity. I'll give you a very simple example. When we had the physical process, we had three bins. There, you separated what was for the lawyers, what was for the Public Prosecutor's Office and what was for the Public

[24] Section 7.6 is dedicated to analyse the effects of CCMS on due process of law.

*Defender's Office. Usually, the lawyer's case had a deadline, and the deadline was peremptory. And so on, you would see the case moving along, with or without the lawyers' participation. On the other hand, as far as the Public Prosecutor's Office and the Public Defender's Office were concerned, the process hardly moved. Firstly, we had the impression that the cases always had inappropriate deadlines. We didn't assess whether the deadline was proper or improper. We went for the improper deadlines. An improper deadline is fake news. We give the deadline as a signpost, but it's when people manifest themselves. This meant that these two institutions didn't work with the process moving forward. It was their time, especially the Public Prosecutor's Office. With the electronic process, it's possible to start and end the deadline. You see the deadline close, with or without that manifestation. This has led to a change in the mindset of the magistrates in the sense that whether or not [the statement] comes, the process moves forward. This is a conceptual and, at the same time, a mental adaptation that the electronic process has made possible ... So, we often run out of time for these two institutions, and we don't stop processing the case. *J4*

The digital divide is cited as a threat that could deepen inequalities in the justice system. According to P4, large law firms, due to their substantial economic resources, have a greater capacity to process CCMS information, allowing them to analyse judicial trends. While the digital divide does not directly impair procedural equality within the CCMS itself, the disparate access to technological resources and analytical capabilities creates an imbalance. This capability can disrupt equality in legal disputes, as smaller firms or individuals may lack the resources to conduct similar analyses:

*Those with more access to technology and more conditions to access technology and more systems certainly have better weapons to fight the duel of a court case. I don't know the reality of law firms yet. Still, I imagine that many good firms have a lot of information, information systems, and research records of trends, court decisions, and trends of a specific judge. They can analyse this in much more depth, while before, you had to be at the weekly hearing table to find out about a judge's tendencies. *P4*

Finally, many participants stated that the technology is neutral and does not influence this value of justice:

*Equality and parity of arms remain the same. I don't see any harm or benefit. *L3*

*No, I don't believe that technology has the power to influence that. Not. *C2*

Figure 13 summarises the effects of CCMS on justice equality:

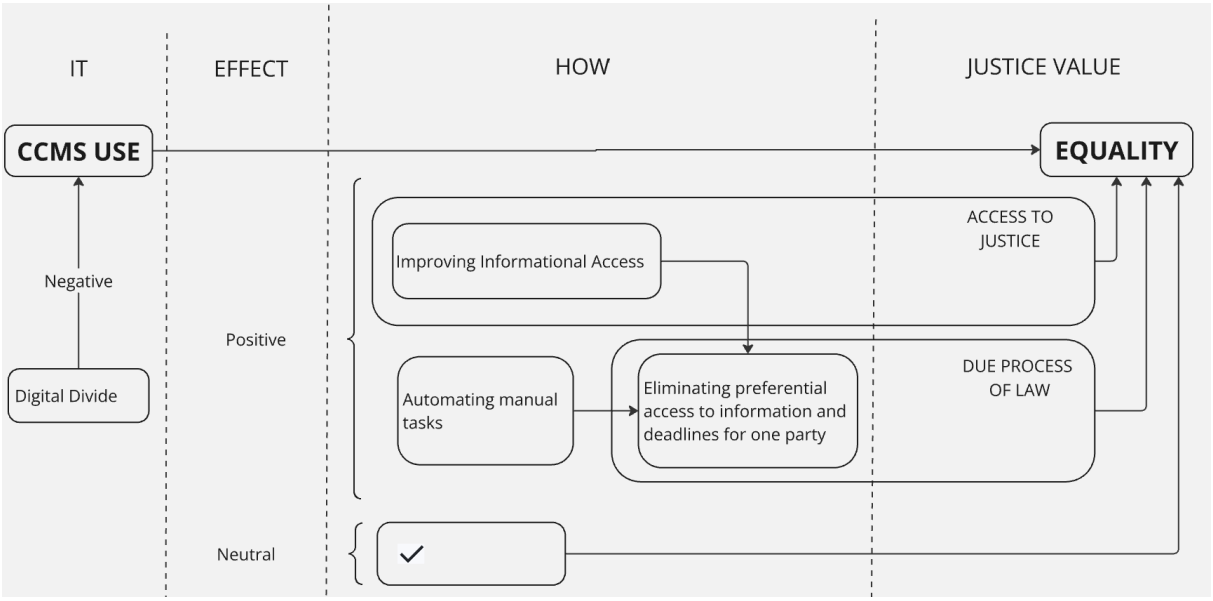


Figure 13: Perceived Effects of CCMS on Justice Equality

It is possible to assert that CCMS positively influence justice equality by a) broadening overall access to justice and, more specifically, to ongoing court cases, improving informational access and b) automating judicial activities, which eliminates privileged access to information and extended deadlines for some judicial actors, reinforcing due process of law and favouring impartiality.

The effects of CCMS on justice equality for some participants are neutral, neither negatively nor positively influencing equality.

Additionally, the digital divide can favour those with better technological resources, negatively influencing equality in justice.

These findings regarding the digital divide's impact on justice equality align with Ferguson's (2022) predictions. He argues that lawyers and clients with better technological resources will gain greater power, control, and influence in the judicial process. The research results provide empirical evidence supporting these concerns about technology potentially widening existing inequalities in the justice system.

8.4.3 Effects of CCMS on Independence and Impartiality

Judicial independence and impartiality are closely interconnected, as both values are essential to ensuring fairness within the legal system, as outlined in Chapter 2. Independence supports impartiality; without an

independent judiciary, external pressures could influence judges, compromising their impartiality. Because of this deep connectedness, these principles are analysed together in this subsection. Most participants could not see how CCMS interferes with or influences judges' independence and impartiality. They see no relation:

> *The system itself doesn't interfere with decisions ... So if it does, it's sporadic. However, I believe that it cannot interfere with impartiality and independence. *C4*

> *I don't see that our independence and impartiality have been affected in any way ... I can't think of any aspect in which they have been affected. *J2*

> *I don't see any influence. Zero [on the independence and impartiality of the magistrate]. *J5*

Conversely, other participants believe that CCMS may interfere, improving the independence and impartiality of justice. Participants report that digital processes create a beneficial professional distance between legal actors, reducing informal interactions that could potentially influence decision-making. By standardising information access, CCMS promotes decision-making based solely on documented evidence, potentially reducing the impact of personal relationships or informal influences on judicial outcomes. As illustrated by participants' experiences, the technology appears to function as an institutional barrier against improper interactions that could compromise judicial impartiality:

> *Yes, they've become more distant and less inclined to engage in idle chit-chat with lawyers. They're less susceptible ... by having contact only with the evidence. *L2*

> *[Independence and impartiality] may have even been greater with technology due to the distance. Perhaps technology provides this distance, and distance increases impartiality. *P5*

> *Another value is impartiality. I've already seen this in my unit. It avoids those "auricular embargoes"[25]; we joke about it. Because the judicial process is there, it's not, for example, in a distribution office, waiting to be forwarded ... You no longer hold the case at the distribution office for the lawyer to come and talk to you: "Look, I'm*

[25] This expression is often used in Brazil to refer to lawyers informally or discreetly discussing a case with a judge, often outside formal court proceedings.

*filing the case because of this, or that reason. However, please, don't distribute it now because I'm still talking to the person to see if it is the case." Because there was a lot of that, unfortunately, there was. *J3*

Another positive effect on independence and impartiality is the increased accountability of judges and prosecutors, which is made possible by making information more accessible. Enhancing access to judicial cases improves social control mechanisms over judicial actors, reinforcing independence and impartiality and ensuring a more equitable judicial system:

*It provided greater publicity. Because the decisions were already published before, but they were published in the journal. It was just for the person looking at their case. Today, since the processes are virtual, many people can access them. You take a website like those that comment on the news; they publish [judicial] decisions. They go there and have access ... [So] it may even have had a positive influence [on independence and impartiality] if you think that access to that information is easier for the public in general ... because now they're being watched too. The population has more access, which puts pressure on it. Society has its pressure. Any decision that is published and becomes information in the media has an impact. *C2*

Participants did not mention any detrimental influence of CCMS on independence and impartiality. Figure 14 summarises the perceived effects of CCMS on justice independence and impartiality:

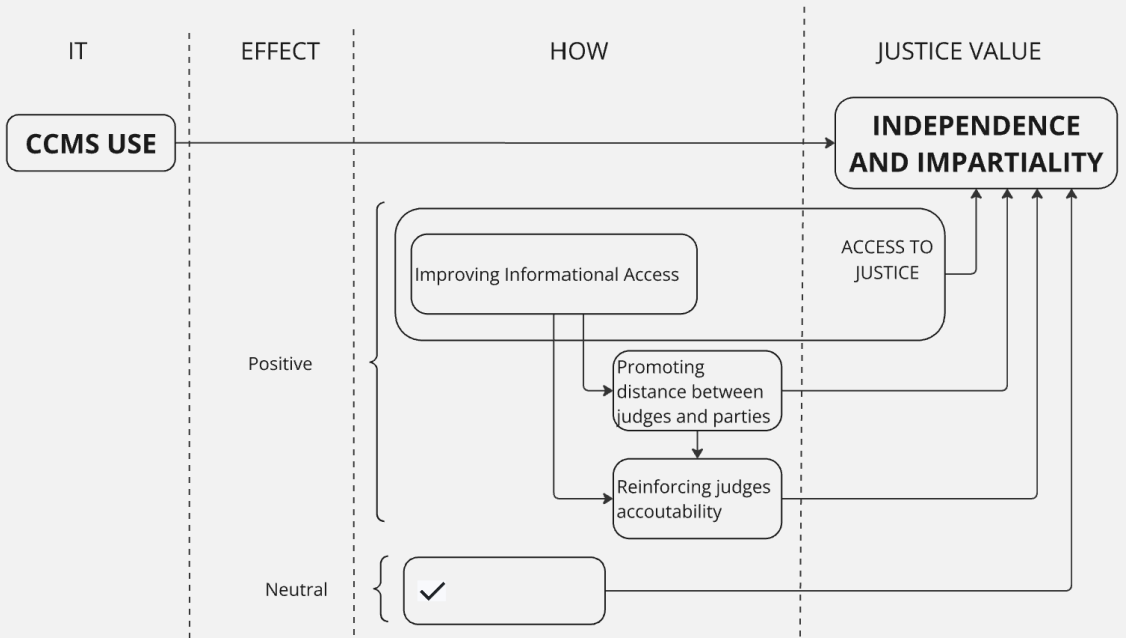


Figure 14: Perceived Effects of CCMS on Justice Independence and Impartiality

It is possible to assert that CCMS is predominantly perceived as neutral, not influencing independence and impartiality. However, it can positively affect judicial independence and impartiality by providing access to ongoing court case information and improving informational access, thereby (a) promoting beneficial distance between judges and parties to reduce potential bias and (b) reinforcing judicial accountability.

The evidence is aligned with the statement of Mukhtar et al. (2023) that electronic recording and documentation of all judicial action make judges more accountable, thus encouraging greater independence and impartiality through external oversight. Conversely, it was not observed that CCMS compromised independence and impartiality by limiting judicial discretion through procedural standardisation, as pointed out by (Doring Reiling et al., 2022).

8.4.4 Effects of CCMS on Due Process of Law

Due process refers to the legal requirement to ensure fair treatment in the judicial system, including the right to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law. As already stressed in Chapter 2, the concept of due process of law includes procedural due process, which focuses on the steps that must be taken during legal proceedings to guarantee they are conducted fairly and that individuals have the opportunity to be heard and to present evidence (Collin, 2004).

Just over half of the participants affirm that CCMS improve due process of law. The main benefit of CCMS cited is the control over deadlines, documentation, and procedural stages:

> *The EJP helped with due process, all the stages, and deadlines. It has helped. There's no way around it. With paper, I think there still was. *L2*

> *Regarding due process of law, the guarantees are more respected because you see them in the system. Everyone has been summoned, and they have respected their deadline, and the system itself counts the deadline. This makes it much easier. You don't have to hassle the server to attach the warrant. Or "hold the warrant there, server, so that the deadline can only be counted when you attach it..." [Now] the process is there; you open the tab and see all the deadlines and the section on summonses, so there's even more respect for deadlines and due process. *J3*

*It's improved. With the electronic process, everything is there. There's no possibility of any document being removed; everything is registered. This has helped, including deadline control. *J5*

*It's improved a lot. Yes. I think it's improved. It records procedural acts much more clearly, the stages; you don't have much doubt because there were some cases where there was doubt as to whether it had been attached at the right time or if that document hadn't been extracted from the file ... Before, there seemed to be more questions when the document was in front of you. Today, we don't question it any more ... Due process of law has been favoured in this respect. *P4*

*Very, very much [the due process has improved] ... [Before] We didn't know who received the case, how long it had been, and today, this technological control has brought a huge gain. *P5*

Access to the judicial case was also cited as a means to reinforce due process of law, allowing each party the opportunity to prepare adequately, respond to arguments, and participate fully in the legal process:

*Technology and progress in this area have been very positive for due process of law because the parties have full access. In the past: "Where was the opening brief? Where's the response?" Today, it's very simple ... that facilitates the due process of law, precisely what this is: the adversarial process, a reasonable defence, access, publicity, transparency, and notice to the parties. What does that mean in the digital field? Making the content available. So, this is very positive. *J6*

Another participant cited the right to adversarial proceedings, also called the contradictory principle, a component of due process of law. It refers to the need for all parties in a case to have (equal) opportunity to present their arguments and evidence and respond to the opposing side's claims before a judge. In practice, each party should have access to the evidence and arguments presented by the other party to challenge or respond to the evidence, ensuring a balanced and transparent process (Reichelt, 2008). The right to adversarial proceedings is one of the essential elements of due process of law.

CCMS is perceived to positively affect the right to adversarial proceedings by amplifying access to the evidence, thus affecting due process of law:

*One of the main values is exercising the right to be heard ... Being able to defend ourselves against what we are accused of. The system makes everything easier and clearer, simpler to access ... in fact, it helps achieve that value because you can put videos, photographs, and audio recordings into the same system and have a wide range of evidence. A fair trial is all about the evidence. Then, let everyone make their defence, present their case, and present their evidence. So, regarding the system, it's better than when we used the physical one. *C2*

One judicial clerk offers a different view compared to the previous, asserting that CCMS can harm the due process of law. The immediacy of the electronic system sometimes leads to overuse or inappropriate actions. Parties often respond or file petitions before they have been officially notified or before a formal decision has been made, which can create procedural confusion. This can disrupt the proper legal process:

*The physical process wasn't as chaotic as the EJP. The EJP is very dynamic. People file petitions all the time. For example, someone files an initial petition, and a case is distributed today ... So, it's much more immediate. The person is already aware of the case as soon as it is filed ... It used to be that a summons would be issued after a case was filed. The person wouldn't be aware of the case ... Information is more dynamic and faster in the EJP, and sometimes this even rushes the process. Parties often don't wait to be notified of a decision—they start filing petitions at any moment, which can create a kind of procedural confusion and fail to follow due process. *C1*

Other participants could not identify any gains or losses to due process of law because of CCMS:

*I don't think it changes anything about due process. *P2*

*So, in terms of due process of law, I don't see much of an impact. *L3*

*In terms of due process, I don't see much of an impact ... I can't describe a scenario arising from the electronic process. *P3*

Figure 15 summarises the perceived effects of CCMS on due process of law:

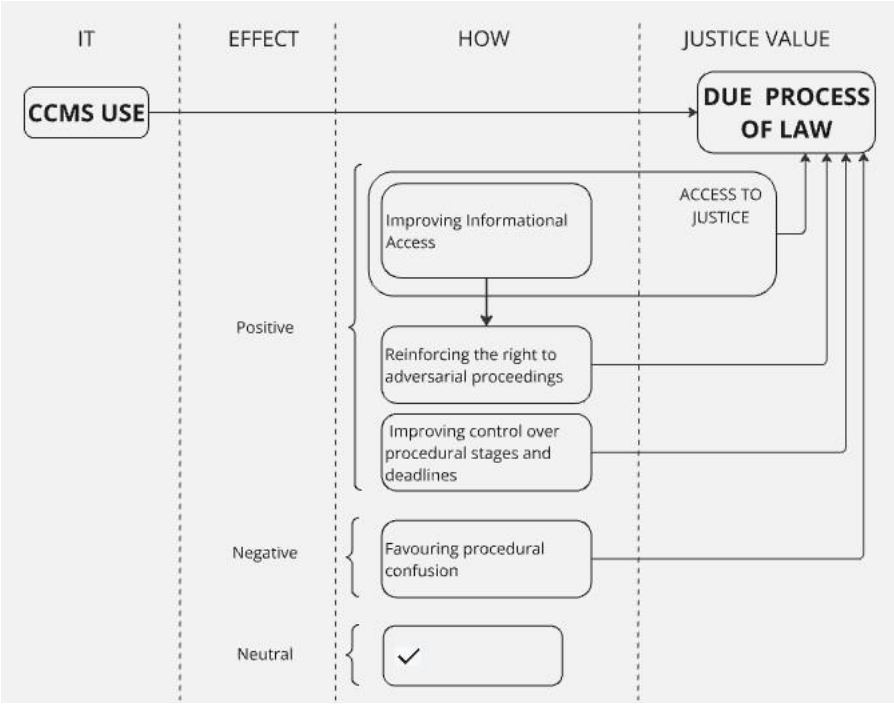


Figure 15: Perceived Effects of CCMS on Due Process of Law

Concerning CCMS's perceived effects on due process of law, it is possible to assert that they are positive: a) by promoting access to ongoing court case information, improving informational access, b) by reinforcing the right to adversarial proceedings and b) by improving control over procedural stages and deadlines. They have a negative effect by creating procedural confusion, which undermines the proper pacing of legal proceedings. CCMS is also perceived as neutral, not affecting due process of law.

8.4.5 (Indirect) Effects of CCMS on Quality of Judicial Decisions

Whereas prior analyses directly investigated the effects of CCMS on justice values, this section examines whether management indicators provided by CCMS—which enables judges to compare their performance and allows society to monitor their work—might interfere with the quality of judicial decisions due to pressures for increased productivity. The quality of a judge's decisions is directly tied to the concept of a fair trial, as quality decisions are essential for ensuring that justice is served. A quality decision requires that the decisions made in a case must be well-reasoned, legally sound, and based on the case's merits performance. The focus on quantity may favour prioritising output metrics at the expense of the overall quality of decisions.

Participants affirm that only the availability of performance indicators developed from CCMS records, such as productivity indicators, does not undermine the quality of decisions. The following statement illustrates this assertion :

*The publicity of the data itself, I don't think [it harms the quality of the decision], but the way they set the targets ... How they demand that targets be met might be detrimental in the sense of wanting to reach that target at any cost. *C2*

They emphasise that goal setting and monitoring by inspection bodies and the National Council of Justice (NCJ), enhanced by CCMS, can negatively influence the quality of decisions. Indeed, the Brazilian NCJ has established productivity targets for the judiciary as part of broader efforts to enhance efficiency. Based on CCMS's records, the NCJ sets performance benchmarks for the Brazilian judiciaries, encouraging faster case processing and the reduction of the backlog of pending cases. National Judicial Goals (Metas Nacionais do Poder Judiciário, in Portuguese) are issued yearly and publicised at the NCJ web portal. The goals end up unfolding and are reflected in the daily work of the judges by the need to comply with specific results.

Concerning this control of the performance goals—which, while not inherently a technology issue, is enhanced by it—participants expressed differing views on its influence on decision quality. A minority of participants believe that productivity targets do not influence judicial decisions, while most assert that these targets either do or could affect decision quality.

As the following statements illustrate, the pressure to meet productivity targets within the judiciary raises concerns among participants. Prioritising efficiency metrics risks undermining the depth and thoughtfulness required for proper judicial consideration:

*They harm. They can and do harm. Yes, they do. I'm talking about the desire to deliver productivity targets based on quantity ... And I'm seeing magistrates who, to clear the backlog and get the court in order, are doing absurdities, absurdities. And they're getting promoted. *L2*

*Sometimes, because the magistrate has this sword over him, the objective and productivity that he must have ... the quality of his decision ends up falling ... The level of that quality falls, it falls. *L3*

This pressure for productivity certainly affects judges. Why is that? For us, for example, having quality and concentrating on a more complicated case takes us a long time, sometimes days or weeks. Sometimes, in a simple case, we make a simple sentence in a correction that the assistants return in half an hour. So, this metric is the same for us, as is the pressure to meet deadlines ... So, yes, this pressure for

*numbers and keeping the court up to date reduces the backlog; this certainly affects quality because we can't cope with all the tasks we have. *J2*

*Focusing solely on quantitative measurement leads to overlooking qualitative measurement, as qualitative measurement is difficult. Then, it can give the judge the impression that only the targets matter. *J3*

*What happens is that we find it difficult to move towards qualitative measurement. In that sense, it can be detrimental. When we say that targets are very important, they are fundamental and essential; the focus is on the quantitative. *J5*

Despite criticism of the goals set for judges, these targets are often seen as necessary for fostering productivity, reducing case backlogs, and maintaining timely court operations, which is the country's primary concern. There is a tension between meeting these quantitative objectives and upholding the integrity of judicial work. Although efficiency was not the primary focus of this discussion, it emerged as a positive effect of the CCMS:

*... in Brazil, [our challenge] is also quality. However, our biggest challenge is our 84.000.000 processes for 200.000.000 inhabitants, which is this backlog. We know that. *J1*

*Targets exist for some standardisation and efficiency. I see them as more necessary, at least most of the time, than unnecessary. *J6*

*The first thing that's important to say is that this initiative by the NCJ, which comes in the context of public management but also a neoliberal context of measuring everything, has its importance. *J5*

*The parameters themselves are good. However, I don't think you can try to achieve them at any cost. *C2*

*That's how it is; it's a win-lose situation. *L3*

*On the one hand, this is very good because the judiciary must act swiftly and provide effective, satisfactory, and timely justice. *C4*

Some participants argue that productivity targets allowed by CCMS do not influence judicial decisions or depend on the judges and their teams:

> *It has not [affected the quality of judgments]. The electronic process only changes from the physical to the electronic system. *P5*

> *It depends on the judge's profile [making a rash decision based on quantity]. However, in general, I don't think there are many [who do this]. *C1*

Figure 16 summarises the participants' perceptions concerning the indirect influence of CCMS on decision quality:

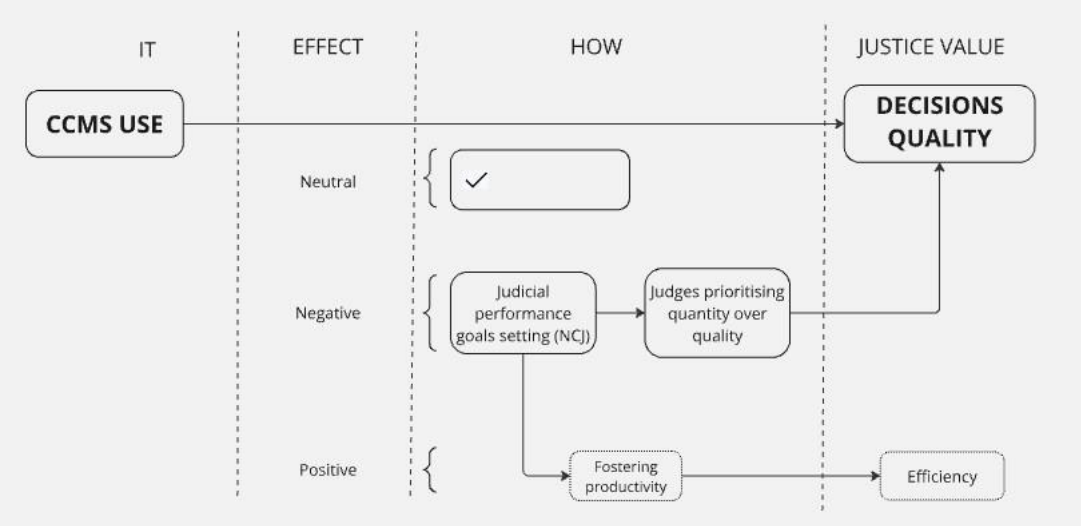


Figure 16: Perceived Indirect Effects of CCMS on Decisions Quality

It is possible to assert that the use of CCMS data alone does not influence the quality of judicial decisions. Nevertheless, CCMS, by promoting access to judicial statistics for oversight bodies, facilitates the development of performance indicators and supports the establishment of judicial goals that negatively affect decision quality, as judges prioritise quantity over quality.

Establishing judicial goals is also perceived as neutral, not to affect the quality of decisions.

The performance indicators enabled by CCMS or the establishment of judicial productivity goals do not positively affect decision quality. However, judicial goal-setting positively affects efficiency by fostering productivity[26].

[26] Although previously analysed in Section 7.2, efficiency is included in this discussion because it emerged not as a direct effect of technology but as an indirect consequence of establishing judicial performance targets.

8.4.6 Effects of CCMS on Other Justice Values

As described in Chapter 6, participants were asked an initial question before being presented with questions related to the selected justice values. This approach was designed to avoid influencing participants' answers and to identify whether any particular justice value was being overlooked. The question was, "What are the impacts of CCMS on what you consider the primary values of justice?" No other justice value emerged from the content analysis. Many participants cited access and efficiency as values that CCMS has positively influenced; these topics were previously addressed in Sections 8.3 and 8.4.1. The right to adversarial proceedings was cited as a value not previously included in the initial values. Meanwhile, as it is one of the elements of the due process of law, it was referred to in Section 8.4.4.

8.5 Rising Demand for Justice as an Effect of CCMS

Many participants assert that CCMS has increased the demand on the courts. The ability to file cases from any location and at any time - procedural accessibility - has directly contributed to the rise in the number of new cases. When people perceive the court system as more straightforward, they are more likely to bring forth new cases. As the court's capacity increases, the number of newly filed cases often increases as courts become more accessible and efficient (Peyrache et al., 2024). People are more likely to pursue legal actions, resolving disputes they might otherwise avoid due to perceived costs, time, or inconvenience. The excerpts below indicate the perception that the increase in the number of cases is due to the use of CCMS:

> *The filing and distribution are much easier, and you don't have to leave your home and go there to file the claim. The lawsuit is filed from home. In the past, you'd think: "I'm not going to file this lawsuit because I'm going to try to resolve it here first". Not today. Instead of trying to settle out of court, you send the claim straight away, which is much more practical. From home, wherever you are, you've downloaded the files, done the PDF correctly, distributed it, and that's it. (In the case of my unit) In the last six years or so, there's been an 80% increase in the number of cases. 70%, 80%. *A1*

> *I believe that ... the electronic process has allowed an increase in demand.*L3*

*Of course, considering this democratisation (of access to justice), more lawsuits have been filed. Things have become simpler. *J1*

*You can now file any digital lawsuit from your home without needing a lawyer, making it easier. Studies are already trying to show how much ease this has generated and the counterpoint of too many lawsuits. *J6*

*Digitalisation, by providing access at any time, anywhere, and by providing the use of technological tools added to the institutional function, has also brought about the issue of excess demand today. *J7*

This increase in new cases has both positive and negative implications. On the positive side, a rise in case numbers indicates that court access has expanded, uncovering a previously unmet demand. This pent-up demand, constrained by factors such as time, distance, or expense, becomes actionable once technology eases these barriers, allowing more individuals to seek justice:

*Certainly, this process is moving much faster, and maybe due to this paradox, we have much pent-up demand. So, the number of distributions has also increased. *J2*

*We have had easier access to justice. So, you see, people used to go to the public prosecutor's office to complain. They used to have to go to the courts to complain. Today, they can do it from their computer or their cell phone. In other words, you've made it easier ... That's good because you give a voice to people who perhaps did not have one. *P5*

Participants point out the increase in predatory claims as a negative aspect of the existence of the CCMS. In the Brazilian legal context, predatory litigation ("litigância predatória" in Portuguese) refers to the abusive and fraudulent exercise of the fundamental right of access to justice. It is similar to the recognised concept of abusive litigation or frivolous lawsuits, where individuals or their representatives misuse the legal system. Like abusive litigation in other jurisdictions, predatory litigation in Brazil typically involves filing multiple unfounded claims, exploiting procedural rules, or using the courts for harassment rather than legitimate dispute resolution. The key similarity is that both concepts describe the intentional misuse of legal processes, often aimed at obtaining undue advantages, overwhelming the judicial system, or harming defendants through the litigation process itself rather than seeking legitimate legal remedies. However, the Brazilian concept has gained particular attention due to specific patterns involving mass

consumer claims and the exploitation of vulnerable individuals by unethical legal professionals who use them to generate numerous lawsuits for personal profit (Souza, 2024). This predatory litigation, with reckless and high-volume lawsuits, is enhanced by the effects of digitalisation:

> *Technology facilitates trials and access to justice, which is great. However, at the same time, there are many predatory lawsuits. *A4*

> *Nowadays, people from anywhere in Brazil, anywhere on the planet, can file a lawsuit. So we know that there are several lawyers and several firms that work with robots and GPT chat. On the justice side, we're still working in an artisanal way. So, this creates a huge mismatch. [For example] a mass filing, often of predatory claims, which in turn, the judge and one of the secretariats work together. *J5*

The effective use of CCMS in Brazil has created a phenomenon in the justice system. While CCMS use has improved access to justice, concerns about its potential relationship with predatory litigation exist. The Brazilian Judiciary's Annual Data Report for 2024 shows legal case filings increased by 9.4% from 2022 to 2023, reaching an unprecedented 35 million new cases - the highest volume in the 20-year history of data collection (CNJ, 2024). While this increase cannot be directly attributed to predatory litigation, the concern about this practice has led the National Council of Justice (NCJ) to initiate several measures: commissioning a comprehensive study on predatory litigation and establishing an information network panel under the Justice National Ombudsperson's Office. This network facilitates nationwide collaboration among courts to monitor and address cases showing characteristics of predatory litigation through enhanced data sharing and oversight mechanisms (Conselho Nacional de Justiça (CNJ), 2024b). The relationship between CCMS use and litigation patterns suggests that, while the system has amplified access to justice, it has also created opportunities for misuse. This highlights the need for new monitoring and control mechanisms to safeguard the judicial system's integrity while preserving legitimate access. Figure 17 summarises the results concerning CCMS's influence on the rising of new cases:

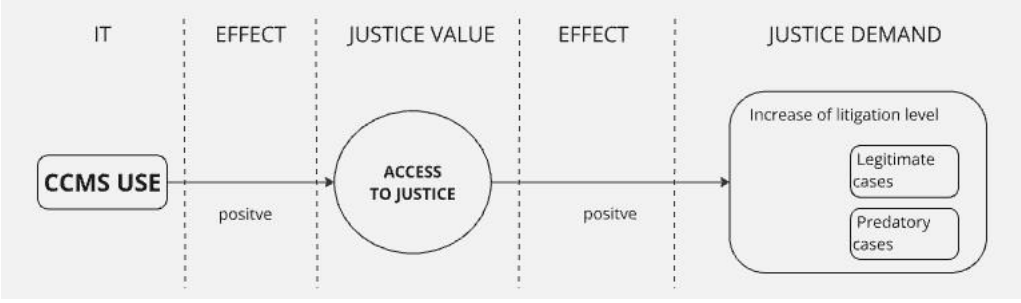


Figure 17: Perceived Effect of Access to Justice on Litigation Level

It can be asserted that by improving access to justice, CCMS increases the number of new cases, resulting in both desirable and non-desirable effects. A desirable effect is the inclusion of previously suppressed complaints in the judicial system that would otherwise not have been presented, ensuring that justice is served. Conversely, a non-desirable effect is the influx of predatory claims, which may risk overwhelming the system and compromising genuine access to justice.

Relationship Among the Effects of CCMS on Justice Values

The analysis of the effects of the CCMS on fundamental justice values reveals their interconnected nature. Participants identified access as the most significantly impacted value, considering its positive aspects. Access is crucial in enhancing other core values of the justice system. By broadening access to justice—both in terms of procedural and informational accessibility—CCMS contributes to greater efficiency, equality, judicial independence, and impartiality and supports the due process of law.

Automating judicial tasks within CCMS strengthens due process, fostering equality in judicial proceedings. CCMS positively and indirectly influences efficiency by favouring the setting of performance judicial goals by the National Council of Justice in Brazil. Moreover, by enhancing efficiency, courts can process a more significant number of cases, thereby expanding their capacity and increasing access to justice.

Even though some negative influences of CCMS on justice values have been observed among participants, the positive impacts significantly outweigh the detrimental ones. Interview excerpts reveal further insights:

> *Of all the other procedural aspects, only benefit, only benefit, only benefit. Everything is fast, everything is accessible, everything. The EJP has revolutionised justice in a positive sense. *J1*

> *In general, it is very good. *C1*

> *Specifically, the digitalisation of the electronic process has undoubtedly been a step forward. There has been progress. *L3*

Figure 18 summarises the positive effects of CCMS on justice values and its relationship:

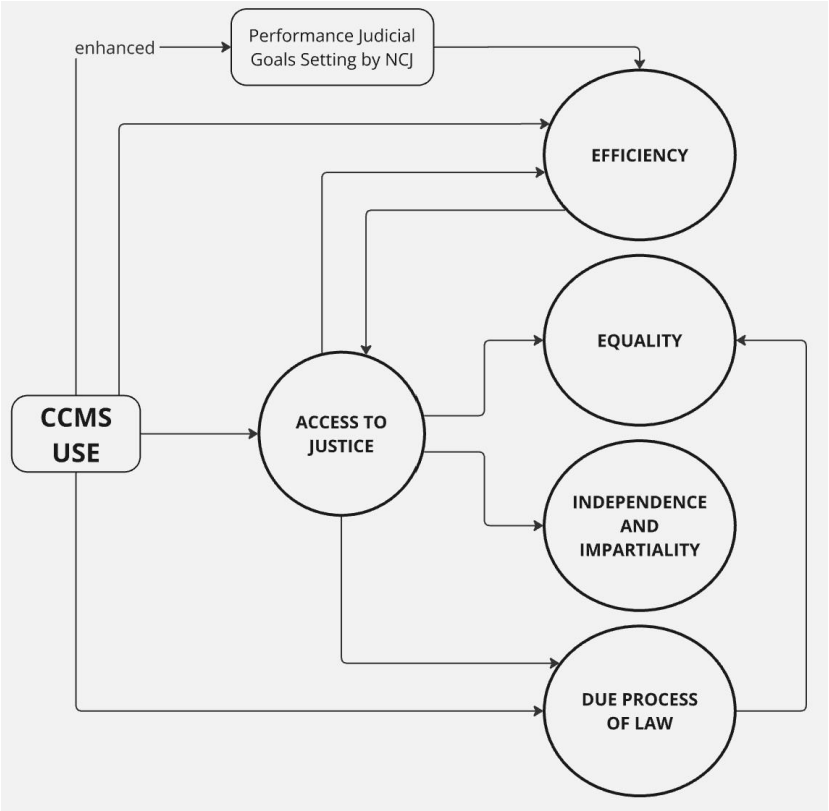


Figure 18: Relationship Among Positive Perceived Effects of CCMS on Justice Values

It can be asserted that 1) CCMS directly and positively affect efficiency, access to justice, equality, and due process of law; 2) Access to justice mediates the positive effect of CCMS on efficiency, equality, independence and impartiality, and due process of law; 3) Due process of law mediates the positive effect on justice equality; 4) Efficiency mediates (part of) the positive effect on access to justice. CCMS indirectly and positively affects justice efficiency by favouring the setting of performance judicial goals.

Regarding the negative aspects, participants noted that the digital divide could hinder the effective use of CCMS, negatively affecting access to justice and equality. CCMS can also lead to procedural confusion due to the high number of additional legal appeals and requests, which can affect the due process of law. It is also stated that CCMS indirectly influence the decision quality by favouring the setting of performance judicial goals.

Figure 19 demonstrates the negative effects of CCMS on justice values and also the relation among them:

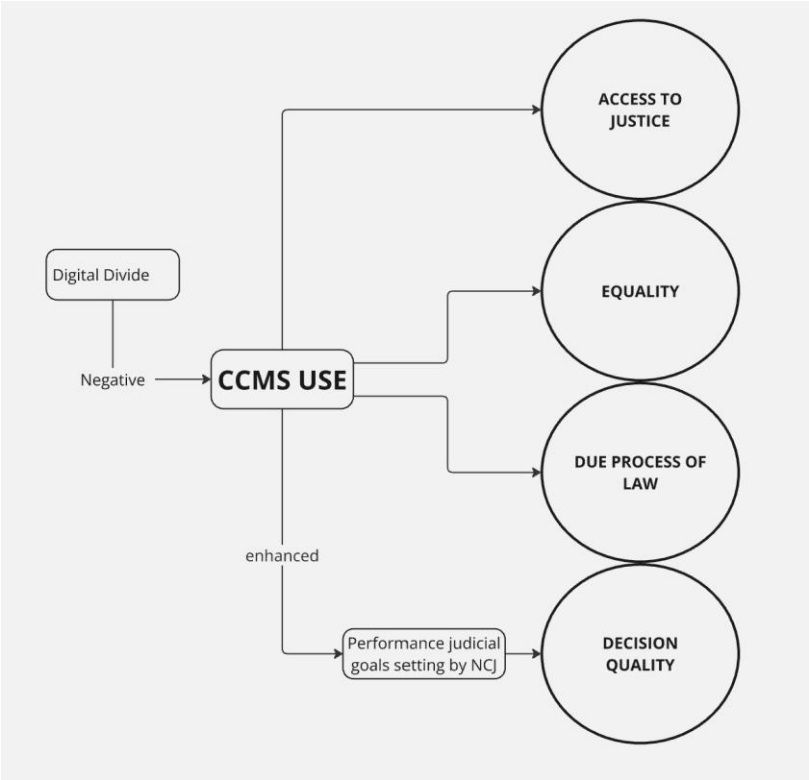


Figure 19: Relationship Among Negative Perceived Effects of CCMS on Justice Values

The digital divide negatively interferes with the use of CCMS, affecting access to justice and equality. CCMS use directly and negatively affects the due process of law due to the possibility of procedural confusion. CCMS indirectly and negatively affects decision quality by favouring the setting of judicial goals. Based on the empirical evidence presented, it seems that contrary to early warnings from scholars about information technology potentially undermining fundamental justice values, the actual use of Court Case Management Systems (CCMS) in Brazil has demonstrated predominantly positive effects on judicial values. While some authors have cautioned about risks to judicial principles, the research findings suggest that CCMS has vastly enhanced, rather than harmed, core justice values. The system has notably improved access to justice through both procedural and informational accessibility, strengthened equality by standardising procedures and access to information, reinforced judicial independence and impartiality by creating professional beneficial distance and improving accountability, and supported due process through better procedural control and transparency. However, some negative effects were identified - particularly regarding the digital divide and its indirect impact on the justice values of access and equality. There is also a direct negative effect of CCMS on the due process of law due to the potential for procedural confusion. These drawbacks need to be well-documented and understood to enable courts to develop strategies and mechanisms that minimise their impact while preserving the substantial benefits of digital justice systems.

8.6 Complementary Topic: Exploring Artificial Intelligence's Effects on Justice Values

As explained in Chapter 6 (Section 6.2.1), two topics were explored in the investigation to complement the analyses of CCMS effects on justice values: videoconference and the use of AI applications. While a considerable amount of content emerged about videoconferencing, the content related to AI was not expressive. This section summarises the perceptions of the possible effects of AI justice applications on justice values.

Brazil already has over 100 AI applications[27] being used or under development. Sooner or later, some of them will be included in the set of CCMS functionalities. The question about AI use in courts addresses the actual use of AI applications, as well as perceptions of their benefits and pitfalls.

The first thing to note is that most participants declare that they do not know enough about the subject. Even those who do not expressly say so, the superficiality of the answers suggests so. With a few exceptions, most of the benefits and losses mentioned by the participants concerning the effects of AI on justice values are speculation. The following excerpts illustrate how AI in judiciaries are still little known:

> *I'm not really into that. *J5*
>
> *I know of a few (AI initiatives for the judiciary). [But] I'm not familiar with the subject. *J6*
>
> *I know very little about artificial intelligence, very little, very little. *P5*
>
> *I have (knowledge of the specific use of AI), not in the world, not outside Brazil. But I know many judges are very distant and not concerned about this. *J2*
>
> *I have no knowledge of it, but I am aware that it is used. *P2*
>
> *To me, it remains a distant reality. *J3*

[27] The National Council of Justice (NCJ) released a report in 2023 to provide an understanding of the state of AI in the Brazilian judiciary.The document outlines technological advances in AI and offers insights into the ethical, operational, and strategic implications of these innovations (CNJ, 2023). The National Council of Justice also publishes a Business Intelligence Panel covering various aspects of AI in the Brazilian judiciary, including the stage of AI projects (initial, under development, or completed), the approach to development (insourcing, outsourcing, or partnerships), AI project tasks (such as indexing, searching for similar cases, classifying documents, etc.), motivations for AI projects, and more. Available at Pesquisa IA 2023 - Projetos.

In addition to participants who acknowledge their lack of awareness or knowledge regarding the use of AI in the judiciary, some respondents reference generative AI, even when the interviewer explicitly clarifies that the focus is on applications specifically developed for judicial processes:

> *I've already started using artificial intelligence in my decisions, but I guide and supervise the artificial intelligence. It's ChatGPT. *J7*

> *I use ChatGPT a lot myself; I even subscribe to it. Some colleagues use another. The Public Prosecutor's Office is officially introducing it for its members to use in our investigative activities. *P1*

> *I'm not sure if I have much knowledge. Last Friday, four days ago, we had the first course on using Copilot. I think it is a Microsoft tool. *P4*

Given the participants' limited knowledge and experience with AI applications in the judiciary, their responses were somewhat speculative regarding the potential impacts of AI on justice values. The majority highlighted celerity, closely associated with efficiency, as the most discernible benefit. They also mentioned the ability to search and classify case law to enhance celerity and judicial decision-making quality. Participants identified similar cases or repetitive actions as promising areas for AI application, highlighting its potential to improve efficiency without compromising judicial fairness:

> *The first step would be to improve efficiency and performance by, for example, analysing repeated cases. Filtering the cases that reach the higher courts to determine if there is a case of general repercussions, such as a repetitive appeal, directs the matters to the ministers and judges... Artificial intelligence, in principle, is helping a lot. *J2*

> *We want to solve the problem of repetition ... We want to ensure that a standard decision is applied. In many cases, we can relieve the burden on the judiciary. So, from this perspective, I think it's appropriate. *J4*

> *At this moment, it would be more forceful in the civil sphere because there are many repetitive actions with the same theme. The parties don't matter much; only the core of the object and the request matter. *P3*

Regarding the potential adverse effects of AI on justice values, participants expressed concerns that implementing AI in judicial processes could undermine values such as equality and judicial independence. Specifically, they noted that standardising decisions or using AI to suggest judicial outcomes may fail to account for each case's unique circumstances and nuances.

> *I think you lose, you lose ... The case there is unique. Although very similar to many, each person's case is unique. I often have this perception, so it loses attention and quality in that specific case. So, it becomes very generic. *L2*

> *This is a huge flaw because you have to analyse each specific case. There are cases where you have to analyse the specifics and cases where you don't. *C4*

> *In this process, there is a life, and one life is not the same as another. Therefore, each case that comes to us is a life, however similar it may be. Yes, this is an individual, or more than one individual, who deserves to have their case read and considered. This is the basic principle of the judiciary. *J5*

Moreover, participants highlighted that AI could erode judge's independence in decision-making. Potential biases embedded in AI systems often reflect the perspectives of their creators rather than those of the individuals subjected to judicial scrutiny. The potential homogenisation of decisions resulting in prescriptive AI-generated suggestions may influence or constrain the judge's ability to exercise discretion and interpret the law in context, threatening judicial independence:

> *We have to be careful, especially when making decisions. The people who make artificial intelligence are not the clients of justice. Especially in criminal justice, they are low-income people, poor people, black people, black and brown people. The programmers of artificial intelligence are elite white men, or not elite, but certainly white men. They're not women. So, I'm concerned about this reading about using artificial intelligence in analysing specific cases. The most important thing in our judicial function is independence. We can judge according to the evidence in the case file and our jurisdictional understanding. *J5*

Participants highlight biases as a threat to equality, noting that biases embedded in systems can perpetuate or exacerbate existing social inequities. When AI systems are trained on biased data or reflect

the perspectives of their developers, they risk producing outcomes that disadvantage marginalised groups. Such biases undermine the principle of equal treatment under the law:

> *If it's simply based on past data, that's a problem ... What makes everyone afraid is the algorithm bias. These biases, these prejudices, these flaws of those who will make the program ... Because the programmer will transfer his biases to the program. If the old decisions in the database are, let's put it this way, discriminatory decisions, this will be passed on to the machine. *L3*

> *It's the same danger as human biases because we hear about biases in artificial intelligence from those who program it. It's humans who have biases. So, I'm not sure if it can be eliminated. So, the dangers would be related to bias. However, biases are inherent to humans and have already been addressed. *J2*

Considering the use of AI in the judiciary, it can be asserted that judicial actors still have little knowledge about its actual, specific, and potential uses in Brazilian justice and abroad. Generative AI, designed for general purposes, was often confused with or treated the same as specific justice AI applications developed to tackle predefined problems in the justice domain. Participants believe that AI can improve efficiency primarily when applied to repetitive tasks. They are concerned about threats to independence and equality. Algorithm and developer biases may harm these justice values.

While the exploratory and complementary approach to artificial intelligence's effects on justice values proved limited, videoconferencing emerged as an essential issue warranting detailed examination in the next chapter.

9. Effects of Videoconference Technology on Justice Values

Videoconferencing emerged as a technology frequently cited by participants for its significant influence on justice values. Although initially included in the research scope as a secondary, exploratory topic, the frequency of mentions—even in responses to questions explicitly related to the CCMS—and its perceived importance during the interviews elevated it to a prominent area requiring detailed analysis.

As highlighted in Chapter 8, judicial professionals in Brazil perceive videoconferencing technologies and CCMS as deeply interconnected. During the COVID-19 pandemic, virtual hearings became widespread, with all participants joining video calls from their homes. Following the pandemic's decline, Brazilian judicial professionals—already accustomed to managing cases digitally—naturally integrated videoconferencing into their daily routines alongside CCMS.

Videoconferencing affordances in courts can be categorised into three main types: 1) Pre-trial tasks: bail hearings and arraignments, initial appearances, preliminary hearings, and others; 2)Trial and hearing tasks: taking testimony from witnesses (experts, incarcerated individuals, among others), presentation of digital evidence, and others; 3) Post-trial tasks: sentencing hearings, probation/parole violation hearings[28], appeals proceedings, and others.

Participants identify both positive and negative effects of virtual hearings and trials on justice values, although most report that the benefits outweigh the possible harms:

> *I see many gains [in videoconferencing]. Many gains. *J6*

> *However, among the risks, the benefits are significantly greater. Because just by having 100% of the hearings done, hearing people out, I don't have to keep having to reschedule them forever, which sometimes even puts a statute of limitations on cases. That's a relief. *J3*

> *As far as day-to-day work is concerned, it's helped a lot. *P1*

One evidence of videoconferencing's positive aspects is that judicial actors seem to prefer virtual hearings:

> *... in general, it makes it easier. Lawyers confirmed it by themselves, by the procedural actors themselves. Almost all the lawyers in my last hearings preferred*

[28] Parole is the supervised release of a prisoner before their complete sentence is served. Probation is a court-ordered period of supervision instead of jail time.

*virtual. Even if I made it possible. I put it this way: face-to-face or virtual? There doesn't seem to be much doubt about that. *J6*

*Culturally, people have embraced this format. *J5*

*In my prosecutor's office, all the hearings, with very, very few exceptions, are online. *P1*

The following sections examine the effects of videoconferencing on justice values, highlighting the factors that contributed to reinforcing or undermining the values of justice. According to the evidence presented, the last section explores the types of judicial cases more suitable for videoconferencing.

9.1 Effects of Videoconferencing on Efficiency

Videoconferencing primarily enhances the judicial process by removing geographic barriers and optimising resource utilisation. In terms of time, two main areas of savings emerged: procedural efficiency and personal time optimisation. Procedural refers to the reduced time required to complete procedural steps, thereby enhancing the overall efficiency of the judicial process. On the other hand, personal time optimisation involves better use of working hours for lawyers, judges, prosecutors, and court staff, potentially leading to increased productivity:

*It's just that online [hearings] have made it much easier in one respect. Even postponements of hearings: "Oh, I'm going to be in another state." Now, there's no reason to postpone the hearing since I can do it virtually with you in another state. *C2*

*That's really helped. You don't have to travel, and it's quicker. *P1*

In the past, you'd hold a hearing in person, everyone had to be there, then a witness wouldn't show up, the hearing would be rescheduled, and the bailiff would spend days and days looking for that witness so that she/he could be summoned. He often contacted them by phone and arranged for them to come, but they wouldn't. Virtual hearings have become much easier because the subpoenas are sent via WhatsApp. People can participate by phone from wherever they are. It often happens like this: two witnesses are located, and both are heard. One witness can't be contacted. She's

*having trouble making contact, so the judge closes the hearing. He starts another one and talks to the parties, the Public Prosecutor's Office and the lawyer, to see if they agree to continue the hearing in which the witness didn't show up and if they can locate her later. So, she was supposed to be heard at 10 o'clock. She couldn't be heard at 10 o'clock, but we managed to get in touch with her at 11 11:30, and we resumed that hearing, continued it, and closed it. In general, it's been quick. *P1*

*Currently, if the lawyer asks for time with the defendant, I return to my other cases and continue working. Because it's all digital, it's more productive for me, too. *J1*

One crucial issue concerning time optimisation is the near elimination of the rogatory letter (or letter of request). A rogatory letter is a formal request for judicial cooperation across jurisdictions, often used when one court requires a judge from another jurisdiction to carry out a judicial act, such as collecting witness statements. Traditionally, this process was time-consuming and could take months to complete. However, with the widespread adoption of virtual hearings, judges are increasingly able to conduct witness examinations remotely, eliminating the need for rogatory letters:

*We used to issue a letter of request to hear a witness. You don't need to issue a letter of request [anymore]. It's even faster and more effective. You schedule a hearing and say that you will hear that witness by videoconference if the parties agree and if nobody has anything against it. However, you always allow the parties to evaluate whether or not they want to do it. *C1*

*Then, I would need to send a letter of request, which I no longer need. *C2*

*For example, [when we need to hear] a witness, we issued a letter of request to another city so that the judge could hear the party. Not any more: you can access Teams. I will hear you here, and the judge will be at the hearing. He can hear the party directly; he can hear the witness himself. He doesn't need another judge. So I think this was very good. *C4*

*So I no longer have this kind of problem of putting things off, putting things off, putting things off. I no longer issue letters of request. Why not? ... We send the link, sometimes even via WhatsApp, and the person is there. *J3*

*Concepts like rogatory letters also went out the window. The need for another judge to hear a witness also went by the wayside. The improvement of the system with videoconferencing optimised time. *J4*

Recording is mentioned as having positive effects that improve efficiency. Public servants typically type hearings in real time, a time-consuming and error-prone process. According to participants, by recording and, in some cases, transcribing the hearings, videoconferencing helps to optimise the process, saving time and increasing efficiency and judicial file Integrity:

*I mean the fact that it's recorded. Even if everyone is there in person, it's recorded on media in a file, so you don't have to type everything out. *C2*

*Previously, you had to provide a clerk to do the typing. It's made it easier for the Secretariat. You had to provide a clerk; you go there, and you have to stop everything. Sometimes, the hearing took much longer because you had to keep dictating. I've already had a hearing, and the judge says: "So-and-so didn't know so-and-so because he only saw the car crash when he was already there..." It was like that, the judge dictating and the clerk typing. That made it much easier because today, with videoconferencing, everything is recorded. *C3*

*It Is secure to record [the hearings] in an archive, and having everything there is easy to check. In the future, if there's anything needed or any doubt about a term or word that was put there, technology has also made it easier for us. *P1*

Participants highlight the challenges associated with transporting high-risk defendants to hearings. This process previously demanded substantial public funds to cover the extensive security measures required. Videoconferencing contributes to efficient resource allocation. In addition, videoconferencing enhances the security of judicial actors and minimises the risk of convicts' escapes:

When you hold a hearing with a dangerous drug dealer in a prison 600 km away, it's a win-win because you don't have to take him from the prison. The [state] justice system and the police have installed equipment in the prison far away, so you can hold a drug trafficking hearing quickly 600 km away. In contrast, in the past, you would have had to get a state police officer to transport this guy 600 km ... 12, 15,

*20 police officers to do it. That was bad for the prisoner, bad for the witness, bad for the court, bad for society. *P5*

*I've already been threatened, so I've had to sit in on hearings with people who were PCC members, ... which is a [criminal] faction of the state. And then there was the whole security scheme. I had to leave the city the same day. That doesn't happen anymore. He stays in one city; I stay in another. I do my hearing, he goes to his cell, and I go home ... Before it was a helicopter, it was a show in the city, it was something like this ... a terrible waste of public money. *J3*

*You don't need to bring those serving custodial sentences from the prison environments where they are. If you have the possibility of holding hearings, you can videoconference, and they don't come here. It not only generates the issue of security but also the fact that you don't have to physically transfer these people, which reduces the percentage of escapes. *J4*

Participants report organisational optimisation of resources by reducing the need to reassign police officers from their duties for court hearings. Police officers frequently serve as witnesses in criminal cases. They commonly lose an entire day of work when required to testify in court. Officers can now provide testimony virtually from their stations, minimising disruption to their law enforcement duties:

*Here in the state, the police agreed with the court so that police officers wouldn't have to go to the unit to be heard. Because it was better for the administration not to have to travel or take the police officers off their duties. *C3*

When public servants have to give evidence, as is the case in the criminal justice system - as our justice system is still very much based on testimony and not on technical expert evidence - we use a lot of witnesses or information from these actors: military police, civil police, and sometimes the police chief. So, with the virtual hearing tool, you can make these people spend less time than before. For example, if you had a police officer in a jury trial, you'd be with that person all day until he was heard ... And today, you open the link, he goes there at his moment, and you take 20 minutes out of his life. So this has certainly brought a huge benefit to this system. You don't have to take the police officer off duty or make him stop that day from

*providing services to the community and society to attend a hearing. So, for me, this was an unprecedented gain. *J4*

None of the participants reported any adverse effects of videoconferencing on the efficiency of justice. Figure 20 summarises the effects of videoconferencing on judicial efficiency:

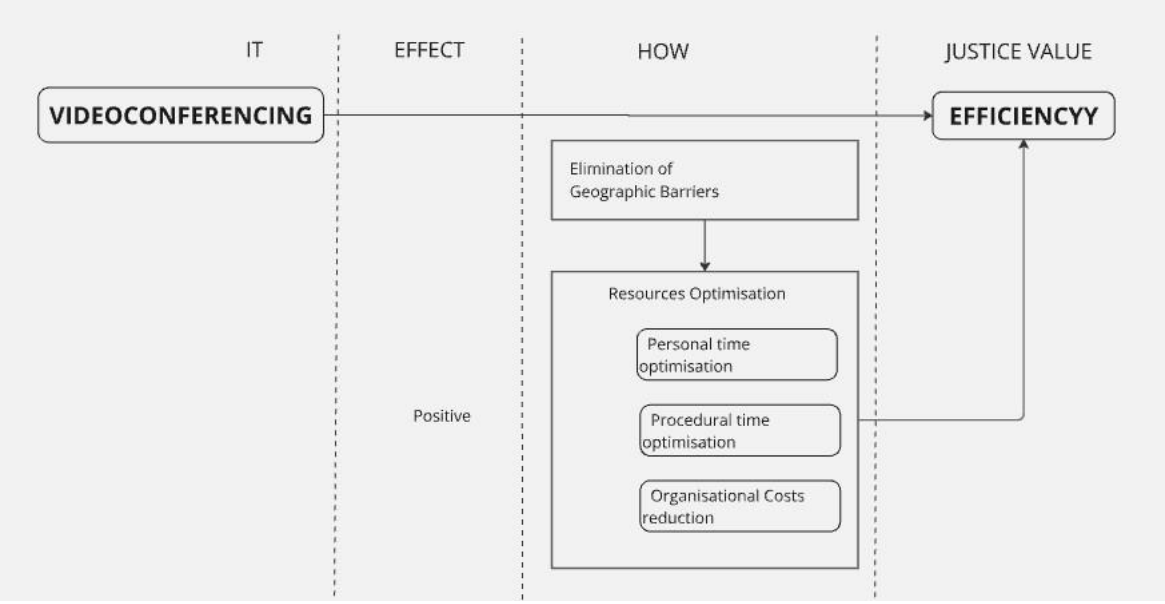


Figure 20: Perceived Effects of Videoconferencing on Judicial Efficiency

It can be asserted that videoconferencing positively affects judicial efficiency by eliminating geographic barriers, leading to the optimisation of personal and procedural time, as well as organisational cost reduction.

The research results are aligned with the studies of Dumoulin et al. (2016), Rowden (2018), Salyzyn (2012), and Sourdin et al. (2020), who assert that remote participation speeds up court processes and substantially reduces costs and delays.

9.2 Effects of Videoconferencing on Access to Justice

According to participants, the main benefits of videoconferencing hearings are the ease of participation in court hearings and cost reduction for participants. These benefits derive from the fact that judicial actors - litigants, lawyers, judges, prosecutors and witnesses - do not need to travel to the courthouse. Virtual participation improves court access, particularly for those with limited mobility or significant geographical or economic barriers. It also reduces expenses for all parties involved, eliminating the costs associated with physical presence, including transportation and accommodations.

*Right after the NCJ confusion over whether or not to hold an electronic hearing [after the pandemic], I scheduled a few in-person hearings and then one of the parties took it and said to me: "Look, you made me spend 60 BRL when the case is on the computer. I know the case is on the computer; my lawyer sends me the case on the computer." *J3*

*Especially in the area of tax criminal justice, where we need to hear a lot from people who are in São Paulo. Especially in São Paulo, a major hub, where the big companies and the big industries are located, but anywhere. So it makes it much easier. It's cheaper, so let's put it that way: it's less expensive. *P1*

*A positive point would be the issue of getting around, costs and ease of use. *L3*

The right to legal counsel is a fundamental principle that ensures individuals can access professional legal assistance during proceedings, particularly in criminal cases. This principle safeguards fair trials by providing representation and guidance through complex legal processes. According to participants, videoconferencing has enhanced access to legal counsel by lowering the financial barriers typically associated with in-person hearings. Videoconferencing reduces travel costs, time away from work, and the logistical expenses often accompanying court appearances. These cost savings impact low-income defendants who might struggle to afford legal representation. So, videoconferencing helps ensure that the right to counsel is not compromised by financial constraints, thus promoting equality and a more accessible justice system:

*It was very important because it meant that lawyers from the countryside, from Londrina, Maringá [etc.] didn't have to travel to court to defend their cases. He speaks from there, he defends. The other client's lawyer, who must be in another city in the countryside, also defends his client and the judge, who was in Curitiba, could give his vote from there. So, the access to justice with this is very good. *C4*

I can draw on my own experience. I've already mentioned that we're in a continental country whose dimensions are impressive. I'm from the state of Ceará, and some very good courts are between 600 and 800 km from each other. Pará isn't even mentioned, nor is Amazonas, not to mention Bahia. So it's advantageous to have

*access at any time if you hold a hearing today with parties from various corners of the country. *J6*

Videoconferencing also expanded lawyer's access to higher courts. In Brazil, the higher courts are located in the capital, Brasília, within the Federal District, which creates an obstacle for lawyers representing low-income clients. These lawyers must travel to the capital to present oral arguments in favour of their clients. This situation disadvantages lawyers representing underprivileged clients, as they may lack the resources to attend these hearings in person. In contrast, large law firms, often with more financial resources, can readily send representatives to argue cases on behalf of their clients, thereby gaining an advantage in the judicial process. Videoconferencing addresses this inequality by allowing lawyers to participate in oral arguments remotely, regardless of location, expanding access to the higher courts and enabling all lawyers, regardless of their financial means, to represent their clients effectively. By removing geographical and economic barriers, videoconferencing promotes equality:

*I went to make an oral argument with my attorney-general in May or April at the Superior Court of Justice, and I saw something incredible. Incredibly, Judge Laurita opened the floor to lawyers for oral arguments. How many oral arguments were made at the Superior Court of Justice by lawyers from the interior of Minas Gerais? From the interior of Pará? He wasn't going to give an oral argument. [Currently] there you have a drug dealer from the corner of the interior of Pará, being defended orally in the Superior Court of Justice, on equal terms, with a big drug dealer, who has hired a big law firm ... In other words, the two had the same voice in the Superior Court of Justice. [It creates] Problems? Yes. Why problems? Because the Superior Court of Justice used to have a shorter agenda. Now, it has a much more extensive agenda for oral arguments. It guarantees everyone's fundamental rights. It's not because I can't afford a lawyer that lawyer won't have a voice in the Superior Court of Justice. *P5*

In the higher courts, in general, this is also very positive. Because until very recently, to make an oral argument in the Superior Court of Justice and the Supreme Court, you had to travel. So today, the Supreme Court, the Superior Court of Justice, and the Superior Electoral Court. It works virtually most of the time as a virtual plenary session. The oral arguments are all recorded ... In the past, you had to go in person.

*The lawyer can't. Sometimes, the lawyer is more humble; the party is more humble about travel: suit, clothes, transportation, and plane. That's why I said, and I repeat, that it brings enormous benefits. *J6*

In addition to being recorded, the audio files from videoconferencing hearings are integrated into the court case files, making videoconferencing sessions accessible to the public. :

*We conduct our hearings through Microsoft Teams, and all hearings with lawyers are recorded and archived as part of the process, including informal hearings. *P1*

*You could say that the recorded hearings have made the parties generally more cautious. *P4*

Participants noted that the digital divide could hinder the effective use of videoconferencing, negatively influencing access to justice. They refer to the lack of internet infrastructure in some regions, economic barriers that make it challenging for poor people to access good equipment and pay for internet and age-related barriers:

*Some of them live in rural areas and don't have much access to the internet. So when they attempt to conduct the video conference, they get stuck. Sometimes, many hearings don't even take place. They're scheduled for that day, but the hearings don't take place because of a problem with the internet network. Sometimes, the more humble party uses a cell phone with poor capacity. The image is bad. The voice ... *L1*

*It's more a question of the barriers faced by people who don't have the internet. Lawyers, for example. They ask for a virtual hearing, and suddenly, he will have a hearing in his car using 3G. A hearing whose internet is not compatible. *C3*

*I had this perception in the hearing that I used to do virtually. Sometimes, because the person was older, they had more difficulty. *J1*

*I saw an old man complaining, "Look, Your Honour, my internet is running out because the system is data-intensive; it's consuming my (monthly) data." I said, "Oh, OK, forgive me, I'm sorry." Then we hurried up. *J3*

*However, on a case-by-case basis, access difficulties can occur. I've done hearings where this was the clearest example of a missing witness. We're here talking, and her data network is running out. We're here talking, and she sends a message to the server, and we know it's true. There was no reason for it to be a lie. She tells us, "Look, I've finished my access." We have to ask to go to the courthouse, and then there's a cost of transportation, and the person can't get there. *J6*

Figure 21 summarises the effects of videoconferencing on access to justice and highlights the mechanisms that have enabled it:

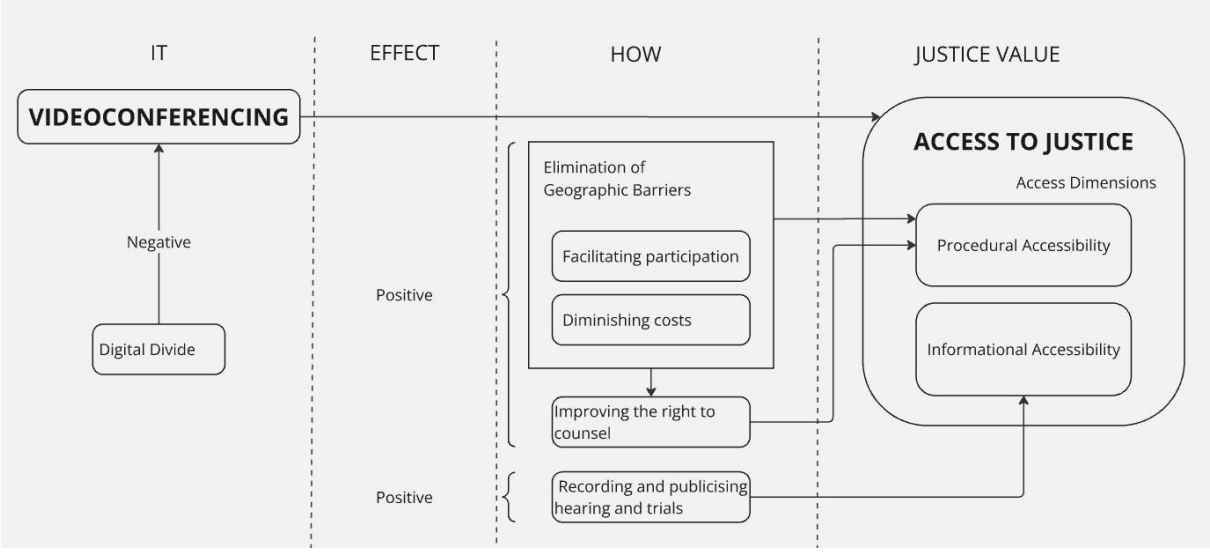


Figure 21: Perceived Effects of Videoconferencing on Access to Justice

It can be asserted that videoconferencing positively affects access to justice a) by eliminating geographic barriers, thus facilitating participation and diminishing cost, b) by improving the right to counsel, and c) by recording and publicising hearings and trials.

The digital divide negatively affects the effective use of videoconferencing, indirectly hindering access to justice.

Previous studies recognised the importance of videoconferencing in broadening access to justice (Beyene et al., 2015; Yamagata et al., 2017). Others affirm that the lack of equipment, connection, or experience with videoconferencing technology can limit access to virtual hearings (Bellone, 2013; Bielik et al., 2020; Puddister et al., 2020).

9.3 Effects of Videoconferencing on Equality

Expanding access to justice through videoconferencing has promoted more equality in the judicial system. As detailed in the previous section, videoconferencing has improved access to justice by eliminating geographical and financial barriers to court participation while also promoting greater equality. This is particularly evident in two key aspects: First, it has democratised access to legal representation by reducing the costs associated with court appearances, enabling lawyers from any location to represent their clients effectively. As noted by C4: "lawyers from the countryside did not have to travel to court to defend their cases," making legal representation more accessible and affordable. Second, it has equalised access to higher courts, addressing a long-standing disparity in the Brazilian justice system. As illustrated by P5's observation, a "drug dealer from the corner of the interior of Pará" can now be defended "on equal terms" before the Superior Court of Justice, whereas previously, such representation would have been practically impossible due to travel costs. While economic status continues to influence the quality of legal representation, videoconferencing has reduced some financial barriers that previously prevented many from accessing justice, particularly at the higher court level. This partial yet significant democratisation of access represents a step toward a more equitable justice system.

Despite the benefits, a potential drawback is the improper guidance of witnesses during hearings. Witnesses cannot be directed during judicial proceedings or communicate with one another. Witnesses are expected to provide truthful, spontaneous testimony based on their knowledge of the facts without any interference or guidance from others while testifying. Coaching a witness during a hearing can compromise the pursuit of justice, leading to inequalities.

Many participants expressed concern about external influences during virtual hearings. Most were public prosecutors who have observed or experienced situations that could raise doubts about lawyer witness coaching during proceedings, contributing to disparities in judicial outcomes. The communication between witnesses was also mentioned as a problem when conducting virtual hearings. None of the seven judges mentioned this potential problem:

> *There is a certain risk of interference by the parties in the witness's testimony. So sometimes, we see the lawyer in the office with the witnesses. You don't know if that person is, in fact, alone there if the lawyer hasn't given guidance, if there isn't something being said there that we can't pick up on. I think this can happen. *P4*

*I'm talking specifically about the criminal area; maybe there is an advantage for lawyers to the virtual hearing. With physical hearing, everyone is there and separated in a room, so they are heard separately. Today, we see in some cases, and maybe it's even more common than the cases we see, that the witness is in a place where apparently someone somehow gives him different information and induces an answer. Sometimes, the scenario shows that he's in a scenario very similar to the one in which his lawyer was. *P3*

*[Videoconferencing] has brought a slightly dangerous informality. Just yesterday, we had a hearing in which the witness was in the lawyer's office. To be heard in the lawyer's office. This was raised before the court about the necessary impartiality that the witness has to bring to the proceedings. It's a bit strange that the witness is in the office. I've heard that ... this is not something so exceptional. These are things that usually happen ... So, I still find it strange that the witness is there; it seems uncomfortable to me ... The lawyer, sometimes for the best of purposes, sometimes didn't even talk to the witness, but it seemed strange to me. He'd feel the same way if I were in the prosecutor's office with the witness beside me. *P1*

*A witness cannot have contact with the other. A witness can't have anyone inducing them. So, if she's not in the judge's field of vision, if she's at home, I'll have to take her word for it that there's no one there. It is complicated. *C2*

*You run the risk of having someone there inducing and saying something. *C1*

*More specifically, the issue of witnesses. I think it could be harmful. Let's say a witness testifies here. The witnesses can't talk to each other. However, how do you control that? Let's say the witness participates in a virtual hearing and gives evidence here [in the city]. Other witnesses are being heard elsewhere. She can call [the first witness]. That's a real obstacle, the issue of communication between witnesses or guidance. It's a problem that I believe won't be solved unless there is greater punishment and action on the part of the magistrates, which I haven't seen so far. *L3*

While videoconferencing has broadly enhanced access to justice and helped to promote equality, these benefits are not uniformly distributed due to the digital divide, which can reinforce existing justice system inequalities. Three main barriers emerged from the interviews. First, infrastructural limitations prevent equal participation, particularly in rural areas with poor or unreliable internet connectivity. As L1 notes, "Some of them live in rural areas and don't have much access to the internet... many hearings don't even take place." Second, economic barriers determine the quality of participation based on one's ability to afford adequate technology and Internet service. J3 illustrates this: "An old man complaining: 'Look, your honour, my internet is running out because the system is data-intensive.'" Third, age-related barriers create additional challenges, as J1 observed that "because the person was older, they had more difficulty." These technological barriers potentially undermine the equality that videoconferencing was meant to promote.

Figure 22 summarises the effects of videoconferencing on justice equality:

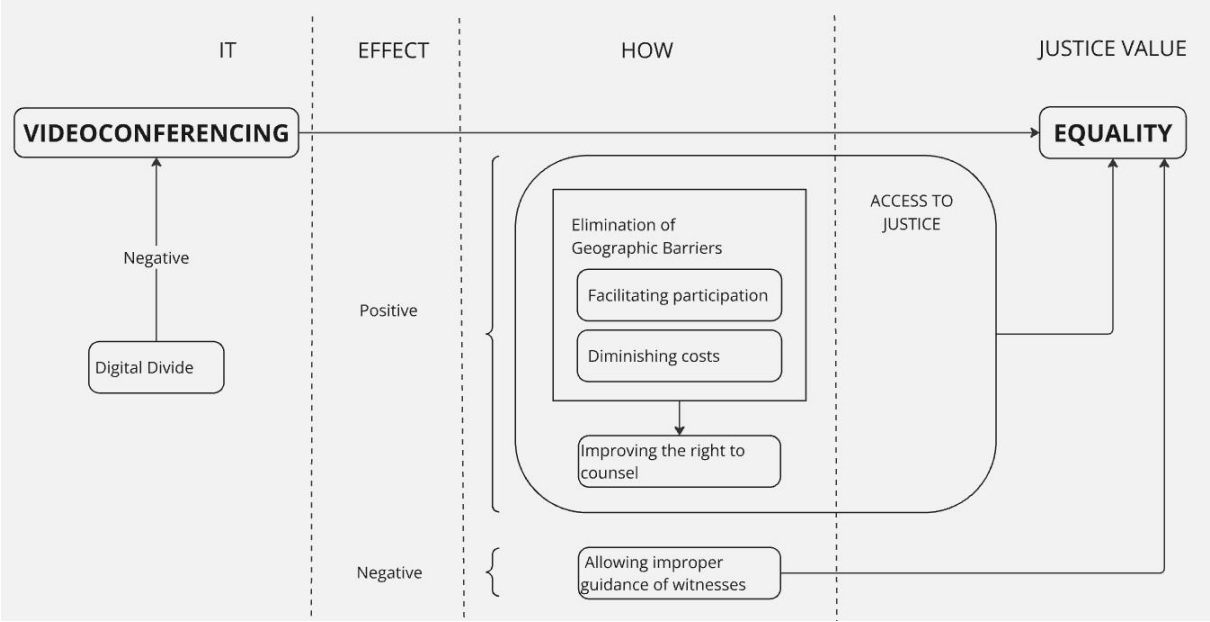


Figure 22: Perceived Effects of Videoconferencing on Justice Equality

It can be asserted that videoconferencing positively affects justice equality by promoting access to justice, specifically by facilitating participation, diminishing costs, and improving the right to counsel. Videoconferencing negatively affects justice equality due to the possibility of allowing improper guidance of witnesses.

The digital divide negatively affects the effective use of videoconferencing, indirectly undermining the equality of justice.

9.4 Effects of Videoconferencing on Independence and Impartiality

Expanding access—whether through simultaneous online viewing or by reviewing the recorded files—has positive implications for overseeing potential abuses of power by judicial authorities. Many participants noted that judicial authorities tend to exercise greater caution and exhibit a higher level of awareness of their conduct when observed on video, as proceedings can be recorded and made public. According to participants, the control of abusive behaviour fosters impartiality and equality in the judicial process. Videoconferencing creates a sense of transparency, which discourages biased or arbitrary decision-making by judges. The awareness that their actions are being observed can potentially lead to a more objective and neutral approach, as judges might be less likely to act in ways that could be perceived as unfair or biased:

> This greater transparency, this greater control, and the judge knowing that he is being *watched improve the magistrate's condition ... There were many cases of abuse before digitalisation, and now they are coming to light more frequently. *L3*
>
> *The hearings could curb the excesses of judges, especially judges and prosecutors, because of this issue of being recorded. *J7*
>
> *They catch judges abusing their authority against citizens or their representatives, and sometimes, this leaks out somehow. You're more exposed. *P2*
>
> *Another situation is the abuses that videoconferencing ultimately curbs. Some judges had abusive practices during hearings and trials; videoconferencing controls this. *J1*

Figure 23 summarises the effects of videoconferencing on justice independence and impartiality:

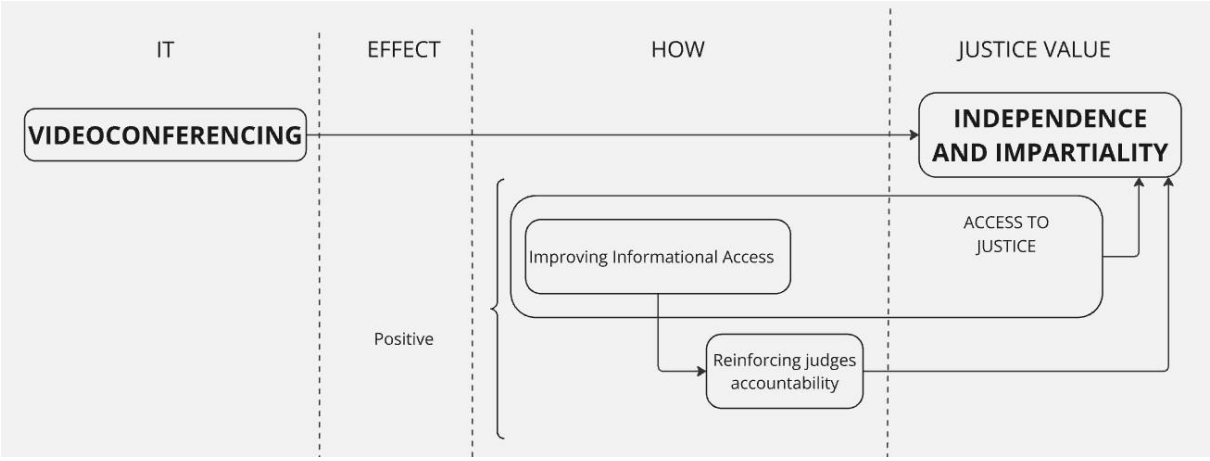


Figure 23: Perceived Effects of Videoconferencing on Judicial Independence and Impartiality

It can be asserted that videoconferencing positively affects judicial independence and impartiality by improving informational access, thus reinforcing judges' accountability.

9.5 Effects of Videoconferencing on Due Process of Law

Videoconferencing enhances both access to justice and due process of law by facilitating testimony from geographically distant witnesses who might otherwise be unable to participate. Access is improved as geographical barriers no longer prevent witness participation, and due process is strengthened by enabling complete evidence collection in legal proceedings. The increased ability to gather witness testimony thus supports the fundamental right to a fair trial, a key component of the due process of law:

> *It really favours witnesses who live far away and perhaps wouldn't be able to testify, Who would find it difficult to come to the courthouse. Today, with any cell phone, they can access it. [For example] Truck drivers are often involved in traffic accidents. He doesn't live there. He's usually passing through. So, it's not uncommon for truck drivers to stop at the gas station to wait for a hearing and give their testimony in the back of the truck. So this has happened many times here. *P4*

Figure 24 summarises the effects of videoconferencing on due process of law:

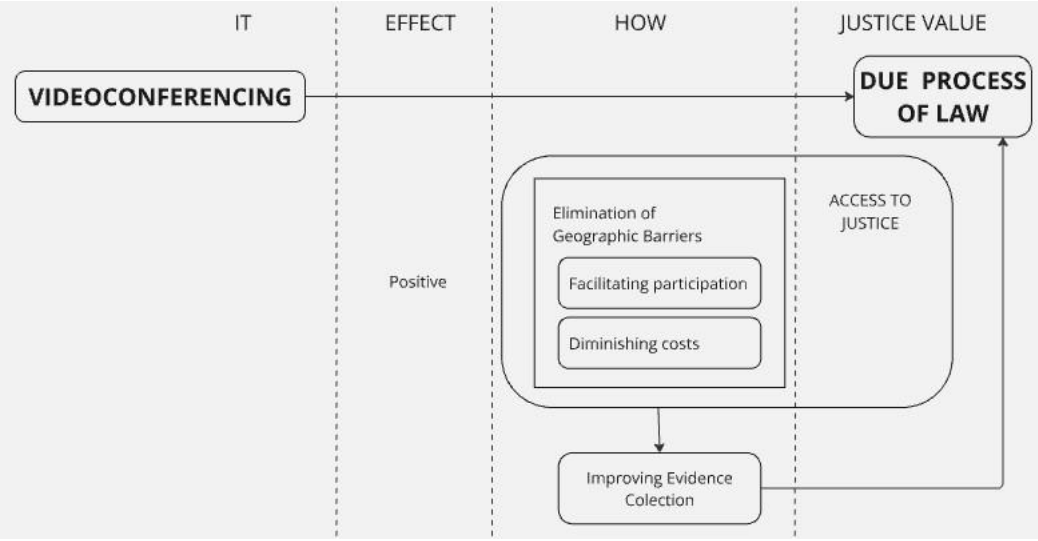


Figure 24: Perceived Effects of Videoconferencing on Due Process of Law

It can be asserted that videoconferencing positively affects the due process of law by promoting access to justice and, thus, improving evidence collection.

Rowden (2018) confirms that videoconferencing improves the quality of evidence due to the convenience of remote witnessing.

9.6 Effects of Videoconferencing on Quality of Judicial Decisions

Videoconferencing proceedings can affect interaction and communication during virtual hearings. The absence or reduction of non-verbal cues in remote settings diminishes the ability to interpret critical aspects of communication, such as body language, facial expressions, and other subtle behaviours essential for assessing credibility and emotional states. Furthermore, the altered dynamic of court interactions may reduce participants' comfort and willingness to communicate openly. These challenges can potentially undermine the practical evaluation of testimony and compromise the quality of judicial decisions by limiting judges' ability to assess the credibility and behaviour of participants fully:

> *In a face-to-face hearing, the judge can better ascertain the truth. Because there is human contact. *L1*

> *On video, the magistrate does not perceive what really happens to the people at the hearing. He doesn't. He doesn't. It's tough to get a sense. The image isn't clear in the video, and sometimes it's cut off. So, you don't know how the person looks. You don't,*

*you don't, you wouldn't have that perception. So, it influences the magistrate's decision. 80% of our communication is non-verbal. *J7*

*When people are in person, they say more, and I think they feel more at ease. I think it has to be quick when the person is at the video conference. Sometimes, they're not very willing to talk. It's easier for them not to talk or to shy away. When the person is there in person, it's better. I don't think anything replaces a meeting. *J5*

*Because there's a question of proof, of feeling the witness, of having that connection, so don't lose that connection. Personal contact is the best way to evaluate evidence, such as testimonials. Seeing eye-to-eye. *C1*

*Listening to a person in person is better than listening to a person virtually because you have perceptions of body movement and everything that video takes away. You end up seeing the whole picture, body language, and everything. You lose a bit of that in the virtual world. *C3*

*You're going to conduct the interrogation; you analyse the gestures, the posture... Several psychological studies comment on gestures, posture, truth, and lies based on your movements. This could create some problems when taking a statement. *J6*

*As far as the hearing is concerned, the victim needs to be present; they need to be there in person to have contact with the prosecutor, the parties, and the judge. I think we need to be cautious about virtual hearings. *P5*

Figure 25 summarises the effects of videoconferencing on decision quality:

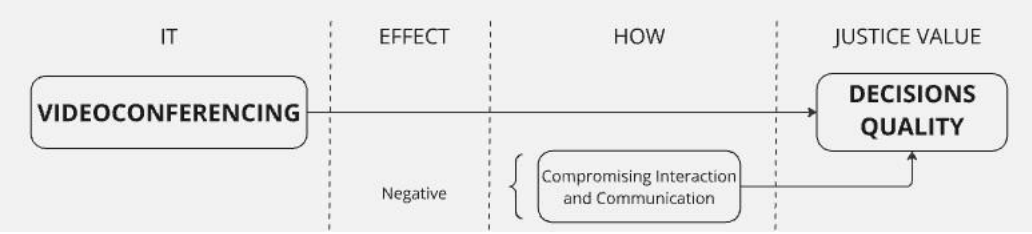


Figure 25: Perceived Effects of Videoconferencing on Decision Quality

It can be asserted that videoconferencing may negatively affect decision quality by compromising interaction and communication in hearings and trials.

Previous research has asserted that communication can be seriously limited since the virtual perception of non-verbal communication, such as facial expressions, voice inflexions, and gestures, is impaired when participants appear remotely (Bellone, 2013; Rowden, 2018; Sourdin, Li, Simm, et al., 2020).

9.7 Other Challenges of Videoconferencing

Participants raised three other significant concerns despite not being directly linked to the justice values investigated in this research. The first one is the possible trivialisation of the ritual of judgment. Researchers have already noted that disrupting the physical geography of adjudication, including the spatial distances between courtroom participants, renders the ritual less formal. This can cause judgment to occur in a casual and trivial environment, which can undermine the authority of judges and the legitimacy of judicial proceedings (Mulcahy, 2008; Salyzyn, 2012).

The participants observed generalised informality, including aspects of dress, language and the place where the participants in the hearings choose to hold them. One of the participants reported disrespect towards a magistrate, which, according to him, is not commonly observed in face-to-face hearings:

> *It's a public, solemn and respectful act. So, what happened when it was in person? The parties had a habit of going to court dressed up. When I say dressed up, I mean at least wearing a shirt. It's because I've had hearings where the party started without a shirt, so this is common ... Sometimes they're not appropriately dressed. Sometimes they're doing something else, like driving or talking to someone else, and that doesn't happen when it's in person ... Culturally, as we're not used to it yet, there's a lack of concern about the act itself on everyone's part. *J7*

> *The NCJ had to issue a regulation stating that people had to be dressed appropriately. So that wouldn't be necessary. People should at least be aware of it. However, it was necessary to regulate that they had to be dressed appropriately and that they had to have the camera opened. A regulation! *C2*

> *Technology has brought much informality to the process. The process needs to be formal... Breaking formality is very dangerous. It's not that we're in an ivory tower in any way, but judging a human being requires formality. However, we sometimes see excesses on social media. People become more uninhibited... Often, the presence of*

*the judge, who should be in one of the most critical situations to prevent this kind of thing, is unable to do so. Is it possible? There's no way... That's not how it works. The judge is not on the same level as the lawyer and the attorney. The judge is there to preside over the hearing. I am a party; the lawyer is a party, but the judge is not. So, within this concept of a triangular legal relationship, in which the judge would be at the top of the pyramid, and the parties would be at the bottom, this brings this problem... I've seen the judge being disrespected, treated more harshly, needing to intervene, and not being heard. I've never seen this in an in-person hearing. The physical environment of the courts themselves is different; they are formal environments. The physical location itself ends up preventing certain types of behaviour. *P1*

*Sometimes, things happen in the videos ... In the court of justice, once during the pandemic, the lawyer took a shower without realising that the camera was on ... The prosecutor from the Public Prosecutor's Office pretended not to see, just stared into space. And then suddenly the man said: "Look, sir, stop talking because a man is taking a shower naked there." *P2*

Secondly, participants pointed out that video hearings can potentially dehumanise participants. The digital environment can make the proceedings feel less authentic or "real," as the physical distance between participants creates a sense of separation. The virtual format may risk reducing individuals to mere images or voices on a screen:

*Sometimes, the online hearing makes the parties feel more distant from the judges, prosecutors, and lawyers, as if it were not very real or if the person was not very human. Therefore, for this reason, presenting [the prisoner] in person at the custody hearing to the judge has an advantage. Because it is not a name and a CPF on a sheet of paper; it is a real person in front of you. This makes you more human when making decisions. *P4*

*In-person [hearings], I notice that there is more human warmth. The judge becomes more sensitive. *L1*

The last aspect concerning the harm of videoconferencing is the risk of improper data disclosure. It is not possible to control whether someone is recording a virtual hearing:

*The first risk is that it could leak. Some proceedings are conducted in secret. We issue the usual warnings. However, some people record the hearing, which is replicated. It has never happened to me, but I have seen some problems. *J3*

Some authors have already highlighted a loss of privacy and the possibility of parties recording video sessions or other online interactions (Puddister et al., 2020; Sourdin, Li, Simm et al., 2020).

While not directly linked to specific justice values, the trivialisation of judicial rituals, the dehumanisation of participants, and the risk of improper data disclosure can undermine the overall legitimacy of judicial proceedings. Figure 26 summarises the effects of videoconferencing not explicitly related to justice values, although potentially affecting judicial proceedings' legitimacy:

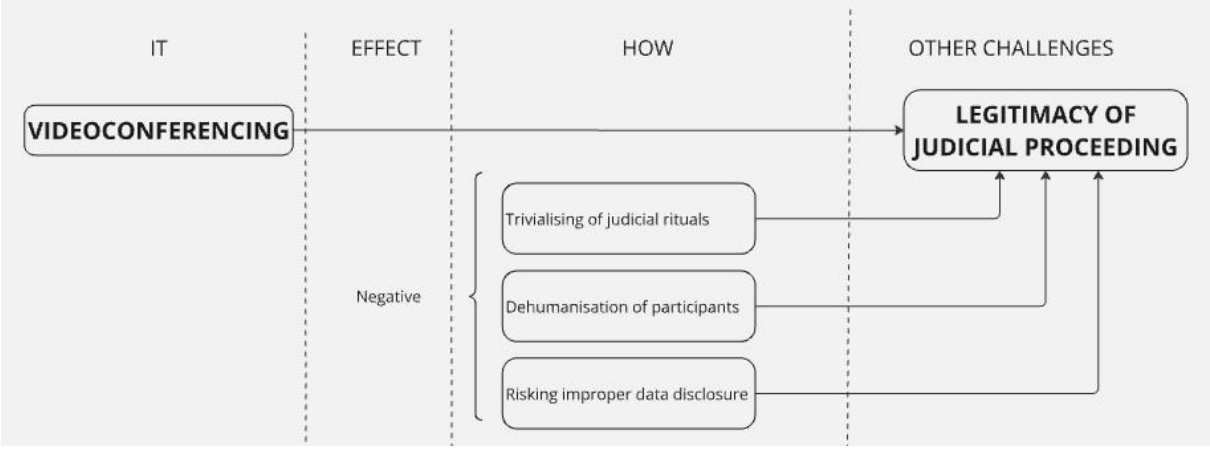


Figure 26: Perceived Effects of Videoconferencing - Challenges Not Related to Specific Justice Values

It can be asserted that videoconferencing negatively affects the legitimacy of judicial proceedings by trivialising judicial rituals, dehumanising participants, and exposing them to improper data disclosure risks.

9.8 Appropriateness of Videoconferencing for Different Judicial Contexts

Participants emphasise that videoconferencing technology may not be appropriate for all judicial hearings. They argue that some instances, particularly complex, criminal, and family matters, are best conducted in person, as remote hearings can compromise outcomes and undermine core justice values. In contrast, more straightforward, civil, and repetitive cases are perceived as more suited to online hearings, where efficiency and convenience can be achieved without detracting from the integrity of the proceedings. In addition, in some violent cases, the victims do not want to meet their aggressor. These distinctions highlight the need to match hearing format to case type and situation carefully:

*In family (subject), there is no way you can do it online. The judge and the public prosecutor need to understand the relationships involved and have that perception of the individuals. I make a parallel with the criminal area. It is the same thing. You do not judge a crime, a criminal action or a family action only by what is written. You also have to have that perception of the person ... There was gain with the online audience, but it can not be used for any action. It is possible in the criminal for those in a differential regime. That is another thing. It is a guy who can not go to the street, where the cost and risk do not pay. *L5*

*Simpler hearings, simpler testimonials, and conversations [using videoconferencing] have many advantages. *J6*

*It is harmful when you have a domestic violence hearing that you need to have the wife in the hearing and the ex-husband in the hearing. So that you can have this confrontation, and she can sit here. So that she can cry, so that she can talk, so that she can let off steam. Because she must be in front of the judge and the prosecutor to say what she feels. You cannot put [videoconferencing] on the same level as a drug trafficking case with two military police officers who will be absolutely OK holding a virtual hearing with a prisoner 600 km away and another domestic violence case without any care. So I have agreed with the judge with whom I work: drug trafficking, OK, virtual; robbery, OK, virtual; fraud, OK, virtual. However, please, robbery with a victim, domestic violence, rape, we will do it in person. Why? Because of the victims' reception, the people's reception, and personal contact with them. I think this is very important. *P5*

*Sometimes, people don't want to meet in person. There's the issue of criminal justice and the fear it generates. I've seen court situations where the victim meets the defendant at a hearing, then leaves and meets them in the hallway. So, it's a situation of fear and embarrassment—issues involving family, too. Sometimes, the couple has a lot of litigation, they have children, and they don't want to meet in person. So, virtual justice helps in this sense. Issues involving childhood ... Providing this digital justice and not excluding physical or in-person justice converges so that these values of justice are preserved. *J2*

*A simple hearing for conciliation. The parties are present. I think it is more fruitful; there is a much greater chance of reaching an agreement; in the virtual process, they are somewhat dispersed. It is much easier not to accept an agreement, and the judge sometimes exceeds his limit. In-person hearing achieves a better objective. *L4*

*When there are many witnesses, for example, when the subject involved is a matter that needs a lawyer or a more incisive performance, I do it in person. However, when a simple audience does not have this requirement, I prefer to do it virtually, depending on the case. *L3*

The participants' perceptions concerning the use of videoconference technology align with IS theories, suggesting that the technology's suitability or "fit" is conditioned by its characteristics and the specific requirements of the task it intends to support (Goodhue et al., 1995). Videoconferencing does not fit in some judicial cases. Beliefs about the consequences of use also affect the use of technology. In the case of videoconferencing technology, despite its ease of use, the outcomes in specific cases might be harmful, diminishing the intention to use. Research already affirms that usefulness, defined as "capable of being used advantageously", is perceived to be more prominent than ease of use (Davis, 1989).

9.9 Summary of Videoconferencing Effects on Justice Values

Videoconferencing technology has significantly enhanced several justice values in the Brazilian judicial system. It has improved efficiency by eliminating geographic barriers, optimising both procedural and personal time, reducing the need for rogatory letters, and decreasing organisational costs associated with transporting high-risk defendants and reassigning police officers from their duties. Access to justice has been expanded through facilitated participation and diminished costs for all participants, significantly improving the right to counsel by enabling lawyers from any location to represent clients effectively and equalising access to higher courts regardless of economic status. Additionally, videoconferencing has positively affected judicial independence and impartiality by increasing transparency through recorded proceedings, reinforcing judicial accountability and curbing potential abuses of power. Due process has also been strengthened by enabling testimony from geographically distant witnesses who might otherwise be unable to participate, thus improving evidence collection.

Despite its benefits, videoconferencing presents several challenges to justice values. The digital divide—comprising infrastructural limitations, economic barriers, and age-related obstacles—can reinforce

existing inequalities in the justice system by preventing equal access to videoconferencing. The quality of judicial decisions may be compromised due to the reduction of non-verbal cues in remote settings, which diminishes the ability to interpret critical aspects of communication, such as body language and facial expressions. Videoconferencing also creates opportunities for improper guidance of witnesses during hearings, which can potentially undermine equality in judicial outcomes. Beyond these direct impacts on justice values, three additional concerns affect the legitimacy of judicial proceedings: the trivialisation of judicial rituals through increased informality; the dehumanisation of participants, making proceedings feel less authentic or "real"; and the risk of improper disclosure of data through unauthorised recording of virtual hearings. These adverse effects are particularly pronounced in complex criminal and family cases, where in-person hearings are often deemed more appropriate.

The investigation of videoconferencing effects on justice values complements the analyses of CCMS effects on justice values by adding essential elements that provide a more comprehensive understanding of the digital transformation of justice.

10. CONCLUSION

This research aimed to investigate the effects of information technology on justice, focusing specifically on the effects of Court Case Management Systems (CCMS) on efficiency and four specific justice values: access to justice, equality, independence (and impartiality), and due process of law. The indirect effect of CCMS on the quality of judicial decisions was also investigated. Brazil was chosen as a case due to its advanced use of IT, which enabled both longitudinal quantitative and qualitative analysis.

The study focused on CCMS as the primary technology, intending to explore the effects of videoconferencing and AI on justice values marginally as a complementary approach. However, videoconferencing emerged as a significant and interconnected technology, and its effects on justice values were incorporated as a secondary focus of the research. Additionally, the study marginally explored the effects of artificial intelligence on justice values. The thesis encompasses two studies that address several aspects summarised below:

- Impact of CCMS use on efficiency indicators - length of proceedings, clearance rates, and number of pending cases - based on data collected and made available by the Brazilian National Council of Justice;
- Effects of CCMS on efficiency, as perceived by judicial actors;
- Effects of CCMS on justice values, as perceived by judicial actors;
- Effects of AI application on justice values integrated into CCMS in Brazil-as perceived by judicial actors.
- Effects of videoconferencing on justice values, a technology paired with CCMS in Brazilian courts, as perceived by judicial actors;

The findings, along with the study's contributions, limitations, and directions for future research, are presented below. The chapter concludes with a list of academic publications resulting from the partial outcomes of this research, which spanned the four years of the PhD program.

10.1 Answering the Research Questions

This study aims to answer two research questions: 'What is the impact of the actual use of IT on judicial efficiency?' and 'What are the effects of the actual use of IT on justice values?'.

- What is the impact of the actual use of IT on judicial efficiency?

The quantitative analysis of Brazilian state courts from 2010 to 2023 revealed no statistically significant correlation between the use of electronic cases and key efficiency indicators, including the length of proceedings, clearance rates, and pending case volume. Regression models across criminal, civil, ordinary, and small claims courts showed no evidence that CCMS use improves efficiency. This challenges common assumptions about the positive impact of technology on judicial processes.

The qualitative research presented in Chapter 8.3 complemented these findings by examining judicial professionals' perceptions of CCMS's effects on efficiency. While participants generally affirmed that CCMS improved efficiency in specific stages of judicial processes—such as enabling work from anywhere, eliminating travel requirements, and facilitating document exchange—their views on overall judicial efficiency were mixed. Perceived effects on the length of proceedings were controversial.

- What are the effects of the actual use of IT on justice values?

The research demonstrates that CCMS has a significant influence on multiple justice values, with access to justice emerging as the most prominently and positively affected value. By digitalising judicial processes, CCMS enhanced both procedural and informational accessibility, allowing individuals to file cases from anywhere, at any time, and access judicial information more readily. This improved access had overlapping positive effects on other justice values, including efficiency, equality, judicial independence, and due process. However, challenges related to the digital divide highlight the need for efforts to bridge these gaps.

Regarding equality, CCMS has had a predominantly perceived positive effect, with its benefits outweighing negative effects. It enhanced equality through broader procedural accessibility, simultaneous access to case information, and automated deadline management that eliminated previous preferential treatment. However, the digital divide emerged as a significant concern, with evidence suggesting that well-resourced law firms can leverage CCMS data analytics capabilities more effectively than smaller practices or individuals, potentially creating new forms of inequality in the justice system.

CCMS is predominantly perceived as neutral or beneficial to judicial independence and impartiality. Most participants did not identify any interference from CCMS, with some emphasising its role in fostering greater accountability, reducing bias, and creating distance between judges, lawyers, and prosecutors. Improved accessibility and transparency of judicial information was also noted as positive effects, enhancing external oversight and reinforcing impartiality. No participants reported detrimental impacts on independence or impartiality.

Most participants highlighted the positive effect of CCMS on the due process of law. Enhanced accessibility to case information is considered a key improvement, as it facilitates adversarial proceedings by enabling all parties to prepare and respond adequately. These systems enhanced control over deadlines, procedural stages, and documentation, ensuring adherence to the due process of law. However, one participant noted that the immediacy of electronic systems could sometimes disrupt the due process by encouraging premature filings and creating procedural confusion. Some participants perceived CCMS as neutral, with no significant effect on due process.

The research findings reveal that CCMS data alone does not directly affect the quality of judicial decisions. However, the system facilitates the development of productivity targets set

by oversight bodies like the National Council of Justice (NCJ), which can negatively influence decision quality by pressuring judges to prioritise speed and quantity over careful deliberation. Most participants expressed concern that this focus on meeting targets undermines the rigour and reasoning necessary for high-quality decisions. Others highlight their neutrality, suggesting they do not inherently harm decision quality. Despite these concerns, participants acknowledge the necessity of productivity targets to address Brazil's significant case backlog and improve judicial efficiency. Some viewed the targets as a practical and essential tool for fostering timely justice. While CCMS promotes efficiency and transparency, emphasising quantitative metrics may create tension with maintaining the quality of judicial decisions.

Ultimately, the evidence indicates that CCMS has substantially increased the demand for judicial services by enhancing procedural accessibility and enabling individuals to file cases remotely and conveniently. This ease of access has encouraged filing new cases, uncovering previously unmet or suppressed demand. Participants view this as a positive development, as it expands access to justice, particularly for individuals who might have avoided litigation due to costs, time, or inconvenience. However, the increase in cases also has negative implications. The rise in predatory litigation, characterised by abusive and fraudulent legal practices such as mass filings and frivolous claims, has been exacerbated by digitalisation. This misuse of the judicial system threatens to overwhelm courts and strain resources, highlighting the need for stricter monitoring and control mechanisms.

Concerning the complementary analysis of artificial intelligence and videoconferencing, the results indicate that AI has a significant knowledge gap regarding its applications among judicial professionals. Despite this, participants identified potential efficiency gains, particularly in repetitive cases, as AI's most promising benefit. They also expressed concerns about risks to fundamental values of justice, such as equality and judicial independence.

Conversely, videoconferencing emerged as an important issue related to CCMS. Videoconferencing has predominantly delivered positive outcomes. Judicial professionals affirm it significantly improved efficiency by eliminating geographic barriers, optimising time, reducing costs, and streamlining resource allocation. Notably, videoconferencing has enhanced access to justice by making court participation more affordable and more straightforward, particularly for individuals facing geographical or economic challenges. These same factors have also contributed to advancing equality within the judicial system. By reducing travel costs and increasing accessibility to higher courts and legal counsel, videoconferencing has helped to mitigate disparities and promote a more equitable justice process. However, concerns exist about threats to equality. Potential improper witness coaching during virtual hearings - as it is harder to ensure witnesses are not being influenced - and the digital divide emerged as an issue, with technological access and literacy creating new barriers to equal participation.

The study found that videoconferencing has a positive influence on judicial independence and impartiality. The recording and broader accessibility of virtual proceedings have enhanced transparency and accountability, as judicial authorities tend to exercise more caution when being recorded. This increased oversight has helped curb potential abuses of power and promoted more impartial behaviour from judges. Due process of law is positively impacted by improving evidence collection.

Evidence suggests that the quality of judicial decisions may be compromised due to the limitation of non-verbal cues and reduced personal interaction in virtual settings, which can affect judges' ability to assess credibility and behaviour effectively.

The evidence also suggests that videoconferencing technology in judicial proceedings is contextually dependent, with its suitability varying according to case complexity, subject matter, and participant dynamics. While the technology is advantageous for straightforward civil proceedings, participants suggest that it may be less appropriate for complex litigation, criminal cases, and family law matters.

10.2 Contributions

The literature broadly indicates the scarcity of empirical studies on e-justice and even more so on evaluating its outcomes. It is essential to emphasise that this research contributes to reducing this gap.

This thesis offers a theoretical contribution through a comprehensive evaluation of the effects of Court Case Management Systems (CCMS) on efficiency and specific justice values. Unlike previous studies that focused solely on quantitative efficiency metrics or qualitative assessments, this study integrates both approaches. It includes unique 14 years of longitudinal quantitative data on efficiency, along with in-depth

qualitative interviews with diverse judicial professionals and an analysis of the interrelationships between various positive and negative effects of IT on justice values.

The findings provide empirical evidence that challenges common beliefs about CCMS. Contrary to widespread assumption, quantitative analysis indicates that CCMS does not significantly improve overall case duration, clearance rates or number of pending cases. Qualitative insights reveal that while CCMS enhances efficiency in specific procedural stages, it does not necessarily improve overall case processing. Additionally, the study highlights how CCMS can inadvertently enable abusive (predatory) litigation while simultaneously expanding access to justice.

This study is also singular in that it conducts the first systematic examination of how judicial professionals perceive the effects of CCMS on fundamental justice values. As shown in Chapter 5, previous research has been scarce and has either addressed these effects tangentially or focused on single values in isolation. By comprehensively investigating multiple justice values—access, equality, independence, impartiality, and due process—through the lens of those who use these systems daily, this study provides fundamental insights into how technology shapes these values, offering necessary guidance for justice administration.

This research makes a significant contribution by addressing earlier scholarly warnings that information technology may undermine fundamental justice values in judicial systems. While previous literature has highlighted the risks posed to judicial principles, empirical evidence suggests that both CCMS and videoconferencing have predominantly enhanced, rather than harmed, core justice values. This is not to diminish the potential risks that IT poses to these values but rather to contribute to addressing these threats by identifying ways to eliminate or mitigate them. Additionally, the findings underscore the importance of carefully considering the appropriate contexts for using IT—particularly videoconferencing—to ensure its application supports and upholds judicial principles.

Theoretically and analytically, the research takes essential steps toward developing a comprehensive framework for understanding how CCMS affects justice values. It demonstrates initial relationships, interconnections, and potential mediating factors that contribute to improving judicial values and the associated risks.

The research also has practical implications. For justice organisations, it provides evidence for critically deploying CCMS and identifies areas that require attention to avoid negative consequences. For policymakers, the research highlights the need to strike a balance between the effects of CCMS on efficiency and justice values. It underscores the importance of monitoring both intended and unintended

consequences. Specifically, it suggests that protective measures are needed against abusive (predatory) litigation enabled by IT.

For academia, the research provides an initial framework for analysing technology's effects on justice values and new research directions regarding IT and justice administration.

10.3 Limitations of the Study

One key limitation of this research is the absence of a direct investigation into citizens' perceptions—the final users of the justice system—regarding the effects of CCMS on justice values. Although they were not interviewed, their perspectives were frequently referenced by interviewees, acknowledging their role as the primary recipients of judicial services. The decision to exclude them was based on the predominance of lawyers in the legal domain, where legal representatives conduct the majority of cases, and self-representation is the exception. Given this context, the study focused on legal professionals as users who primarily interact with CCMS, enabling an informed analysis of how these systems affect justice values. While this approach allowed for a focused examination of professional perspectives, it inevitably creates a gap in understanding how those who ultimately experience the outcomes of judicial processes perceive the effects of court technology on justice values.

Another limitation concerns the research's scope, which is limited by focusing on Brazilian first-instance ordinary courts, which may limit its direct applicability to appellate courts, other jurisdictions, and specialised courts.

While comprehensive in examining Brazilian first-instance state courts, the quantitative analysis of CCMS's impact on efficiency has a high level of aggregation that excludes a more detailed examination of specific jurisdictional domains or procedural contexts. This limitation may overlook significant variations in CCMS efficiency across different judicial settings. Given the diversity of court operations, certain jurisdictional domains or case types may be more receptive to technological optimisation, potentially leading to efficiency gains not captured by the present aggregate analyses.

Furthermore, judicial efficiency is influenced by a complex array of organisational, political, and institutional factors. While the research model included several control variables, these influential factors challenge the ability to isolate the specific impact of technology on efficiency outcomes. Additionally, some relevant control variables may not be quantifiable, which limits the ability to fully account for elements that could influence the relationship between CCMS and efficiency.

The qualitative analysis faces methodological constraints beyond its scope limitations. The complex interrelationships between justice values present inherent challenges in establishing clear causal paths for how CCMS affects each value independently. Since these values are interconnected, effects observed in one domain may be influenced by or manifest through changes in another, making it challenging to isolate direct causal relationships. Moreover, this interconnectedness complicates the analysis due to variations in how different judicial professionals interpret the values of justice. While all participants engage with these values in their practice, their understanding and articulation of these concepts may vary based on their role, experience, and professional perspective. These definitional differences introduce potential interpretative challenges when analysing how CCMS affects specific justice values.

Lastly, due to its secondary focus in the research, the evidence collected to evaluate the effects of videoconferencing on judicial values did not specifically address each justice value separately, as was done with CCMS. This may have limited the depth of insights into the effects of videoconferencing on these values.

10.4 Future Research Directions

This research presents limitations that provide valuable opportunities for future studies to expand upon and refine the understanding of the effects of CCMS and videoconferencing on judicial values.

Analyses of the impact of CCMS on judicial efficiency

- The scope limitation suggests that quantitative comparative studies between diverse jurisdictions (countries) and legal systems should be conducted to identify existing differences or confirm the lack of correlation between the use of IT and judicial efficiency.
- The high level of aggregation in the quantitative analysis limited the ability to examine specific jurisdictional domains or procedural contexts in detail. Future research could break down the analysis into more detailed categories, such as specialised court cases, or even further into specific legal subjects. This would help identify variations in how CCMS impacts efficiency across different case types, uncovering potential differences in how technology affects judicial processes depending on the nature of the cases handled.
- Replicating the study in each Brazilian state could identify variations in the results, helping to address other variables affecting efficiency and improving the robustness of the research model by adding other control variables. This broader approach could provide a more nuanced

understanding of the conditions under which technology can enhance or hinder efficiency in the judicial system.

- The likely distorted perception of the CCMS effect on diminishing the length of proceedings deserves attention to identify why the perception contradicts reality or whether those specific perceptions reflect the research's failure to capture actual improvements in timely justice for particular cases.

Analyses of the effects of CCMS on justice values:

- Future research would benefit from complementing this study by addressing citizens' perceptions of the effects of CCMS on justice values. A sample of citizens who appeal to justice may provide additional elements to help develop a more comprehensive understanding of the effects of CCMS across all levels of the justice system.
- The results presented in the qualitative analysis favour the development of a comprehensive framework to explain the relation between CCMS and justice values. This framework would contribute to a better understanding of their interconnectedness by describing how changes affecting one value influence or manifest in others. This would help clarify the causal relationships and determine whether specific values are more susceptible to technological influences than others.
- Future research should investigate the causes of the harmful effects of CCMS on justice values. In particular, the consequences of the digital divide, which this study identified as having an indirect negative impact on access to justice and equality, warrant further investigation. Examining how differing levels of access to technology affect various populations (e.g., rural areas, lower-income individuals, older people) could shed light on how digital technologies may inadvertently exacerbate disparities within the judicial system.
- Future research should investigate the IT impact on the detrimental effects of favouring procedural confusion by promoting dilatory measures and increasing abusive (predatory) litigation to inform protective actions that minimise them.

Analyses of the effects of videoconferencing on justice values:

- Due to its secondary status in the research, the limited focus on videoconferencing in this study presents an opportunity for future studies focusing specifically on how videoconferencing influences each justice value. In particular, the effects of videoconferencing on the quality of judicial decisions could be explored by considering how its use in various contexts (e.g., remote

hearings, witness testimonies, trials, mediation) might affect the fairness and thoroughness of the decision-making process. Investigating the factors that make videoconferencing more or less effective in promoting justice values could help refine guidelines for its use.

- As in the case of CCMS's effects on justice values, future research would benefit from complementing this study by addressing citizens' perceptions of the effects of videoconferencing on justice values.

Analyses of the effects of artificial intelligence on justice values:

- Exploratory findings highlight the nascent use of artificial intelligence in the context of public justice. Future research could examine how judicial professionals, particularly judges, utilise generative AI while addressing its potential benefits and risks to justice values. Another promising avenue for research would involve investigating the effects of AI on justice values by gathering insights from judicial professionals in courts that already implement AI-specific systems, providing a more informed and nuanced understanding of its effects.

10.5 Research Publications

The publication of partial results throughout the development of this PhD project reflects not only the progressive deepening of understanding and the growing quality and robustness of the research outcomes but also highlights the significant enhancement of the student investigator's analytical and methodological competencies throughout the study. Studies published beyond the project's main focus-related topics demonstrate the student's ability to understand the nuances of the broader field of study.

The partial results of the research were presented and published in international and Portuguese information systems conferences and international e-government conferences. One study was presented at an international conference on the administration of justice, and another was published in a Brazilian journal issued by a judicial institution. The final publication was accepted by a highly regarded international journal specialising in the administration of justice.

1. Rocha, Cinara Maria Carneiro; Martins, João; Carvalho, João Alvaro; Suxberger, Antonio Henrique Graciano; Soares, Delfina, "The Impact of Court Case Management Systems on Judicial Efficiency" (2025). *International Journal for Court Administration* (forthcoming).
2. Rocha, Cinara Maria Carneiro; Carvalho, João Alvaro; and Suxberger, Antonio Henrique Graciano, "Judicial Virtual Desk Service: Brazil's Approach to Broadening Access to Justice" (2024). *17th*

International Conference on Theory and Practice of Electronic Governance, ICEGOV 2024. Pretória. South Africa.

3. Rocha, Cinara Maria Carneiro; Carvalho, João Alvaro; and Suxberger, Antonio Henrique Graciano, "Impact of Court's Case Management Systems: Perspectives on Efficiency" (2023). *AMCIS 2023 Proceedings. 12.*

4. Rocha, Cinara Maria Carneiro; Aguiar, Ana Lúcia; and Carvalho, João Alvaro. "National Brazilian judicial database (DataJud): transparency and better administration of justice" (2023). *ACM International Conference Proceeding Series*, 417–419.

5. Rocha, Cinara Maria Carneiro; Carvalho, João Alvaro; and Suxberger, Antonio Henrique Graciano, "16 Years of e-Justice in Brazil: a literature review (2023). *CEURS Workshop Proceedings*. 3449.

6. Rocha, Cinara Maria Carneiro; and Carvalho, João Alvaro. "e-Justice: Relating Practical Guidelines in Videoconferencing with the Concerns of Academic Literature" (2022). *CAPSI 2022 Proceedings. 35.*

7. Rocha, Cinara Maria Carneiro; and Suxberger, Antonio Henrique Graciano, "Enablers of Electronic Judicial Process in Brazil" (2023). *CAPSI 2023 Proceedings. 16.*

8. Rocha, Cinara Maria Carneiro; and Carvalho, João Alvaro, "Artificial Intelligence in the Judiciary: uses and threats (2022). *CEUR Workshop Proceedings. 3399*.

9. Rocha, Cinara Maria Carneiro; Carvalho, João Alvaro; and Suxberger, Antonio Henrique Graciano, Information technology in judicial procedures: challenges in the use of videoconferencing for hearings and trials (2022). *Revista do Ministério Público do Distrito Federal e Territórios*, Brasília, n. 12, p. 15-43, 2022. Anual.

10. Rocha, Cinara Maria Carneiro; Carvalho, João Alvaro; and Suxberger, Antonio Henrique Graciano, "Descriptive e-Justice Framework to Support Studies at Administration of Justice" (2021). 4o *Encontro de Administração da Justiça,* EnAJUS 2021. Lisboa. Portugal.

11. Rocha, Cinara Maria Carneiro. "Success Factors for e-Justice Adoption" (2021). *Information System for Latin America. ISLA 2021 Proceedings. 12.*

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ANNEX I - RESEARCH APPROVAL AT THE ETHICS COMMITTEE FOR RESEARCH IN SOCIAL AND HUMAN SCIENCES OF THE UNIVERSITY OF MINHO

Universidade do Minho

Conselho de Ética

Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH)

Identificação do documento: CEICSH 018/2024

Título do projeto: ***Efeitos do uso de Sistemas de Gestão de Casos dos Tribunais no respeito dos Valores da Justiça***

Equipa de Investigação: Cinara Maria Carneiro Rocha (IR), Programa Doutoral em Tecnologia e Sistemas de Informação, Escola de Engenharia, Universidade do Minho; João Álvaro Carvalho (Orientador), Escola de Engenharia, Universidade do Minho; Antônio Suxberger (Orientador), Centro Universitário de Brasília; Delfina Soares (Orientadora), Universidade das Nações Unidas (UNUEGOV).

PARECER

A Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) analisou o processo relativo ao projeto de investigação acima identificado, intitulado ***Efeitos do uso de Sistemas de Gestão de Casos dos Tribunais no respeito dos Valores da Justiça.***

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na investigação com humanos, em conformidade com as normas nacionais e internacionais que regulam a investigação em Ciências Sociais e Humanas.

Face ao exposto, a Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) nada tem a opor à realização do projeto nos termos apresentados no Formulário de Identificação e Caracterização do Projeto, que se anexa, emitindo o seu parecer favorável, que foi aprovado por unanimidade pelos seus membros.

Braga, 25 de março de 2024.

O Presidente da CEICSH

Assinado por: EMANUEL PEDRO VIANA BARBAS DE ALBUQUERQUE
Num. de Identificação: 07185799
Data: 2024.06.25 08:54:15 +0000

(E uerque)

Pedro B. Albuquerque

Anexo: Formulário de identificação e caracterização do projeto

APPENDIX I – SCRIPT OF THE SEMISTRUCTURED INTERVIEW

Código:
Nome:
Gênero:
Idade:
Cargo:
Tempo no Cargo:
Tempo no cargo antes da adoção do PJE:
Área de atuação: Criminal ☐ Não-Criminal ☐

Guião para Entrevista:

O Brasil desde o ano de 2006 vem consistentemente implantando o Processo Judicial Eletrônico, aqui entendido genericamente como o Sistema de Gerencimento de Processos Judiciais dos Tribunais, com funcionalidades semelhantes em todo o País (possibilidade de iniciar procedimentos on-line mediante cadastro prévio do usuário, produção, armazenamento e troca de documentos de forma digital, pagamento de taxas on-line, notificações e citações digitais, arquivamento do processo eletronicamente e a possibilidade de acesso ao sistema 24/7). Atualmente com quase 100% de processos novos iniciados digitalmente o Brasil é um caso singular no cenário mundial.

Q1. Tem conhecimento dos dados produzidos pelo DATAJUD-Jud no que se refere indicadores de performance do Tribunal como um todo e dos juízes individualmente? A disponibilização desses dados pode afetar a qualidade do trabalho do juiz? De que maneira?

Q2. Considera que o processo judicial eletrônico tornou o tribunal mais eficiente, ou seja, são julgados mais casos em menos tempo?

Q3. Pensando no seu trabalho como (juiz, promotor, advogado, assessor de juiz/promotor), e tendo vivenciado tanto a condução de processos judiciais baseados em papel como também ultimamente de forma eletrônica/virtual por meio do processo judicial eletrônico, como você percebe a influência do processo judicial no respeito ao que você considera valores da justiça?

Q4. O processo judicial eletrônico influenciou o acesso dos cidadãos ao judiciário? Ao mencionar acesso refiro-me a: acesso aos serviços judiciais, à participação nas diversas etapas processuais; às informações contidas nos processos judiciais. Aumentou ou diminuiu o acesso? De que maneira?

Q5. O processo judicial eletrônico afetou a igualdade de tratamento entre os litigantes? De que maneira?

Q6. O processo judicial eletrônico teve efeitos sobre a independência e imparcialidade do juiz? De que maneira?

Q7. O processo judicial eletrônico teve efeitos sobre o devido processo legal? De que maneira?

Q8. Para além do Processo Judicial Eletrônico, outras tecnologias da informação são ou podem ser usadas nos tribunais. Referindo-me ao uso da videoconferência e de aplicações de inteligência artificial, que efeitos têm sobre o respeito aos valores da justiça?

APPENDIX II – INFORMED CONSENT TO PARTICIPATE IN THE STUDY

Acordo de Consentimento Informado:

Título do estudo: Efeitos do uso de Sistemas de Gestão de Casos dos Tribunais no respeito dos Valores da Justiça.

Enquadramento: O estudo é parte do doutoramento realizado no Programa Doutoral em Tecnologia e Sistemas de Informação da Universidade do Minho-PT, sob a orientação dos professores João Álvaro Carvalho, Antônio Henrique Graciano Suxberger e Delfina Soares.

Explicação do Estudo: O objetivo geral deste estudo é perceber como os principais atores do sistema de justiça percebem os efeitos do uso da tecnologia no respeito dos valores da justiça usando, para tal, o Brasil como objeto de investigação. De forma mais específica, pretende-se perceber como e em que medida tais influências são exercidas. Para tal serão realizadas entrevistas com atores do sistema de justiça. As entrevistas serão gravadas, terão posteriormente seu conteúdo analisado e, ao final de 2024, as gravações serão destruídas.

Condições e Financiamentos: Não há financiamento para realização do estudo. Estima-se que a entrevista dure 40 minutos. Os riscos associados à participação neste estudo são praticamente inexistentes.

Confidencialidade e Anonimato: A Universidade do Minho (UMinho) com sede no Largo do Paço, 4710-057, Braga, Portugal ao abrigo da Lei Geral de Proteção de Dados do Brasil (LGPD), Lei 13.709/2018 e da requisitos da Lei de Proteção Geral de Dados da União Europeia, recolhe os dados pessoais solicitados neste formulário, com a finalidade de complementar a análise dos efeitos do uso da tecnologia sobre o respeito dos valores da justiça, e assegura que utilizará esta informação exclusivamente para este fim. Os dados serão utilizados para produção da tese de doutoramento e/ou artigos científicos. Os dados serão anonimizados antes do início da análise de conteúdo, tornando-se definitivamente anônimos. Todos os registros serão mantidos na nuvem pessoal da investigadora principal na Microsoft Office 365 que respeita os requisitos da Lei de Proteção Geral de Dados da União Europeia.

Os entrevistados têm o direito a solicitar informações sobre o tratamento dos seus dados pessoais, a aceder e retificar os seus dados pessoais, à portabilidade dos dados que tenha fornecido, enquanto os dados não sejam tornados anónimos por meio do e-mail: id8325@alunos.uminho.pt

Participação Voluntária: A sua participação no estudo é totalmente voluntária.

Caso pretenda notificar algum aspeto relativo à proteção dos seus dados, deverá fazê-lo, por escrito, dirigindo notificação ao Encarregado de Proteção de Dados da Universidade do Minho (protecaodados@uminho.pt).

Eu Cinara Maria Carneiro Rocha, investigadora principal, contacto telefônico +351 918492971, email id8325@uminho.pt, agradeço antecipadamente a disponibilidade e contribuição para construção do conhecimento proposto neste estudo.

APPENDIX III – EMAIL FOR INTERVIEWEES

Caro Sra/Sr/Dra/Dr XXXX,

Escrevo hoje para confirmar sua participação, já anteriormente agendada, na pesquisa intitulada "Efeitos do uso do PJE sobre a adesão aos valores da justiça" cujo objetivo é explorar a percepção de atores da justiça sobre este tema.

A entrevista deverá durar 40 minutos e está agendada para o dia xx/xx/xxxx, às XX horas e ocorrerá por meio da plataforma Teams.

Aproveito a oportunidade para encaminhar, em anexo, acordo de consentimento informado e solicito sua leitura previamente à realização da entrevista.

Agradeço desde já a colaboração.

Cinara Maria Carneiro Rocha
Pesquisadora principal
Doutoranda em Tecnologias e Sistemas de Informação – Universidade do Minho PT