DOCTORAL THESIS

Digital Transformation of Court Processes: Driving Forces, Success Factors, Regulations and Technology Acceptance

Rozha Kamal Ahmed

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Declaration:
Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology, has not been submitted for any academic degree elsewhere.

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signature

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Kohtuprotsesside digitaalne ümberkujundamine: liikumapanevad jõud, edu tegurid, regulatsioonid ja tehnoloogia vastuvõtmine

ROZHA KAMAL AHMED

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Contents

List of Publications

The present Ph.D. thesis consists of the following collection of publications:

I Rozha K. Ahmed, Khder H. Muhammed, Aleksander Reitsakas, Ingrid Pappel, and Dirk Draheim. Improving court efficiency through ICT integration: Identifying essential areas of improvement. In *Proceedings of ICT4SD'2019 - the 4th International Conference on ICT for Sustainable Development. ICT Analysis and Applications. Lecture Notes in Networks and Systems*, volume 93, pages 449–461. Springer, 2020.

II Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Challenges in the digital transformation of courts : A case study from the Kurdistan Region of Iraq. In *Proceedings of ICEDEG' 2020 - the 7th International Conference on eDemocracy & eGovernment*, pages 74–79. IEEE, 2020.

III Rozha K. Ahmed, Silvia Lips, and Dirk Draheim. eSignature in eCourt systems. In *Proceedings WorldS4'2020 - the 4th World Conference on Smart Trends in Systems, Security and Sustainability*, pages 352–356. IEEE, 2020.

IV Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Impact of e-court systems implementation: a case study. *Transforming Government: People, Process and Policy*, 15(1), 2021.

V Rozha K. Ahmed, Khder H. Muhammed, Awat O. Qadir, Soran I. Arif, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation: A proposal based on a comparative case study. In *Proceedings of EGOVIS'2021 - International Conference on Electronic Government and the Information Systems Perspective. Lecture Notes in Computer Science*, volume 12926, pages 115–128. Springer, 2021.

VI Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, and Dirk Draheim. e-court system evaluation through the user ' s perspective : Applying the end-user computing satisfaction (EUCS) model. In *Proceedings of DGO' 2022 - 23rd Annual International Conference on Digital Government Research*, pages 293–299. ACM, 2022.

VII Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, Aleksander Reitsakas, and Dirk Draheim. The role of digital transformation in fostering transparency : An e-court system case study. In *Proceedings of I3E'2022 - the 21st IFIP Conference on e-Business, e-Services, and e-Society*, volume 13454 of *Lecture Notes in Computer Science*, pages 219–230. Springer, 2022.

VIII Rozha K. Ahmed, Khder H. Muhammed, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation. *SSRN Electronic Journal*, pages 1–20, 2022.

IX Rozha K. Ahmed, Aleksander Reitsakas, Khder H. Muhammed, Soran AB. Saeed, Ingrid Pappel, and Dirk Draheim. System model of the Sulaymaniyah Appellate Court e-court system. *SSRN Electronic Journal*, pages 1–107, 2022.

Author's Contributions to the Publications

I The author of this thesis is the lead author of this article (first author and corresponding author), responsible for the majority of the article content, including data collection, data analysis, and manuscript writing.

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Abbreviations

ADR	Action Design Research
AI	Artificial Intelligence
CMS	Court Management System
CRMS	Court Records Management System
DSS	Decision Support Systems
e-CODEX	e-Justice Communication via Online Data Exchange
eID	Electronic Identification or Electronic Identity
EUCS	End-User Computing Satisfaction
ICT	Information and Communications Technology
IS	Information Systems
IT	Information Technology
KRG	Kurdistan Regional Government
KRI	Kurdistan Region of Iraq
ODR	Online Dispute Resolution
RQ	Research Question
TAM	Technology Acceptance Model
UIS	User Information Satisfaction
UTAUT	Unified Theory of Acceptance and Use of Technology
WS	Web Service

Terms

e-Court	electronic court, is the court case management system that automates the workflow of courts. [103].
e-Document	“electronic document means any content stored in electronic form, in particular text or sound, visual or audio-visual recording” [39].
e-Government	“electronic government, the provision of government information and services by means of the internet and other computer resources” [1].
e-Service	“electronic service, the use of electronic technology by an organization to provide services to its customers” [1].
e-Signature	digital and electronic signature “means data in electronic form which is attached to or logically associated with other data in electronic form, and which is used by the signatory to sign” [39].
Framework	“a set of beliefs, ideas or rules that is used as the basis for making judgements, decisions, etc. or the structure of a particular system” [2].

Summary

In a world that is moving toward digitization and e-services, this thesis reflects a contribution to the digital transformation of court processes. It unfolds the development and evaluation activities undertaken to implement an e-court system as a design science effort [66, 98, 50] in the Kurdistan Region of Iraq (KRI).

This thesis is a summary article reflecting a compilation of nine published articles, with copies of the articles presented in the appendix.

This thesis is structured as follows. Section 1 lays out the research problem statement and motivation and explains the research objectives, along with research questions. Section 2 provides an overview of the relevant literature. Section 3 explains the research design. Section 4 spells out the results of the research questions and demonstrates how these results contributed to evaluating the KRI e-court system. Section 5 highlights the major contributions of this thesis. Section 6 enumerates some of the limitations and challenges of this work and suggests some directions for future improvements. Finally, Section 7 is dedicated to concluding remarks.

1 Introduction

1.1 Problem Relevance

Based on the insights obtained from relevant studies, the following knowledge gaps were identified to be addressed by this work:

- Lack of efficiency and effectiveness of court processes in the conventional paper-based systems concerning: slow manual case registration; problems with paper registries such as duplication of data across all registries and difficulty in searching and indexing; time-consuming manual case transfer between institutions; an inefficient notification system; non-transparent processes, i.e., in manual case allocation to judges and difficulty of tracking document content modifications; unsecured court case files; and unreliable manual statistics [71, 70, 123, 125, 121, 131, 102, 101, 75]. Additionally, in the case of a system that is based on paper, there is a greater chance of the paper being mishandled, fraudulent changes being made to the documents, or content being lost in the case of large piles of paper dossiers. Furthermore, the quality of service delivery and the efficiency of court processes are critical aspects of global justice systems [34, 37, 31, 30]. Consequently, implementing e-court systems as a digital solution would be essential to addressing the aforementioned challenges and providing better justice services, enhancing citizen trust, improving the efficiency and effectiveness of internal administration processes, and ensuring increased security and transparency of case document management, i.e., by using a timestamp and logging each modification and access to the document, as well as all other activities [102, 94, 4, 45, 114, 117, 87].

- There has not been a lot of attention paid to developing and undeveloped countries in the digital transformation of justice systems. Many countries worldwide are eager to step into digital transformation; however, many developing and undeveloped countries are faced with several issues and challenges "linked to multiple contextual factors such as resource limitations, a lack of digital infrastructure, and insufficient capacities or capabilities" [112]. Relevant literature has presented several technology applications in justice systems from developed countries in Africa [71, 70, 10, 11, 122, 63], America [64, 14, 15, 59, 29, 41], Asia [125, 124, 28, 78, 102, 65, 49, 47, 48, 11, 45, 23, 44, 42, 43, 94, 95, 79, 120, 82, 18, 92, 93, 58], Australia [108], Europe [37, 18, 114, 82, 103, 52, 104, 116, 34, 23, 4, 96, 68, 105], and New Zealand [67]. As a result, presenting a new experience from a different geographical region such as KRI, located in a developing country such as Iraq with several challenges related to political transitions, insecurity, budget and economic disorders, and a lack of digital infrastructure [106, 107] would significantly broaden the knowledge of academics, decision-makers, and practitioners in the justice domain who are planning to implement e-court systems in particular in countries with similar challenges.

- Another challenge identified in the relevant studies on the integration of information and communications technology (ICT) into justice systems is that they are more descriptive in nature, i.e., they simply present knowledge in relevance to the system description and design, system prototype, and specifications [71, 70, 123, 125, 121, 131, 102, 101, 57, 49, 42, 95, 45, 75, 122, 92, 93]. Furthermore, while measuring the impacts of ICT integration into judicial systems and the services they offer is an essential concern for the evaluation and assessment of justice efficiency and effectiveness [37], marginal studies have been conducted to define the efficiency improvements in time and cost reduction [64, 42, 95, 70] and user acceptance of

the information system [126, 23, 46, 130, 4]. Therefore, a comprehensive study with the design science effort [50] that combines the processes of the artifact development as a digital solution for courts and its evaluation through several empirical studies [66, 50, 98, 19] would yield a significant resource for other countries to refer to when deciding or planning for a transition to digitization, as it would serve as a package combining the entire digital transformation process-related aspects encompassing court process re-designing and implementation of the system; identifying areas of improvements after the system implementation; identifying potential challenges; measuring user acceptance and satisfaction with the new system; and exploring regulatory support.

- The KRI has developed a long-term plan for transitioning to e-government. Providing such an e-service pilot project along with an in-depth analysis would provide a pathway for the government to draw up future digital inclusion plans more efficiently.

1.2 Objectives

The efforts in this work aim to contribute to filling the stated gaps through the following objectives:

- To design and implement an e-court system for transforming the conventional paper-based system into a digital and systematic one to offer better, faster, and more efficient justice delivery to citizens and to improve internal administrative processes.
- To introduce the e-court system at the KRI as a first step in the digital transformation of justice. Then, present this new experience from a different location, such as the KRI, to academic researchers, practitioners, and the scientific community.
- To evaluate the system implementation from different perspectives, such as determining improvements in efficiency and effectiveness of court processes and system impacts, identifying challenges and barriers that could be faced during the system implementation, examining court user satisfaction with the solution and change management, and finally, investigating the gaps in rules, laws, and regulations through several empirical studies.
- To present results to the Kurdistan Regional Government (KRG) as a first e-service pilot project in justice digital transformation in order to address the discovered challenges before moving to the next stages in digitizing other services in other domains.

1.3 Research Questions

A main research question (RQ) and four sub-research questions were defined to be answered as follows:

- RQ: How to utilize ICT to improve the effectiveness and efficiency of court processes?

  This question aims to examine the essence of integrating ICT tools into court processes.

  - RQ.1: Which areas are improved by the post-digitalization of court processes?
    This question aims to identify significant improvements in court processes after the system's implementation.

- RQ.2: What are the major challenges faced by the digital transformation of court processes?

  This question aims to identify the main issues and challenges emerging during the system's implementation.

- RQ.3: What are the users' perspectives on the e-court system, and how satisfied are they with performing daily operations through the digitalized system?

  This question aims to understand the user satisfaction of the system toward change management in their daily processes and whether they consider the e-service a success.

- RQ.4: Which laws are missing for the e-court system, and which regulations are required for e-government implementation?

  This question aims to identify essential laws and regulations to be introduced to allow proper usage and application of technological tools in courts and a smooth operation of a paperless e-court system and beyond, paperless public administration in general.

Table 1 presents the aforementioned research and sub-research questions that are addressed accordingly in separate published articles:

Table 1: Publications and associated research questions

Research Questions	**Publications**
RQ	[I, II, III, IV, V, VI, VII, VIII, IX]
RQ.1	[I, IV, VII]
RQ.2	[II, III]
RQ.3	[VI]
RQ.4	[V, VIII]

2 Relevant Studies

The author has continuously conducted a thorough analysis of the state of the art from the beginning of her study in 2018 to 2022 to maintain a continuous reflection on the related work. Scopus, IEEE Xplore, and the ACM Digital Library were searched using the keywords and query ((Court AND (digital OR electronic OR digitalization)) OR (e-court OR eCourt OR e-justice OR "court information system" OR "case management system"). The author has reviewed a total of 572 articles and used the most relevant studies in her publications and thesis.

The presented work in this section provides an overview of the relevant information obtained from the related literature as well as how this thesis will contribute to the knowledge base [50] by addressing the current gaps with regard to the research questions presented in Section 1.3.

2.1 The Digital Transformation of Court Processes

In this section, the author analyzes only studies relevant to e-court system implementation to digitize court workflow, excluding studies relevant to court websites [59], electronic systems for litigants and advocates [6, 57], systems for prosecutors [52], and decision support systems (DSS) [69, 48, 68, 120], or any other use of ICT in the justice systems [40, 15, 116, 79, 110, 64]. Consequently, this section analyzes nine examples to give a cross-section of nations that have introduced solutions to digitize court workflow. This section concludes by comparing the KRI's e-court system to the nine presented examples.

In Botswana, a court records management system (CRMS) was presented in [71, 70]. The system manages civil and criminal cases. The system was piloted at Botswana's Lobatse High Court in 2004 and expanded to Magistrate's Courts in 2006. The system was introduced to maintain court records, preserve files and information for speedy retrieval, and improve service delivery. Furthermore, to address missing court case files, unreliable statistics, difficulty updating registries, access to judgments, slow responses to litigant requests on case status, resource allocation, inefficient financial reporting, and a lack of coordination and case file information sharing between institutions.

In Canada, an e-court system was presented in [123]. The system manages judicial family law related cases. The system was introduced at Nova Scotia's Supreme Court in 2017 and went live in 2020; however, it initially involved only parties with legal representation, such as lawyers, and was planned to be expanded to include self-representation at a later stage. The system requires judges' and parties' consent to be used. The system was created to provide a new way for case processing and to address slowness, cost, divisiveness, and complexity. The electronic system is a new "chat-based court process" to provide a new way of processing cases and "chat room" for communication between a judge and the individual parties. However, there is no video, and communication is done by typing.

In China, a service-oriented digital court framework as a model-driven collaborative development platform for civil courts was proposed by [125] to enable distributed users of digital courts to work collaboratively. Further studies by [121, 131] demonstrated China's recent progress in integrating a range of newer technologies into court processes. The Chinese judicial system entered a new phase of transition in 2017 with the deployment of a smart court system to improve access to justice. The system is designed using advanced technologies such as artificial intelligence (AI) and blockchain. In 2018, Hangzhou Internet Court became the first court in China to recognize blockchain technology as a means of storing evidence. Moreover, in 2018, China's courts also developed a mobile application as the mobile micro court to allow litigants to complete the entire case process online. The application has been very significant during the COVID-19 pandemic and lockdown.

In India, an e-court system was presented in [102, 101]. The computerization of Indian courts began in 1990; however, e-judiciary was initiated in 2003, and the e-court system was started in three phases in 2005. During the three phases, all requirements are met, such as the preparation of infrastructure, hardware, and software; training; arranging technical staff; connectivity; backup power; video conferencing; digital signatures; process re-engineering; management; and monitoring of change. The system was developed to improve court process efficiency, and they are working to improve the system's performance by presenting a new algorithm to improve the case dispensation process.

In Indonesia, an e-court system was presented by [57, 49]. The system was launched by the Supreme Court in 2018. The system was created to facilitate the administration of justice. Both of the terms "e-court" and "e-litigation" are used "interchangeably when Indonesian judicial officers refer to the application that facilitates the administration of cases and trials in court electronically"[57].

In Malaysia, three different systems were introduced to improve the management process of court cases. A study by [42] presented an e-court system in the High Courts in Kuala Lumpur and Kuching, Sarawak, for managing civil cases. Further studies by [95, 126] presented the E-Shariah/E-Syariah system in Shariah courts in Malaysia. The system was developed in 2002 for Shariah cases. The system effort has failed to reach its full potential because of the differences between state laws in different jurisdictions, the fact that the application of E-Shariah is not uniform, the institutionalization of E-Shariah is taking longer than planned, and the large number of courts at various stages of maturity. The system does not support the recording of trial proceedings. Furthermore, a study by [45] demonstrated the implementation of an online dispute resolution (ODR) system in the e-court system for e-commerce cases.

In Nigeria, a study by [75] reported the integration of a number of ICT tools into court processes to ensure more effective criminal trial case flow and more transparent and timely administration. The study reported on separate applications for pre-trial, during the trial, and after the trial, when the final verdict is issued.

In Rwanda, a study described an Integrated Electronic Case Management System by [122], that automates the case management workflow of civil and criminal cases in Rwanda. The system was designed and implemented in stages. At first, a module for police to track criminal investigations was introduced in 2015. The prosecution, courts, and Rwanda Correctional Services were added gradually, and the final system was delivered in 2016.

In Thailand, the initial design and prototype of a court management system (CMS) and Web Service (WS) software and system architecture were presented by [92, 93] to be implemented in the Central Intellectual Property and International Trade Court to improve the court processes.

Comparing the implemented e-court system in the KRI [1] to the examples presented in this section, based on the detailed description of the system as information technology (IT) artifact along with its implemented features and functionalities as presented in the publication [IX] and further details in the publications [I, IV], the following conclusion can be drawn:

[1]The legal structure of the courts in Kurdistan follows the legal system of Iraq and is composed of one Supreme Court and several Appellate Courts. The Supreme Court is located in Erbil, the Kurdistan region's capital. The Supreme Court administers four appellate courts in the cities (Erbil, Sulaymaniyah, Duhok, and Kirkuk). Every appellate court administers several sub-courts from both civil and criminal jurisdictions. The Sulaymaniyah Appellate Court is located in Sulaymaniyah City, in the north of Kurdistan. Currently, the Sulaymaniyah Appellate Court and all its sub-courts are functioning through the e-court system.

First, most of the presented models are capable of managing one type of proceeding. The current e-court system, similar to the system models of Botswana [71, 70] and Rwanda [122] is capable of managing both civil and criminal proceedings, where cases related to personal and family status, civil status, and commerce are all under civil jurisdiction. Furthermore, the Sulaymaniyah Appellate Court's new system is able to manage court certificate proceedings [2] in addition to court cases [IX] that were not stated in the other studies.

Second, the system was initiated in 2014 and introduced as a pilot system in 2018, with the complete version being delivered to all courts in 2021 [IX]. Similar to the experiences presented in different studies [71, 70, 123, 75, 92, 92], the digital system aimed to address several challenges associated with the paper-based conventional system. These challenges in the KRI were: difficulty in managing paper registers; a slow process of manual case registration and repetition of information across all registries; manual case allocation to judges; unsecured court case files; none-transparent processes; manual case transfer; an inefficient notification system; and difficulty in searching and indexing.

Third, similar to the cases of India [102, 101] and Rwanda [122], the system has been introduced in phases and gradually added to the courts. After the infrastructure and network were established in the Sulaymaniyah Appellate Court, the e-court system has been implemented in several phases, including planning, analysis, design, implementation, testing and integration, monitoring and support, and parallel end-user training [IX].

Last, in terms of functionality and features, the author extracted all of the features presented in the aforementioned nine experiences and compared them to features of the KRI system. Table 2 presents the comparison of features. This mark ($*$) is assigned to the features that exist but are implemented differently.

Table 2: A summary of the features comparison

Features	Botswana [71, 70]	Canada [123]	China [125, 121, 131]	India [102, 101]	Indonesia [57, 49]	Malaysia [42, 95]	Nigeria [75]	Rwanda [122]	Thailand [92, 92]	KRI [IX,I,IV]
Case submission, registration, and management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Summons management		✓			✓			✓		$*$
Hearing management and scheduling	✓	✓	✓			✓	✓			✓
Queue management						✓				✓
Fee management	✓				✓				✓	✓
Document management						✓			✓	✓
User roles and permissions								✓		✓

Continued on next page

[2] Certificates are documents to be issued by courts to certify certain aspects, i.e., birth, death, marriage, and others. The certificate proceedings are not court cases but are processed similarly to cases, but the process is without hearing. Each certificate type has its own fixed template set by the courts. In the Sulaymaniyah Appellate Court, certificates are issued by the Personal Status and the Personal Items courts.

Table 2 – continued from previous page

Features	Botswana [71, 70]	Canada [123]	China [125, 121, 131]	India [102, 101]	Indonesia [57, 49]	Malaysia [42, 95]	Nigeria [75]	Rwanda [122]	Thailand [92, 92]	KRI [IX,I,IV]
Central database							✓		✓	✓
Reports and statistical data	✓					✓		✓		✓
Public portal			✓			✓				✓
Publishing the final judgement	✓				✓		✓			✓
Document distribution									✓	✓
Log of case activities								✓		✓
Case tracking	✓								✓	✓
Events registration									✓	✓
Efficient searching									✓	✓
Information sharing and data exchange			✓					✓		✓
Public service center	✓									✓
Electronic payment					✓					
Video conferencing				✓		✓	✓			*
Trial recording						✓	✓			*
Library management						✓				
Communication channel		✓								*
AI for voice-to-text			✓							
Blockchain for storing evidence			✓							*
Case-law of old decisions										✓
Bar-coded digital and physical case files										✓
Multilingual system										✓
User management interface										✓
Case status management										✓
Robust statistics										✓
Activity update with electronic notification										✓
Case archiving										✓
Automatic case distribution										✓
Case referral										✓
Linking and suspending cases										✓

Continued on next page

It can be noted that the KRI e-court system covers most of the functionalities that are presented in the nine examples in this section [I, IV, IX]. In particular, it covers all the features presented in the cases of Botswana [71, 70], Rwanda [122], and Thailand [92, 92].

However, there are five features in the table that are implemented in different ways. These features are: summons management, in the KRI system, summonses are managed electronically and generated from the system, however, they are delivered to the participants on paper, not via email, phone calls, or SMS as in the examples from Canada [123],

Indonesia [57, 49], and Rwanda [122]; video conferencing and recording, as the current system is supplied with separate equipment for conferencing and recording but is not integrated into the e-court system like the ones in India [102, 101], Malaysia [42], and Nigeria [75]; for the communication channel, in the case detail view of every case is equipped with a note area that allows participants to chat and communicate, which is implemented differently from the chat room model existing in Canada [123]; furthermore, regarding the blockchain for evidence as presented by studies from China [125, 121, 131], in the current system, every activity on cases and documents is recorded, and there is a log history of all activities [I, IV, IX].

There are three features that are not present in the current e-court system, such as library management as in the Malaysian e-Shariah system [95], electronic payment that is present in the Indonesian court system [57, 49] due to the lack of an internet banking system in the KRI, and features of AI for voice-to-text during the hearing sessions as in the Chinese modern court system [125, 121, 131].

Furthermore, it can be noted that there are certain features that are implemented in the KRI system but not stated in other studies; these include case-law, bar-code, multilingual system, user management, case status management and implementation of 13 statuses, comprehensive statistics view, electronic notification to participants on case updates, possibility to archive old closed cases, automatic case distribution, electronic case referral from one court to another, linking cases together, and suspending cases. A detailed description of all implemented functions and features is presented in the publication [IX].

2.2 Court Processes and Digitization Impact

Different studies approached the analysis of the impact of court process digitization in different ways. Broadly, all studies have described the benefits of court process digitization with respect to improving the efficacy of the justice administration, including promoting process transparency, faster case disposal, time and cost saving, concurrent access to justice, information integrity, better document management, better hearing scheduling and management, easier access to justice, and better case registration [59, 6, 52, 40, 15, 116, 79, 110, 64, 71, 70, 123, 125, 121, 131, 102, 101, 57, 49, 42, 95, 45, 75, 122, 92, 93]. However, only the four following studies empirically evaluated the improvements.

Saman and Haider [95] found that the standardization of work processes and a higher rate of case resolution were both notable improvements.

Luzuriaga and Cechich [64] studied the improvements of integrating the electronic notification system into the e-court system and revealed that electronic notification will result in cost and time reduction.

Hamin et al. [42] examined the benefits and achievements of adopting ICT in court systems and presented a number of improvements, including faster case disposal, enhanced court performance, simplification of work processes, a better overview of cases and monitoring, and cost and time efficiency.

Mosweu and Kenosi [70] analyzed the improvements after implementing the court records management system, and the findings showed that the record management system ensures better case data retrieval and more efficient preservation and disposition of court records.

In contrast, the author of this thesis conducted an in-depth analysis of the improvements after the implementation of the e-court system in the KRI through three publications. In the publication [I], preliminary findings identified four major areas for improvement: improved daily operations (case management, registration, notification, referral,

statistics, information retrieval, and case distribution); enhanced security; expanded access to the judiciary; and increased transparency. The publication [IV] extended the analysis and presented ten significant improvements in the areas of transparency in the internal daily operation; security of court cases; extended access to the judiciary through remote access; electronic registers with a more organized view; document generation that is accelerating the judgment process; fair and transparent automatic case distribution; more robust and faster statistics; more efficient electronic case registration; faster case transfer between institutions; and electronic notification for faster information sharing. Furthermore, in the publication [VII], the author conducted a more in-depth analysis of transparency, which was identified as one of the most significant improvements following the implementation of the e-court system, and noted that the use of the e-court system improves court process transparency. It should be noted that related work did not investigate transparency and security as improvements post-digitalization of the court system.

On the other hand, the author was not able to evaluate the reduction in paper usage and time savings [64, 42] in most of the processes in the current implemented e-court system due to the fact that there is a lack of a digital signature and eID, and therefore, court processes are managed in both digital and paper formats in parallel [II, III].

2.3 Main Challenges and Barriers

The process of digital transformation of court workflow and integration of ICT tools into court processes is not only about the application of technology, but it will also involve some potential tensions between organization and technology, such as organizational changes, procedural standardization, re-engineering of work processes, and user involvement [81]. Different nations face different challenges according to the country's settings and maturity level in different aspects, including technological infrastructure, regulatory framework, and cultural aspects. It is vital to share knowledge regarding the risks and challenges associated with the digitalization of justice systems in order to provide lessons for those who intend to start the process.

Several studies, including [81, 127, 115], have investigated the challenges faced by various e-justice systems and linked them to institutional changes and regulatory frameworks, additionally, the security of court case files and data considered one of the critical associated risks [43]. On the other hand, [102, 122, 3] identified a number of critical success factors for efficient and effective digitization of court processes to avoid failure risks. The author limited the scope of this section to the challenges encountered during the implementation of the e-court system.

Watson et al. [122] presented some challenges, including limited human resources; user resistance to change; promotion of public awareness to use the system; unavailability of a reliable internet connection; adapting to scale the system fully as one package; time management and the difficulty of requirement change management; and concluded with a lack of a supportive regulatory framework.

Motsaathebe and Mnjama [71] also presented several challenges, such as the lack of a regulatory framework and policy; the need for trained professionals and skilled staff, in particular, the system manager; the shortage of storage space at the courthouse; and the vulnerability of the system to potential security risks.

Mosweu and Kenosi [70] reported that, in addition to the lack of a regulatory framework, the system access being limited to only court personnel is a challenge for other users such as police officers, the general public, lawyers, and prosecutors who are involved in the process; additionally, an unstable internet connection negatively affects system usage; the need for staff training and security breaches are also considered notable issues.

Kharlie and Cholil [57] added challenges from their experience, including data security and confidentiality; users' resistance to change; required costs for building the infrastructure and providing technology equipment; and a lack of skilled users to understand the use of information systems, in particular, for those who live in rural areas.

Both of the studies by Lowry [63] and Saman and Haider [95] considered the lack of a national regulatory framework as a challenge for the design and implementation of the system.

Williams [123] mentioned that one of the system's challenges is the risk of security and privacy breaches, as well as the lack of a storage system for records, which forces users to print the data and add it to the physical file.

Helmi [49] also considered the lack of skilled personnel to use sophisticated technology to process cases as one of the system's significant challenges.

Wang [121] and Yu and Xia [131] presented concerns about privacy and data protection; internet connection stability; the digital divide and skilled users; and the acceptance of automated judgments by users.

In the publication [II], the author of this thesis investigated the challenges associated with the implementation of the e-court system in the KRI. The findings revealed seven challenges: a lack of digital signatures; a lack of IT-skilled personnel; a lack of ICT-related laws to support ICT tools' application in court processes; external issues such as hardware and electricity shortages, as well as the instability of internet connections outside the courthouse; a low rate of use of public portals; a need for ongoing training programs; and a lack of human resources.

It should be noted that the majority of challenges are similar across studies, and a lack of regulatory framework is a common barrier to digitizing any process in the court system. The absence of a digital signature was identified by the author as a new challenge that had not previously been identified by other studies. The absence of a digital signature was regarded as the most difficult challenge for the KRI's e-court system, which limited the system's ability to be fully paperless. Consequently, the author conducted a more in-depth investigation into the digital signature for the implementation of e-court systems in the publication [III]. According to the findings, the availability and validity of e-signatures are critical for the implementation of e-court systems in order to save time and money and develop a completely paperless system. Furthermore, while the security of court cases and documents is viewed as a potential risk to the e-court system's use [43], findings of the publication [III] pointed out that the valid e-signature in e-court systems ensures the security and integrity of the court documents. Consequently, in addition to the absence of a proper legal framework, the lack of a digital signature poses a significant challenge and is a barrier to implementing an entirely paperless e-court system.

2.4 End-User's Perspective

Several studies demonstrated that end-users are critical players throughout the digitalization process, and their satisfaction with the solution after the system has been implemented is significant for further improvements [26, 53, 97, 55]. User views are addressed differently by related studies. Among the studies extracted from the literature review process, the author identified five relevant articles related to users' views to be analyzed for this section.

Yahya et al.[126] examined user acceptance of the e-Syariah portal by utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT) model [119] as a theoretical framework. The e-Syariah was defined as an online portal to link all Syariah courts in Malaysia for Islamic judiciary related cases. The study found that the e-Syariah Portal was

successful from the users' perspective.

Deligiannis and Anagnostopoulos [23] investigated the acceptance of the judicial ICT system by judges and court officials in Greece. The study employed a Technology Acceptance Model (TAM) [22] as a theoretical framework. The findings revealed that they are capable of using ICT technologies and office applications. However, they seemed cautious about using the new digital system for justice.

Dotto and Mwantimwa [46] investigated the use of an e-records management system in Tanzanian courts and adapted some attributes from both the TAM [22] and the Technology Acceptance Model 3 [118] to construct a theoretical framework. Results revealed that the system did not meet the users' expectations and was ineffective due to the end-users capacity; they preferred using a paper-based system.

Yu [130] identified the factors influencing e-justice system adoption in China. The study found that users are more likely to use e-justice services if they are easy to use, useful, and trustworthy.

Agrifoglio et al. [4] analyzed the information systems success of the case management system in the Italian courts and investigated its success factors using DeLone and McLean's Information Systems (IS) Success Model [24]. The IS model considers user satisfaction as a vital variable for the system's success. The study concluded that system quality, information quality, and system use positively influence user satisfaction, and user satisfaction influences individual impact. Furthermore, [4] noted that the higher the quality of the system and the greater the information it provides, the more the system will contribute to the user's job performance.

The author of this thesis observed that none of the available studies have addressed user satisfaction following the implementation of the e-court system, and thus this research gap was filled with the publication [VI]. The author examined several relevant frameworks and models that exist to evaluate the success of information systems and technology integration into an organization's business processes. It is discovered that user satisfaction has received significant consideration as a success indicator of the information system and is one of the critical factors in understanding the user's perception of the effectiveness and efficiency of the adopted system [26, 53, 97]. It is noted that "the success of e-justice efforts depends, to a great extent, on the satisfaction of the direct stakeholders of these services, in general, judges, prosecutors, legal authorities, administrative staff, and citizens" [55]. Therefore, among the various models, which include the developed instrument presented in [12] for measuring overall computer user satisfaction, the User Information Satisfaction (UIS) model presented in [53]; the TAM presented in [22]; the UTAUT model presented in [119]; the Information System Success Model presented in [24], the author has chosen the End-User Computing Satisfaction (EUCS) model presented in [26] as a theoretical framework for the research. The findings of the publication [VI] revealed three significant results, such as that the EUCS model is valid and reliable for e-court systems, as this model has not been validated before; end-users were satisfied with the new e-court system in the KRI; and finally, end-users considered e-court a successful and reliable system to perform daily tasks.

2.5 Regulatory Framework

A legal framework is fundamental to any electronic government ecosystem to ensure effective service delivery [V]. Legal issues must be addressed at the early stages of digitalization to facilitate valid transformation while protecting citizens' rights [73, 74].

The regulatory framework was viewed as essential for digitally transforming judicial systems. Relevant studies showed that when a new technology paradigm is introduced

in courts, the process should be supported by relevant laws, regulations, and policies to validate and standardize the use of the new technological tools [115, 71, 70, 95, 63]. Hence, there is a need to establish a regulatory framework on the national level to influence and standardize the processes on the technical level for the design and implementation of the system [63].

Available studies considered the absence of a regulatory framework as a challenge, but no study has conducted an in-depth analysis of what can be done in respect of introducing new laws and amending the existing ones.

In this regard, the author of this thesis examined the current situation in the KRI through two publications and proposed a new legal framework. The publication [V], shows that creating a legal framework needs careful analysis and study of laws in any country that wants to start the digital transformation. It is also advisable that overregulation be avoided [73, 74]. New laws might not be needed for every matter, but existing laws can be amended if required to fit the smooth transformation of the government towards digitization, providing legal validity for electronic data and transactions. Because e-court systems are a type of information system that is considered a component of the overall e-government infrastructure, the relevant laws that support the operation of e-government also apply to specific domains such as e-courts. All general laws established at the higher level are generic, and each specific domain will use them. The study proposed a new legal framework that can be established for specific domain laws, such as an e-court system, and general laws relevant to e-government. Furthermore, in the publication [VIII], the author conducted a deeper analysis and extended the work given in the publication [V] and developed a guideline for implementing the proposed framework.

3 Research Design

Digital transformation is aimed at increasing the efficiency and effectiveness of working processes, supporting sustainable government development, and leveraging public trust [112, 37], through the application and practice of technological tools for "the development, implementation, operation, and maintenance" of IT-based systems [66].

In the context of solving a problem through creating information systems, generally, design science is the proper methodology, which is fundamentally focused on building innovative and valuable IT artifacts to meet business needs and generate organizational changes [50, 113, 77, 66]. Design science research consists of two main activities: building and evaluating. The building component is in charge of constructing an artifact to address a specific problem, and the evaluation component is available for assessing the artifact's performance and added value [66, 98, 50]. Further research is focused on action design research (ADR) for developing and evaluating IT artifacts to improve an organization's capabilities through the design and release of multiple versions of technology with a specific type of information system [98, 72, 19, 21].

This work adopts the principles and practices of both design science and ADR to ensure that the designed and developed artifact contributes to the justice domain and solves several problems relevant to case management and daily operations in courts [IX]. The system was developed based on a rigorous method and has been evaluated through different approaches of qualitative and quantitative studies.

For building the artifact, an agile software development approach was considered to: produce high-quality software with different iterative activities focusing on knowledge-sharing with the active participation of project stakeholders; organize actively engaged team members to react efficiently to change requests combined with flexible design; reduce documentation; provide several training sessions; ensure production of a high-level successful software [9, 7, 8, 25, 13, 16, 51, 17, 5, 132, 61]. The description of the e-court system as an executable artifact is covered in the publication [IX].

Building an artifact demonstrates its feasibility in its environment, but it must be evaluated scientifically to determine if it has made any progress and "how well" it works [66]. Evaluating an artifact provides researchers with valuable feedback about the problems that need to be resolved in order to enhance the product's quality [50]. Evaluation requires empirical and qualitative studies to define metrics and measures that assess the performance of an artifact [66, 50, 98, 19]. A crucial measure for evaluation is determined through the "efficiency and effectiveness of the artifact, and its impacts on the environment and its users", where efficiency and effectiveness are dependent on "significant improvement" after the implementation of the artifact [66].

Therefore, the system has been evaluated against four essential factors: i.e., identifying the improvements following the system implementation; identifying the challenges and issues to be considered for the next software version in other courts; assessing the system from users' perspectives and their satisfaction with the new digital system; and finally, delving into the laws and regulatory support through analyzing available relevant laws to support electronic transactions. The evaluation of the system is covered in the publications [I, II, III, IV, V, VI, VII, VIII].

Figure 1 presents an overview of the research design along with publications relevant to each stage and associated research questions.

Concerning the employed research methodologies in the published articles, the case study methodology is considered a best practice in the design science paradigm for conducting an in-depth analysis of the artifact in its business environment [50]. Therefore, during the evaluation phase, case study methodology has played a significant role in con-

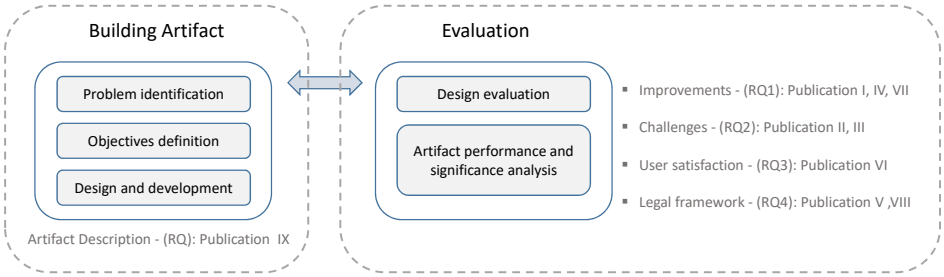

Figure 1: Research Design

ducting an in-depth assessment and investigation to provide valuable and extensive knowledge about the topic [128, 129] in the majority of the publications. Furthermore, the author has analyzed different frameworks and models to evaluate user satisfaction and system success and employed the EUCS model as a theoretical framework.

The author used a triangulation of multiple sources of data such as surveys, expert interviews, personal observations, and document analysis in an attempt to strengthen and validate research results and generate a more comprehensive picture of the context by obtaining various perspectives on the subject [128, 129].

For the data analysis, the author relied on RQDA[3] for qualitative data and IBM SPSS Statistics[4] software for quantitative data.

Table 3 summarizes the research methodologies and data sources for each publication.

Table 3: Publications' research approach

Publication	Methodology	Qualitative	Quantitative	Expert interviews	Personal observation	Document analysis	Legal databases	Survey	Business requirements
[I]	Case study	✓		✓	✓	✓			
[II]	Case study	✓		✓	✓	✓			
[III]	Case study	✓		✓	✓	✓			
[IV]	Case study	✓		✓	✓	✓			
[V]	Comparative case study	✓				✓	✓		
[VI]	EUCS model		✓			✓		✓	
[VII]	Case study	✓	✓	✓	✓	✓		✓	
[VIII]	Comparative case study	✓				✓	✓		
[IX]	Agile software development for artifact design and development								✓

[3]https://rqda.r-forge.r-project.org/

[4]https://www.ibm.com/products/spss-statistics/details

4 Evaluation

The evaluation of a new artifact in an organizational setting provides the possibility to use both empirical and qualitative methodologies [50]. The evaluation procedure is essential for observing and assessing how effectively the artifact contributes to a solution for an existing problem by comparing the set objectives of a solution with the actual outcomes attained by utilizing the artifact in the demonstration [77].

This section demonstrates the evaluation of the research through the RQs results and how they have contributed to filling gaps in the state of the art; furthermore, the section spells out how the results of the RQs have met the study's objectives as follows:

- RQ: How to utilize ICT to improve the effectiveness and efficiency of court processes?

  Table 4 summarizes the RQ results with associated publications compared to the current knowledge gaps.

Table 4: A summary of the RQ results with associated publications and current knowledge gaps

Results and associated publications	**Current knowledge gaps**
All nine publications are relevant to the main RQ. – The description of the artifact and its implemented features and functionalities is presented in the publication [IX], and its evaluation is presented in the publications [I, II, III, IV, V, VI, VII, VIII]. – The e-court system as an executable artifact has been designed and developed to increase organizational performance in courts, it has been validated in the organizational context, and it has been implemented in all courts that are under the administration of the Sulaymaniyah Appellate Court in the KRI. – The system has digitized all court processes and addressed the challenges related to the paper-based system in terms of efficiency and effectiveness. – The system is able to manage court cases of both jurisdictions of civil and criminal cases, as well as court certificate proceedings. – The system is equipped with all the features and functionalities required for everyday court operations in all KRI courts.	In Section 2.1, a review of related literature shows that the majority of the implemented systems are capable of managing a single type of case, i.e., civil or criminal. A few examples were presented that managed both jurisdictions, while no study described the system's capability of managing court certificate proceedings. Table 2 in Section 2.1 demonstrates that the KRI e-court system is most complete and way beyond the state of the art in terms of the integrated features and functionalities to assist users with daily court operations.

- RQ1: Which areas are improved by the post-digitalization of court processes?

Table 5 summarizes the RQ1 results with associated publications compared to the current knowledge gaps.

Table 5: A summary of the RQ1 results with associated publications and current knowledge gaps

Results and associated publications	**Current knowledge gaps**
Three publications are relevant to the RQ1. – In the publication [I], the preliminary result of the study identified four main improvements, such as internal daily operations, security, concurrent access to the judiciary, and transparency. – In the publication [IV], further analysis was conducted, and the result of the study found ten improved areas, such as transparency, security, remote access, electronic registers, document generation, case distribution, statistics, case registration, case movements, and electronic notification. – In the publication [VII], further analysis of the improvements was conducted, and the result of the study showed that the transparency of court processes had been enhanced through the use of the e-court system.	In Section 2.2, a review of related literature shows that there is a lack of studies on transparency and security improvements post-digitalization of court systems. Furthermore, in terms of improved areas, the publication [IV] presented comparisons of the ten improvements discovered in this study with 21 relevant studies, demonstrating clearly that this study covered all significant improvements compared to other experiences worldwide.

- RQ2: What are the major challenges faced by the digital transformation of court processes?

  Table 6 summarizes the RQ2 results with associated publications compared to the current knowledge gaps.

Table 6: A summary of the RQ2 results with associated publications and current knowledge gaps

Results and associated publications	**Current knowledge gaps**
Two publications are relevant to the RQ2. – In the publication [II], the result of the study identified seven critical issues that can be considered challenges for digital transformation, such as a lack of digital signature, a lack of IT skills, a lack of ICT-related laws to support ICT application in court processes, external issues such as unstable connections and inadequate hardware equipment, public portal usage, the need for constant training, and a lack of human resources. – In the publication [III], further analysis was conducted and the result of the study found that availability and validity of the e-signature are essential for the implementation of e-court systems to ensure the security and integrity of court documents, as well as time and cost savings and for establishing an entire paperless system.	In Section 2.3, a review of related literature shows that the absence of a digital signature which was identified as a new challenge in this work was not found by other studies previously.

- RQ3: What are the users' perspectives on the e-court system, and how satisfied are they with performing daily operations through the digitalized system?

  Table 7 summarizes the RQ3 results with associated publications compared to the current knowledge gaps.

Table 7: A summary of the RQ3 results with associated publications and current knowledge gaps

Results and associated publications	**Current knowledge gaps**
One publication is relevant to the RQ3. In the publication [VI], the result of the study revealed three significant findings as follows: – The EUCS model is valid and reliable for e-court systems. – End-users are satisfied with the new e-court system. – End-users considered the new e-court system a successful and reliable solution.	In Section 2.4, a review of related literature shows that the EUCS model for the e-court system was not used before in other studies. Furthermore, none of the available studies addressed user satisfaction following the implementation of the e-court system.

- RQ4: Which laws are missing for the e-court system, and which regulations are required for e-government implementation?

Table 8 summarizes the RQ4 results with associated publications compared to the current knowledge gaps.

Table 8: A summary of the RQ4 results with associated publications and current knowledge gaps

Results and associated publications	**Current knowledge gaps**
Two publications are relevant to the RQ4. – In the publication [V], the result of the study proposed a new legal framework. The framework can be established for specific domain laws, such as the e-court system and regulations relevant to e-government in general. – In the publication [VIII], the work given in the publication [V] was extended and further analysis was conducted, the result of the study proposed a guideline for the legal framework's implementation in the KRI.	In Section 2.5, a review of related literature shows that the lack of a regulatory framework was viewed as a challenge. However, no study has focused on conducting an in-depth analysis of what can be done in terms of establishing a regulatory framework for introducing new laws or amending existing ones.

Additionally, it can be concluded that the answers to the main research question and sub-research questions provided by this study have contributed to achieving all the set objectives of this study as follows:

First, the new e-court system has been designed and developed as an IT artifact to automate the court workflow to ensure efficient justice delivery to citizens and improve the court's internal administrative processes.

Second, the new digital system has been introduced in the Sulaymaniyah Appellate Court as a first pilot e-service project in the justice domain in the KRI.

Third, the system has been evaluated through a number of studies with four sub-research questions to tackle significant aspects of court processes' digital transformation, including identifying improvements in efficiency and effectiveness after the system's implementation; identifying challenges and barriers that have been faced during the system's implementation; examining court user acceptance and their satisfaction with the new digital system; and investigating the gaps in rules, laws, and regulations.

Fourth, the results of the published articles have contributed to serving the KRG as an in-depth study for planning to digitize other courts and other services.

5 Contributions

According to Hevner et al.[50], the artifact resulting from the design science study has the potential to provide three types of research contributions, depending on its "novelty, generality, and significance". Consequently, this section outlines the study's contribution.

5.1 Novelty

It should be noted that there is a global shift toward modernizing traditional judicial systems and automating court processes through the use of various technologies in courts in order to optimize court operations, improve the efficiency of justice delivery, ensure a better connection between judicial institutions, and ensure effective data and e-document exchange during collaborative activities [39, 38, 37, 34, 54, 32, 33, 35, 36]. National practices, on the other hand, demonstrated examples of ICT integration into court processes primarily from advanced and developed nations with technologically advanced governments and established ICT infrastructures, such as Africa, America, Asia, Australia, Europe, and New Zealand [IV,IX]. There is a shortage of research on the experiences of developing and undeveloped nations, where cultural features, levels of IT literacy and technical skill, security and economic stability, and other factors differ significantly. The present e-court system at the KRI has digitized court processes at the Appellate Court of Sulaymaniyah. The KRI is located in northern Iraq. It is independently administered by the KRG. Nonetheless, KRI shares all of the country's challenges, including institutional challenges such as performance, productivity, corruption, and administration; economic instability challenges such as trade imbalance and a disordered public budget; a limited role for the private sector; and political transitions and insecurity [106, 107].

Within the stated existing challenges, the current e-court system has been successfully implemented as the region's first e-service in the justice domain. This is an innovative solution that has addressed several issues with the traditional paper-based system, including the slow case registration process, nontransparent processes, and insecure paper case files, among others. Furthermore, the availability of in-depth study in this area helps expand the knowledge base for other nations with similar characteristics to Iraq as well as the rest of the world.

5.2 Generality

The current e-court system is designed and developed in accordance with the applicable laws in Iraqi courts[5], primarily procedural laws that govern case management procedures such as the Criminal Procedure Code, the Civil Procedure Code, and the Evidence Law, and others that govern substantive matters such as the Labour Law, the Personal Status Law, the Civil Status Law, the Care of Minors Law, the Juvenile Welfare Law, and the Penal Code for the Internal Security. The Iraqi legal system is derived from the French legal system [56, 20]. As a result, the implemented e-court system is applicable to all other appellate courts in the KRI and Iraq.

Furthermore, in a larger perspective, the system as an artifact could serve as a template and model for other nations with a comparable environment to the Iraqi legal system, whose laws are also driven by the French legal system, such as Egypt and other Arab Middle East countries[6].

Additionally, this work has contributed by proposing a new legal framework that may be built to assist the legal and smooth operation of the digital transformation process of

[5] `http://iraqld.hjc.iq:8080/identity search.aspx`

[6] `https://egyptjustice.com/egypt-law-an-overview`

the e-court system as a specific domain and e-government in general. In the publications [V, VIII], the author emphasized the transition from the " specific-and-unique to generic-and-abstract as a critical component of ADR "[98]. The author conducted an in-depth study of the current laws in the KRI and Iraq that support the digital transformation of judicial processes as a specific domain and which laws and regulations may be supported by generic laws on the e-government level. Because the e-court system is a kind of information system that is regarded as a component of the overall e-government infrastructure, the applicable regulations that enable the functioning of e-government also apply to specific domains such as e-courts. All higher-level general laws are generic, and each specific domain will apply them.

5.3 Significance

In the context of design science research, the "artifact itself" is seen as a contribution that would extend the existing knowledge base [50]. An "implementable" artifact in a business setting that addresses a previously unsolvable problem will indicate a demonstrable scientific contribution [50]. In addition, the primary parameters for the contribution assessment are the artifact's "representational fidelity and implementability" [50].

In this regard, the transition from service to e-service through the adoption of the e-court system significantly contributes to enhancing the court's organizational performance in justice service delivery to citizens and improving internal administration efficiency and effectiveness. As presented in Figure 2, the system is equipped with all the features and functionalities necessary to perform daily operations in all courts. In addition, the features and functionalities included in the current system are the most comprehensive and go beyond the state of the art, as evidenced by the comparison of the features of the current system with other experiences from other nations presented in Table 2 in Section 2.1.

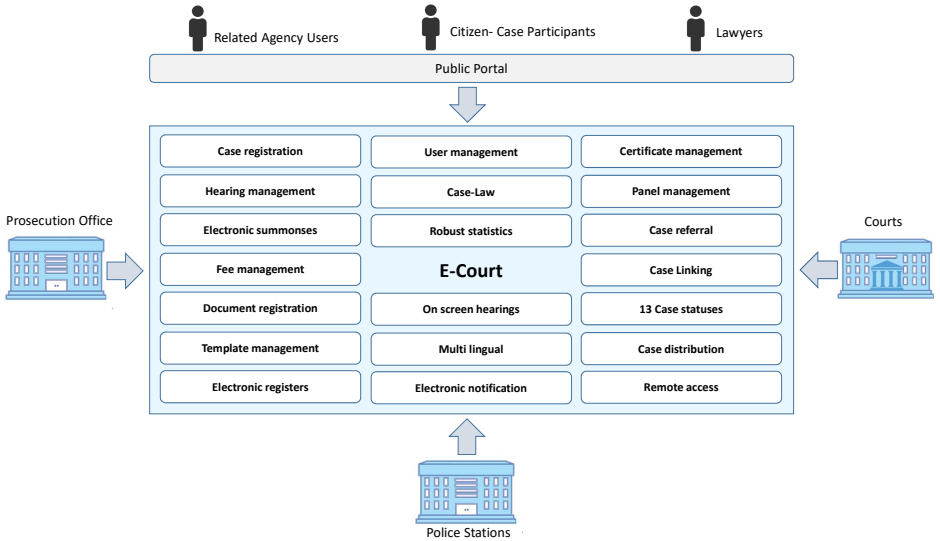

Figure 2: KRI's e-court system as a first e-service [V, VI, VIII, IX]

The system has digitized the case management process at the Sulaymaniyah Appellate Court. The system is capable of managing civil and criminal cases, as well as other court

certificate procedures. The system serves all users as an online platform and enables efficient and secure collaboration between several institutions.

Additionally, as the "creative development and use of evaluation methods" provide design science research contribution [50]; this thesis contributes to the field of justice through these nine published articles [I, II, III, IV, V, VI, VII, VIII, IX] to demonstrate the design, development, and evaluation of the e-court system as a design science endeavor by drawing the complete picture for this research.

In conclusion, the nine studies presented in this thesis have shed light on critical issues and provided new insights related to the digital transformation of judicial systems, including:

- Presentation of the transition processes from a traditional system to a modern one and automation of the courts' workflow [IX].
- Validation of system value through a number of tangible improvements in everyday operations performance and how the court processes are enhanced in terms of efficacy, effectiveness, transparency, security, and better justice service delivery post digitization [I, IV, VII].
- Analysis of different drivers and barriers that influence the success of the implementation [II, III].
- Assessment of user satisfaction with the new system and their perspectives on change management. This finding provides new knowledge to the government for drawing an expansion roadmap to digitize other sectors. Furthermore, concerning system acceptance and users satisfaction, the EUCS model has been validated on the e-court system, which has not been conducted before [VI].
- Proposal of a new legal framework to allow a smooth and valid transition from a manual to a digital court system and to support the successful implementation of an entirely paperless e-court system and the required relevant laws to implement e-government [V] with the implementation guideline for the proposed framework [VIII].

6 Limitations and Future Work

6.1 Limitations

In this section, the author acknowledges a number of limitations, as follows:

- First, a challenge that is associated with the generalization could be due to the "highly situated nature" of the artifact outcome in respect of the organizational change and its implementation [98]. The author claims that the developed e-court system may be utilized as a scalable model in other courts in the KRI and that it can be used in other cities in Iraq in general or in nations with comparable legal systems to Iraq.

  The potential limitations to the generalizability of the system and its implications could be as follows:

  - Replication of the system in other courts in the KRI and Iraq, as the system is implemented in other courts in the KRI and Iraq, no fundamental modifications in the system's design are required since the courts follow the same legal framework and the system is developed based on the present Iraqi laws in place. However, before replicating the system, further preparation is needed as follows:
    * Analyzing the number of courts for each court type in the Appellate Court, such as the Civil Primary Court, the Personal Status Court, the Personal Items Court, the Labour Court, the Investigative Court, the Misdemeanor Court, the Felony Court, and the Juvenile Court. Once the numbers are identified, these courts can be created and configured in the system by the system administrator [IX].
    * Creation of the necessary user accounts, connecting them to relevant courts and institutions in the system and identifying their roles and permissions by the system administrator [IX].
    * Equipping the courthouse buildings with necessary hardware requirements, data centers, and connectivity to run the system [IX].
  - The implications of the system in some other nations may be challenging due to different legislative systems, which may require system redesign and reconfiguration to be adopted. As stated earlier in Section 5, the current e-court system is designed based on Iraqi laws; hence, replicating the system in another country will require an in-depth legal analysis to identify the applicable laws in court processes. If the legal system of the country intending to implement the system is not patterned after the French system laws, the e-court system may need to be redesigned and reconfigured in terms of case management processes for both civil and criminal jurisdiction.
  - Furthermore, the present system software cannot be generalized and used as a template for further e-services in other government sectors, for instance, health, education, and others [99, 62]. The current system was built and developed for court case processing and has automated the court's workflow. The software's architecture and features will be incompatible with those of other services. However, the conducted empirical studies may be significant as an in-depth analysis for adopting other e-services in the KRI, particularly to get a better understanding of citizen satisfaction with e-services and to address obstacles before digitizing other sectors.

- The second limitation is associated with the current ICT infrastructure of the KRI. As there is a lack of a digital signature, the e-court system is limited to functioning as an entirely paperless digital system. Due to the fact that every court document, such as a hearing memo or final judgement document, has to be printed out, signed by hand, and scanned into the system [III].

- Another limitation is related to connectivity and case transfer. The e-court system is currently only functioning in the Sulaymaniyah Appellate Court [IV]. Therefore, as the system is not connected to the Supreme Court and other appellate courts in the KRI, all communications, data exchange, case file transfer, and appeal processes are performed in paper format.

- The lack of electronic payment in the KRI is identified as an additional limitation. The current system performs the fee calculation for cases and is equipped with a section for the fee department and its registers; however, the payment process is performed manually, and the system is not integrated with an electronic payment system.

- A further limitation is related to the interoperability and integration of the e-court system with other systems. Due to the lack of other information systems, such as the police information system, the prison information system, the expert information system, and any other information systems that courts need to communicate and exchange data for case processing, the current e-court system works as a standalone e-service. In the current system, other related agencies can create accounts and exchange data and documents; however, they communicate through the system on the case file view to add requested documents by courts. This method of document exchange is not very efficient [IX].

- Finally, regarding technological tool integration, the current system needs to be integrated with an audio and video conferencing system with the possibility of transcribing the hearing sessions. The hardware equipment is present at the Sulaymaniyah Appellate Court but is not integrated into the system and can be used separately. This feature has not been utilized up until today due to the fact that it is not supported by the law, and online witness and hearing participation is not considered valid and legal according to the current laws in place for conducting hearings [V, VIII].

6.2 Future Work

The current e-court system has proven to enhance the efficiency and effectiveness of the court process and deliver better justice services to citizens. However, there is an opportunity for additional research and improvement in future work.

The analysis of relevant research on integrating sophisticated technology into judicial systems has provided the author with further knowledge for determining the future direction. Following are recommendations based on the author's assessment of the currently implemented e-court system and related research. Furthermore, in this section, the author tried to turn some of the limitations into possible future improvements as follows:

- To improve the system's features and capabilities, it is recommended to employ speech-to-text and text-to-speech features to enhance hearing effectiveness [109, 121]. The functionality of speech-to-text, if integrated into the current system, would have a significant impact on the efficiency of the processes, in particular with getting

witness speech and automatically converting it to the text on the witness template or judge's decision. Text-to-speech technology would improve the system's usability and ease of use.

- National experiences illustrated the significance of integrating recent advancements and incorporating new technologies into e-court systems, such as blockchain for activity and evidence storage [121] and AI [109, 80, 47] to certain processes. These processes are:
  - Case distribution process, to allocate the cases to judges based on the calculation of case type, complexity, and processing time, among other elements.
  - Claim submission process, to allow the system to automatically classify the claim type [14, 100] and sends it to the proper court.
  - Case statistics could be improved with more efficient calculation and representation of visual data.
  - Case finalizing process, to be integrated with DSS [69, 48, 68, 120] to improve the decision generation process by analysis and extraction of the old similar case judgments and related laws and present the template to the judge for making the final decision.
- It is recommended that as soon as the infrastructure of internet payment and electronic banking systems exists in the KRI, the system be upgraded with features to allow participants to perform fee transactions through electronic payment in the system.
- To solve the existing e-court system's limitation of continuing to use paper, eID and digital signatures must be utilized to ensure the security, authenticity, and validity of documents and to develop a completely paperless system.
- It is recommended that an e-court system be implemented in the Supreme Court and all other appellate courts in the KRI to ensure faster processes between courts with respect to case transfer and appeal processes for document and case data exchange. This integration also guarantees cost reduction due to the amount of money spent on postage and delivery between the Supreme Court and lower-level courts while presenting better access to justice. This practice is considered significant not only for the KRI courts but also for other courts outside the KRI and Iraq to build a future e-justice cross-border solution as is currently being experienced in Europe with the (e-Justice Communication via Online Data Exchange) e-CODEX project as an "European digital infrastructure for secure cross-border communication in the field of justice"[7].
- A further recommendation is to integrate the e-court system into other information systems. The author of this thesis envisions the expansion of the future development of the e-justice system in the KRI by creating a core data management solution with a modular-based flexible infrastructure that locates case management as a central system, such as the e-case central system. In addition, the system considers interoperability design to ensure secure and efficient data exchange between different modules. With their e-court system, the courts can act as a single module. As shown in Figure 3, all other relevant information systems, such as the police

[7] `https://www.e-codex.eu/about`

information system, the archiving information system, the prosecution information system, the lawyers' information system, the prison information system, the library and legal database, and all other agencies, can operate as separate modules. The proposed model is recommended to be implemented after ensuring that an inter-operable platform for secure data exchange is in place in the KRI, along with an established eID and a digital signature [27, 76, 111].

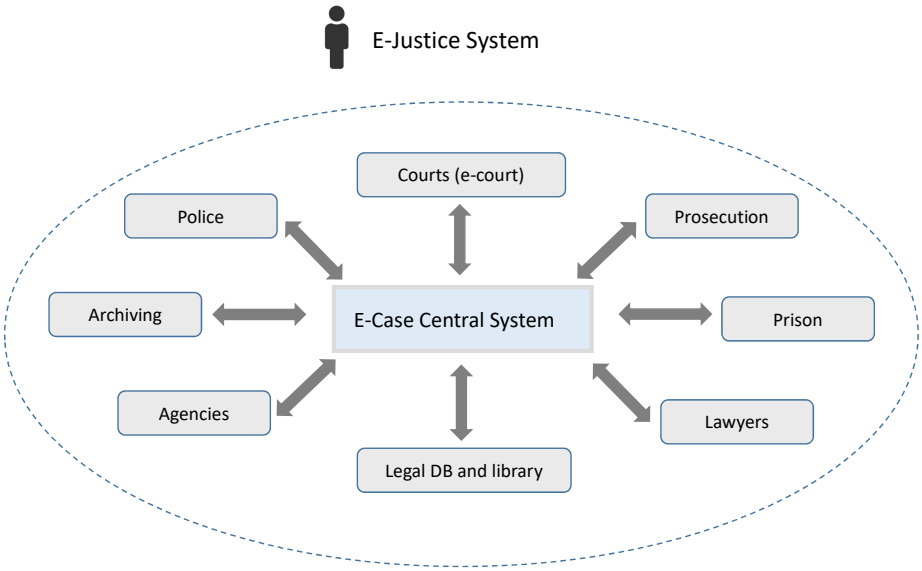

Figure 3: Future vision of e-justice in the KRI

- Since this e-court system is new and considered the first e-service solution in the KRI's justice domain, more research is highly recommended before expanding the project to other courts and implementing electronic systems in other domains [99, 62] in the KRI while also considering further public-private partnerships and their shared responsibilities [60].

7 Conclusion

To conclude, the implemented e-court system in the KRI has contributed to increasing the organizational performance of courts, and the collection of publications in this work has extended the stock of knowledge in the academic literature by providing a new experience of digital transformation in the justice domain and implementation of the e-court system from a different geographical location. The nine publications presented and used in this thesis have presented a cycle of developing an e-court system as an executable artifact and its evaluation from different perspectives. The evaluation resulted in identifying significant improvements, discovering challenges, assessing end-user satisfaction with the digitization of their daily operations, and delving into regulatory support. The findings of this research will help understand the significance of digital transformation in courts to increase the efficiency and effectiveness of court processes while ensuring the appropriate environment for system setup concerning the availability of regulatory support and addressing potential challenges. The study has met the set objectives.

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References

[1] [last accessed: 1 july 2022] https://www.collinsdictionary.com.

[2] [last accessed: 1 july 2022] https://www.oxfordlearnersdictionaries.com/.

[3] J. T. Adeleye, R. K. Ahmed, K. Nyman-Metcalf, and D. Draheim. E-court transition process : Identifying critical factors and recommendations for developing countries. In *Proceedings of the 8th International Conference on Electronic Governance and Open Society: Challenges in Eurasia 2021 (EGOSE 2021)*, pages 305–317. Springer, 2022.

[4] R. Agrifoglio, C. Metallo, and L. Lepore. Success factors for using case management system in Italian courts. *Information Systems Management*, 33(1):42–54, 2016.

[5] A. Ahmed, S. Ahmad, N. Ehsan, E. Mirza, and S. Z. Sarwar. Agile software development: Impact on productivity and quality. *5th IEEE International Conference on Management of Innovation and Technology, ICMIT2010*, pages 287–291, 2010.

[6] O. Al-Naimat, N. A. Al-Dabbas, and M. M. F. Maaqqbeh. Transition to e-litigation as a mechanism to activate e-court in Jordan: An analytical study. *Journal of Legal, Ethical and Regulatory Issues*, 24(1):1–10, 2021.

[7] S. W. Ambler. Lessons in agility from internet-based development. *IEEE Software*, 19(2):66–73, 2002.

[8] S. W. Ambler. Agile model driven development is good enough. *IEEE Software*, 20(5):71–72, 2003.

[9] S. W. Ambler. *Agile software development at scale*, volume 5082 LNCS of *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Springer, 2008.

[10] L. P. Asamoah, E. W. Amaglo, and Q. . Kester. Using bayesian networks in analysing judgement. In *Proceedings - 2019 International Conference on Computing, Computational Modelling and Applications, ICCMA 2019*, pages 110–114, 2019.

[11] A. S. Asonibare and H. T. Akaje. E-path to effective justice delivery : The Nigerian courts in perspective. *Second Covenant University Conference on E-Governance in Nigeria (CUCEN 2015)*, (08062158623):1–15, 2015.

[12] J. E. Bailey and S. W. Pearson. Development of a tool for measuring and analyzing computer user satisfaction. *Management Science*, 29(5):530–545, 1983.

[13] J. M. Bass. Artefacts and agile method tailoring in large-scale offshore software development programmes. *Information and Software Technology*, 75:1–16, 2016.

[14] T. C. D. Bueno, A. Bortolon, H. C. Hoeschl, E. S. Mattos, C. S. Santos, and I. Theiss. Using RBC to classify judicial petitions on e-court. In *Proceedings of the 9th international conference on Artificial intelligence and law - ICAIL '03*, pages 83–84. ACM, 2003.

[15] D. M. Chada and F. A. Silva. Visualizing Brazilian justice : The Supreme Court 2.0 project. In *Proceedings of the 15th International Conference on Artificial Intelligence and Law - ICAIL '15*, pages 176–180. ACM, 2015.

[16] T. Chow and D.-B. Cao. A survey study of critical success factors in agile software projects. *Journal of Systems and Software*, 81(6):961–971, 2008. Agile Product Line Engineering.

[17] D. Cohen, M. Lindvall, and P. Costa. An introduction to agile methods. volume 62 of *Advances in Computers*, pages 1–66. Elsevier, 2004.

[18] F. Contini and M. Fabri. *Judicial electronic data interchange in Europe: applications, policies and trends*. Research Institute on Judicial Systems (IRSIG) National Research Council (CNR) Via. Editrice Lo Scarabeo, 2003.

[19] S. Cronholm and H. Göbel. Action design research: integration of method support. *International Journal of Managing Projects in Business*, 15(8):19–47, 2022.

[20] S. Dan E. From Baton Rouge to Baghdad: A comparative overview of the Iraqi Civil Code. *Louisiana Law Review*, 65(1):131–156, 2004.

[21] L. Danneels and S. Viaene. Identifying digital transformation paradoxes: A design perspective. *Business and Information Systems Engineering*, 2022.

[22] F. D. Davis. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3):319, 1989.

[23] A. P. Deligiannis and D. Anagnostopoulos. Towards open justice: ICT acceptance in the Greek justice system: The case of the integrated court management system for penal and civil procedures (OSDDY/PP). In *2017 Conference for E-Democracy and Open Government (CeDEM)*, pages 82–91. IEEE, 2017.

[24] W. H. . DeLone and E. R. . McLean. Information systems success : The quest for the dependent variable. *Information Systems Research*, 3(1):60–95, 1992.

[25] G. W. Dirk Draheim. *Form-oriented analysis – A new methodology to model form-based applications*. Springer, 2005.

[26] W. J. Doll and G. Torkzadeh. The measurement of end-user computing satisfaction. *MIS Quarterly*, 12(2):259–274, 1988.

[27] D. Draheim, K. , oosapoeg, M. Lauk, I. , Pappel, I. Pappel, and J. Tepandi. The design of the Estonian governmental document exchange classification framework. In *Proceedings of EGOVIS'16 - the 5th Conference on Electronic Government and the Information Systems Perspective. LNCS 9831*, pages 1–15. Springer, 2016.

[28] W. Duan and L. Li. Multi-types court e-file classification system. In *2018 IEEE Conference on Multimedia Information Processing and Retrieval (MIPR)*, number 1, pages 210–211. IEEE, 2018.

[29] M. S. Elliott and J. L. King. A common information space in criminal courts: Computer-supported cooperative work (CSCW) case management systems. *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*, 00(C):272a–272a, 2005.

[30] European Commission for the Efficiency of Justice (CEPEJ). European commission for the efficiency of justice (CEPEJ), European judicial systems, edition 2008 (data 2006): Efficiency and quality of justice. Technical report, Council of Europe, 2008.

[31] European Commission for the Efficiency of Justice (CEPEJ). European commission for the efficiency of justice (CEPEJ), European judicial systems, edition 2010 (data 2008): Efficiency and quality of justice. Technical report, Council of Europe, 2010.

[32] European Commission for the Efficiency of Justice (CEPEJ). European judicial systems efficiency and quality of justice, high quality justice for all member states. Technical Report 22, Council of Europe, 2015.

[33] European Commission for the Efficiency of Justice (CEPEJ). European judicial systems efficiency and quality of justice, an overview. Technical Report 23, Council of Europe, 2016.

[34] European Commission for the Efficiency of Justice (CEPEJ). European judicial systems efficiency and quality of justice, thematic report: Use of information technology in European courts. Technical Report 24, Council of Europe, 2016.

[35] European Commission for the Efficiency of Justice (CEPEJ). European judicial systems efficiency and quality of justice. Technical Report 26, Council of Europe, 2018.

[36] European Commission for the Efficiency of Justice (CEPEJ). Case weighting in judicial systems. Technical Report 28, Council of Europe, 2020.

[37] European Commission for the Efficiency of Justice (CEPEJ). European judicial systems CEPEJ evaluation report, 2020 evaluation cycle (2018 data). Technical report, Council of Europe, 2020.

[38] European Commission for the Efficiency of Justice (CEPEJ). 2022 – 2025 CEPEJ action plan:"digitalisation for a better justice". Technical Report 12, Council of Europe, 2021.

[39] European Commission for the Efficiency of Justice (CEPEJ). Guidelines on electronic court filing (e-filing) and digitalisation of courts document. Technical Report 15, Council of Europe, 2021.

[40] R. F. Filho and A. Veronese. *Electronic justice in Brazil*, pages 135–151. E-Justice: Information and Communication Technologies in the Court System. IGI Global, 2008.

[41] U. Gorham. State courts, e-filing, and diffusion of innovation: A proposed framework of analysis. In *Proceedings of the 13th Annual International Conference on Digital Government Research*, dg.o '12, pages 232–239. ACM, 2012.

[42] Z. Hamin, M. B. Othman, and A. M. Mohamad. Benefits and achievements of ICT adoption by the High Courts of Malaysia. In *2012 IEEE Symposium on Humanities, Science and Engineering Research*, volume 2, pages 1233–1238. IEEE, 2012.

[43] Z. Hamin, M. B. Othman, and A. M. Mohamad. ICT adoption by the Malaysian High Courts: Exploring the security risks involved. In *International Conference on Innovation Management and Technology Research*, pages 285–289. IEEE, 2012.

[44] K. H. Hassan and M. F. Mokhtar. The e-court system in Malaysia. In *2nd International Conference on Education and Management Technology*, volume 13, pages 240–244, 2011.

[45] K. H. Hassan, S. S. A. Yusoff, M. F. Mokhtar, and K. A. T. Khalid. The use of technology in the transformation of business dispute resolution. *European Journal of Law and Economics*, 42(2):369–381, 2016.

[46] M. Hassan Dotto and K. Mwantimwa. Electronic records management in Tanzanian courts. *Information Development*, 2022.

[47] Y. Hayashi and K. Wakabayashi. Can AI become reliable source to support human decision making in a court scene? In *The 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing*, pages 195–198, 2017.

[48] Y. Hayashi, K. Wakabayashi, S. Shimojyo, and Y. Kida. Using decision support systems for juries in court: Comparing the use of real and CG robots. In *ACM/IEEE International Conference on Human-Robot Interaction*, volume 2019-March, pages 556–557. IEEE, 2019.

[49] H. R. Helmi. The existence of electronic courts (e-court) in realizing simple, fast and low-cost justice. *International Journal of Innovation, Creativity and Change*, 8(9):270–278, 2019.

[50] A. R. Hevner, S. T. March, J. Park, and S. Ram. Design science in information systems research. *MIS Quarterly: Management Information Systems*, 28(1):75–105, 2004.

[51] J. Highsmith and A. Cockburn. Agile software development: the business of innovation. *Computer*, 34(9):120–127, 2001.

[52] F. Iannacci. Digitising criminal justice in England and Wales: Revisiting information-growth dynamics. *Transforming Government: People, Process and Policy*, 3(1):50–64, 2009.

[53] B. Ives, M. H. Olson, and J. J. Baroudi. The measurement of user information satisfaction. *Communications of the ACM*, 26(10):785 – 793, 1983.

[54] Jean, Jean-Paul and Gurbanov, Ramin. Judicial systems of the Eastern European countries, analysis of data by the European commission for the efficiency of justice (CEPEJ). Technical Report 21, Council of Europe, 2015.

[55] M. Jneid, I. Saleh, and R. Fakhoury. Digital transformation in justice: Discussion of challenges and a conceptual model for e-justice success. In *Proceedings of the European Conference on e-Government, ECEG*, volume 2019-October, pages 35–42, 2019.

[56] C. A. Johnson. *Iraq: Legal History and Traditions*. 2004.

[57] A. T. Kharlie and A. Cholil. E-court and e-litigation: The new face of civil court practices in Indonesia. *International Journal of Advanced Science and Technology*, 29(2):2206–2213, 2020.

[58] K. Kowsrihawat and P. Vateekul. An information extraction framework for legal documents: A case study of Thai Supreme Court verdicts. In *12th International Joint Conference on Computer Science and Software Engineering (JCSSE)*, pages 275–280. IEEE, 2015.

[59] L. P. Kurtz, P. M. Santos, and A. J. Rover. Access to information on websites of Brazilian superior courts of justice. In *Proceedings of the 19th Annual International Conference on Digital Government Research Governance in the Data Age - dgo '18*, pages 1–5. ACM, 2018.

[60] K. Lõhmus, K. Nyman-Metcalf, R. K. Ahmed, I. Pappel, and D. Draheim. The private sector' s role in e-government from a legal perspective. In *Proceedings of the Fourth International Congress on Information and Communication Technology*, pages 283–298. Springer, 2019.

[61] M. B. Legowo, B. Indiarto, and D. Prayitno. Agile software methodology with scrum for developing quality assurance system. *Proceedings - 2019 2nd International Conference of Computer and Informatics Engineering: Artificial Intelligence Roles in Industrial Revolution 4.0, IC2IE 2019*, pages 104–109, 2019.

[62] S. Lips, R. K. Ahmed, K. Zulfigarzada, R. Krimmer, and D. Draheim. Digital sovereignty and participation in an autocratic state: Designing an e-petition system for developing countries. In *Proceeding of the 22nd Annual International Conference on Digital Government Research*, pages 123–131. ACM, 2021.

[63] J. Lowry. Correlations between ICT and records policy integration and court case management system functionality: East African case studies. *Records Management Journal*, 23(1):51–60, 2013.

[64] J. M. Luzuriaga and A. Cechich. Electronic notification of court documents: A case study. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, ICEGOV '11, pages 45–50. ACM, 2011.

[65] A. Mandal, K. Ghosh, A. Pal, and S. Ghosh. Automatic catchphrase identification from legal court case documents. In *Proceedings of the 2017 ACM on Conference on Information and Knowledge Management - CIKM '17*, pages 2187–2190. ACM, 2017.

[66] S. T. March and G. F. Smith. Design and natural science research on information technology. *Decision Support Systems*, 15(4):251–266, 1995.

[67] D. McKechnie. The use of the internet by courts and the judiciary: Findings from a study trip and supplementary research. *International Journal of Law and Information Technology*, 11(2):109–148, 2003.

[68] O. Metsker, E. Trofimov, and S. Grechishcheva. Natural language processing of Russian court decisions for digital indicators mapping for oversight process control efficiency: Disobeying a police officer case. In *Electronic Governance and Open Society: Challenges in Eurasia*, pages 295–307. Springer, 2020.

[69] O. Metsker, E. Trofimov, and G. Kopanitsa. Application of machine learning for e-justice. In *Journal of Physics: Conference Series*, volume 1828, 2021.

[70] T. L. Mosweu and L. Kenosi. Implementation of the court records management system in the delivery of justice at the Gaborone Magisterial District, Botswana. *Records Management Journal*, 28(3):234–251, 2018.

[71] L. Motsaathebe and N. Mnjama. The management of high court records in Botswana. *Records Management Journal*, 19(3):173–189, 2009.

[72] M. T. Mullarkey and A. R. Hevner. Entering action design research. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 9073:121–134, 2015.

[73] K. Nyman-Metcalf. e-governance: A new reality for legislative drafting? *International Journal for Legislative Drafting and Law Reform*, 5(1), 2017.

[74] K. Nyman-Metcalf. How to build e-governance in a digital society: The case of estonia. *Revista Catalana de Dret Public*, 58:1–12, 2019.

[75] O. Olugasa. Utilising technology in making the Nigerian administration of criminal justice act effective for criminal trials. *International Journal for Court Administration*, 11(2):1–11, 2020.

[76] I. Pappel, I. Pappel, J. Tepandi, and D. Draheim. Systematic digital signing in Estonian e-government processes - influencing factors, technologies, change management. *Transactions on Large-Scale Data- and Knowledge-Centered Systems XXXVI. Lecture Notes in Computer Science*, 36:31–51, 2017.

[77] K. Peffers, T. Tuunanen, M. A. Rothenberger, and S. Chatterjee. A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3):45–77, 2007.

[78] R. Prakash, T. Mohanty, R. Gupta, and V. Jain. ICT in Indian court challenges & solution. *International Journal of Internet Computing*, (1):2231–6965, 2011.

[79] A. Rahman, H. Nawaz, O. Naeem, F. Zaffar, F. Naseer, and A. Zaffar. Finding needle in the case-stack: Effective remote monitoring of courts. *Proceedings of the Annual Hawaii International Conference on System Sciences*, pages 1906–1915, 2014.

[80] A. D. D. Reraling. Courts and artificial intelligence. *International Journal for Court Administration*, 11(2):1–10, 2020.

[81] D. Reiling and F. Contini. E-justice platforms: Challenges for judicial governance. *International Journal for Court Administration*, 13(1), 2022.

[82] J. Rosa, C. Teixeira, and J. Sousa Pinto. Risk factors in e-justice information systems. *Government Information Quarterly*, 30(3):241–256, 2013.

[83] Rozha K. Ahmed, Aleksander Reitsakas, Khder H. Muhammed, Soran AB. Saeed, Ingrid Pappel, and Dirk Draheim. System model of the Sulaymaniyah Appellate Court e-court system. *SSRN Electronic Journal*, pages 1–107, 2022.

[84] Rozha K. Ahmed, Khder H. Muhammed, Aleksander Reitsakas, Ingrid Pappel, and Dirk Draheim. Improving court efficiency through ICT integration: Identifying essential areas of improvement. In *Proceedings of ICT4SD'2019 - the 4th International Conference on ICT for Sustainable Development. ICT Analysis and Applications. Lecture Notes in Networks and Systems*, volume 93, pages 449–461. Springer, 2020.

[85] Rozha K. Ahmed, Khder H. Muhammed, Awat O. Qadir, Soran I. Arif, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation: A proposal based on a comparative case study. In *Proceedings of EGOVIS'2021 - International Conference on Electronic Government and the Information Systems Perspective. Lecture Notes in Computer Science*, volume 12926, pages 115–128. Springer, 2021.

[86] Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Challenges in the digital transformation of courts : A case study from the Kurdistan Region of Iraq. In *Proceedings of ICEDEG' 2020 - the 7th International Conference on eDemocracy & eGovernment*, pages 74–79. IEEE, 2020.

[87] Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Impact of e-court systems implementation: a case study. *Transforming Government: People, Process and Policy*, 15(1), 2021.

[88] Rozha K. Ahmed, Khder H. Muhammed, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation. *SSRN Electronic Journal*, pages 1–20, 2022.

[89] Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, and Dirk Draheim. e-court system evaluation through the user ' s perspective : Applying the end-user computing satisfaction (EUCS) model. In *Proceedings of DGO' 2022 - 23rd Annual International Conference on Digital Government Research*, pages 293–299. ACM, 2022.

[90] Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, Aleksander Reitsakas, and Dirk Draheim. The role of digital transformation in fostering transparency : An e-court system case study. In *Proceedings of I3E'2022 - the 21st IFIP Conference on e-Business, e-Services, and e-Society*, volume 13454 of *Lecture Notes in Computer Science*, pages 219–230. Springer, 2022.

[91] Rozha K. Ahmed, Silvia Lips, and Dirk Draheim. eSignature in eCourt systems. In *Proceedings WorldS4'2020 - the 4th World Conference on Smart Trends in Systems, Security and Sustainability*, pages 352–356. IEEE, 2020.

[92] P. Rungruangpattana and T. Achalakul. The design framework of the civil court case management system in Thailand. In *TENCON 2007 - IEEE Region 10 Conference*, pages 1–4. IEEE, 2007.

[93] P. Rungruangpattana and T. Achalakul. The software prototype of civil court case management in Thailand. In *Advanced Software Engineering and Its Applications*, pages 221–225. IEEE, 2008.

[94] W. S. W. M. Saman and A. Haider. E-court: Information and communication technologies for civil court management. In *Proceedings of PICMET '13: Technology Management for Emerging Technologies.*, pages 2296–2304. IEEE, 2013.

[95] W. S. W. M. Saman and A. Haider. E-shariah in Malaysia: Technology adoption within justice system. *Transforming Government: People, Process and Policy*, 7(2):256–276, 2013.

[96] A. Schmidt. IT and the judiciary in the Netherlands - a state of affairs. *Computer Law and Security Report*, 23(5):453–460, 2007.

[97] Ö. Sebetci. Enhancing end-user satisfaction through technology compatibility: An assessment on health information system. *Health Policy and Technology*, 7(3):265–274, 2018.

[98] M. K. Sein, O. Henfridsson, S. Purao, M. Rossi, and R. Lindgren. Action design research. *MIS Quarterly*, 35(1):37–56, 2011.

[99] M. Shahin, F. Eskandari, R. K. Ahmed, and D. Draheim. Implementation of e-birth registration systems : Potential and challenges (the case study of Iran). In *Proceedings of ICT4SD: ICT Analysis and Applications*, volume 1. Springer, 2021.

[100] A. C. Silva and L. C. G. Maia. *The Use of Machine Learning in the Classification of Electronic Lawsuits: An Application in the Court of Justice of Minas Gerais*, volume 12319 LNAI of *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. 2020.

[101] M. Singh. Indian judicial system overview and a approach for automatic roster preparation and case scheduling for faster case solving (need of: E-courts). In *2018 International Conference on Advances in Computing, Communication Control and Networking (ICACCCN)*, pages 128–131, 2018.

[102] M. Singh, G. P. Sahu, Y. K. Dwivedi, and N. P. Rana. Success factors for e-court implementation at Allahabad High-Court. In *22th The Pacific Asia Conference on Information Systems (PACIS)*, 2018.

[103] M. Smolej and J. T. Johnsen. European commission for the efficiency of justice (CEPEJ), time management of justice systems: a Northern Europe study. Technical report, Council of Europe, 2007.

[104] E. Somer. Court information system. Technical report, Centre of Registers and Information Systems (RIK).

[105] S. Stetsenko, S. Pylypenko, A. Zghama, E. Sydorova, and S. Shkliar. E-justice: European standards and the state of implementation in Ukraine. *Journal of Legal, Ethical and Regulatory Issues*, 22(5):1–6, 2019.

[106] The Ministry of Planning in the Republic of Iraq. National development plan 2018 – 2022. Technical report, 2018.

[107] The World Food Programme (WFP). Iraq annual country report, country strategic plan 2018 - 2019. Technical report, UN, 2018.

[108] R. Tipping, G. Farrell, V. Farrell, and C. J. Woodward. From collection to courtroom: Perceptions and realities of how the data flows. In *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures the Future of Design - OzCHI '14*, pages 107–110. ACM, 2014.

[109] E. Troulinos. The prospects of artificial intelligence in a court information system. In *CEUR Workshop Proceedings*, volume 2844, pages 119–122, 2020.

[110] E. Troulinos and E. Tambouris. Investigation of Interoperability Governance: The Case of a Court Information System. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, volume 12220 LNCS, pages 29–40, 2020.

[111] V. Tsap, I. Pappel, and D. Draheim. Key success factors in introducing national e-identification systems. In *Proceedings of FDSE'2107 - the 4th International Conference on Future Data and Security Engineering, LNCS 10646*. Springer, 2017.

[112] United Nations. E-government survey 2020 digital government in the decade of action for sustainable development. 2020.

[113] A. van der Merwe, A. Gerber, and H. Smuts. Guidelines for conducting design science research in information systems. In *Communications in Computer and Information Science*, volume 1136 CCIS, pages 163–178. Springer, 2019.

[114] M. Velicogna. Justice systems and ICT what can be learned from Europe? *Utrecht Law Review*, 3(1):129–147, 2007.

[115] M. Velicogna. In search of smartness: The EU e-justice challenge. *Informatics*, 4(4):38, 2017.

[116] M. Velicogna and A. Errera. e-justice in France : the e-barreau experience. *Utrecht Law Review*, 7(7):163–187, 2011.

[117] M. Velicogna, A. Errera, and S. Derlange. Building e-justice in continental Europe: The télérecours experience in France. *Utrecht Law Review*, 2013.

[118] V. Venkatesh and H. Bala. Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2):273–315, 2008.

[119] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis. User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3):425 – 478, 2003.

[120] M. B. L. Virtucio, J. A. Aborot, J. K. C. Abonita, R. S. Avinante, R. J. B. Copino, M. P. Neverida, V. O. Osiana, E. C. Peramo, J. G. Syjuco, and G. B. A. Tan. Predicting decisions of the Philippine Supreme Court using natural language processing and machine learning. In *IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC)*, volume 2, pages 130–135. IEEE, 2018.

[121] Z. Wang. China's e-justice revolution. *Judicature*, 105(1):37–47, 2021.

[122] A. Watson, R. Rukundakuvuga, and K. Matevosyan. Integrated justice: An information systems approach to justice sector case management and information sharing: Case study of the integrated electronic case management system for the Ministry of Justice in Rwanda. *International Journal for Court Administration*, 8(3):1–9, 2017.

[123] R. J. Williams. Taking a shot: Access to justice, judging and ecourt. *Family Court Review*, 59(2):278 – 293, 2021.

[124] A. L. Xu. Chinese judicial justice on the cloud: a future call or a pandora's box? an analysis of the 'intelligent court system' of China. *Information and Communications Technology Law*, 26(1):59–71, 2017.

[125] Y. Xu, Y. Li, L. Wang, J. Shi, and J. Shen. A service-oriented collaborative development platform for digital courts. In *Proceedings - ICEBE 2007: IEEE International Conference on e-Business Engineering - Workshops: SOAIC 2007; SOSE 2007; SOKM 2007*, pages 641–648, 2007.

[126] M. Yahya, F. Nadzar, and B. A. Rahman. Examining user acceptance of E-Syariah portal among Syariah users in Malaysia. *Procedia - Social and Behavioral Sciences*, 67(November 2011):349–359, 2012.

[127] N. Yavuz, N. Karkin, and M. Yildiz. *E-Justice: A Review and Agenda for Future Research*, volume 38 of *Public Administration and Information Technology*. 2022.

[128] R. K. Yin. *Case study research: Design and methods*. SAGE, 2014.

[129] R. K. Yin. *Case study research and applications: Design and methods*. SAGE, 2018.

[130] J. Yu. Citizen adoption of e-justice services: An empirical research in China. In *ACM International Conference Proceeding Series*, 2021.

[131] J. Yu and J. Xia. E-justice evaluation factors: The case of smart court of China. *Information Development*, 37(4):658–670, 2021.

[132] X. Yu and S. Petter. Understanding agile software development practices using shared mental models theory. *Information and Software Technology*, 56(8):911–921, 2014.

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Abstract

Digital Transformation of Court Processes: Driving Forces, Success Factors, Regulations and Technology Acceptance

Judiciaries are integrating technological tools into court processes to improve the efficiency and effectiveness of court case management and deliver better justice services to citizens. This thesis presents the experience of an implemented e-court system in the Kurdistan Region of Iraq (KRI) through 9 publications. In a design science context, an e-court system was developed to increase court performance and digitize court processes to ensure providing better justice services. Then, the system as an executable artifact was evaluated through several empirical studies. Results identified significant improvements in the court processes, analyzed different drivers and barriers that influence the success of the implementation, and later assessed user satisfaction with the new system and their perspectives on the change management and digitized court processes; finally, the author of the thesis proposed a new legal framework to support the successful implementation of a fully paperless e-court system and the creation of required relevant laws to implement e-government. Implementation of the e-court system is a notable contribution to improving the court's organizational performance by enhancing efficiency and effectiveness in internal administration and promoting better justice services to citizens.

Kokkuvõte

Kohtuprotsesside digitaalne ümberkujundamine: liikumapanevad jõud, edu tegurid, regulatsioonid ja tehnoloogia vastuvõtmine

Kohtud integreerivad kohtuprotsessidesse tehnoloogilisi vahendeid, et parandada kohtumenetluste haldamise tõhusust ja tulemuslikkust ning pakkuda kodanikele paremaid õigusemõistmise teenuseid. Käesolevas doktoritöös tutvustatakse Iraagi Kurdistani piirkonnas (KRI) rakendatud e-kohtusüsteemi kogemusi läbi 9 publikatsiooni. Disainiteaduse kontekstis töötati välja e-kohtusüsteem, et suurendada kohtu tulemuslikkust ja digitaliseerida kohtuprotsesside, et tagada paremad õigusemõistmise teenused. Seejärel hinnati süsteemi kui teostavat artefakti mitme empiirilise uuringu abil. Tulemused näitasid märkimisväärseid paraendusi kohtuprotsessides. Analüüsiti erinevaid tegureid ja takistusi, mis mõjutavad rakendamise edukust, ning hiljem hinnati kasutajate rahulolu uue süsteemiga ja nende seisukohti muudatuste juhtimise ja digiteeritud kohtuprotsesside kohta. Lõpuks pakkus doktoritöö autor välja uue õigusliku raamistiku, et toetada täielikult paberivaba e-kohtu edukat rakendamist ja e-valitsemise rakendamiseks vajalike asjakohaste õigusaktide loomist. E-kohtusüsteemi rakendamine on märkimisväärne panus kohtu organisatsioonilise tulemuslikkuse parandamisse, suurendades sisemise halduse tõhusust ja tulemuslikkust ning pakkudes paremaid õigusemõistmise teenuseid kodanikele.

Appendix 1

[I]

Rozha K. Ahmed, Khder H. Muhammed, Aleksander Reitsakas, Ingrid Pappel, and Dirk Draheim. Improving court efficiency through ICT integration: Identifying essential areas of improvement. In *Proceedings of ICT4SD'2019 - the 4th International Conference on ICT for Sustainable Development. ICT Analysis and Applications. Lecture Notes in Networks and Systems*, volume 93, pages 449–461. Springer, 2020

Improving Court Efficiency Through ICT Integration: Identifying Essential Areas of Improvement

Rozha K. Ahmed, Khder H. Muhammed, Aleksander Reitsakas, Ingrid Pappel and Dirk Draheim

Abstract Integration of information communication technology (ICT) with the judicial system has recently brought new opportunities in courts toward improved efficiency, quality, and transparency of court cases; better management of cases from registration through case disposal; and extended availability of the judiciary. This paper reflects on the implementation of the e-court system in the Sulaimaniyah Appellate Court in the region of Kurdistan in Iraq. The analysis is based on expert interviews of different stakeholders in the appellate court. The results show significant improvements in terms of the court case management workflow in the following four areas: improved internal daily operations, the security of court cases, concurrent extended access to the judiciary, and transparency. The research aims at extending the body of knowledge for judiciaries, who are on the way to start integrating technology to courts.

Keywords E-court · Court information system · E-services · E-government

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1 Introduction

Information and communication technology (ICT) can be considered a critical factor in modernizing and reshaping the conventional judiciary. E-court systems are a crucial factor in enhancing the quality of court services with various potential benefits such as online accessibility, timeliness, transparency, efficiency, data accuracy, secured access to files and information, etc. This paper aims at systematically identifying and characterizing these areas of improvement.

In service of the research question, the paper delves into the implementation of the e-court system in the Sulaimaniyah Region Appellate Court as a case study. This project is a pilot for a greater plan to introduce e-government in the Kurdistan region of Iraq. On behalf of the project, the essential daily work routines at court were transformed from *paper to digital* documents.

The analysis is based on structured expert interviews. Further evidence is provided by observations from inside the project. The interviewees have been selected based on their professional background, i.e., all interviewees have long-term experience in the conventional paper-based system and are now active users of the paperless system. We have interviewed five judges, one lawyer, one investigator, and one prosecutor of the Sulaimaniyah Appellate Court, and, furthermore, the head of the IT department of the Sulaimaniyah Appellate Court. Among the interviewees, we had the previous court president, one active and one previous member of the appellate court panel, and, furthermore, a member of the judges' advisory board in the e-court project. Three of the authors have been actively involved as stakeholders in the implementation project, i.e., the project owner and the on-site project leader from the implementing service provider, and the e-court project supervisor from the Sulaimaniyah Appellate Court.

In Sect. 2, we provide a detailed description of the e-court system in the Sulaimaniyah Appellate Court. In Sect. 3, we present the findings of our analysis on the major fields of improvement, based on evidence from the conducted interviews and observation from inside the project. We discuss related work in Sect. 4 and finish with a conclusion in Sect. 5.

2 The E-Court System in the Sulaimaniyah Appellate Court

The aim of this project at Sulaimaniyah Appellate Court was transforming the conventional paper-based system into digital and systematic form, through court case management system, achieving better and more efficient justice delivery. The initial idea of the project emerged in October 2014. The project was then implemented in six stages (planning, system analysis/master plan, prototyping, building infrastructure, piloting, and implementation).

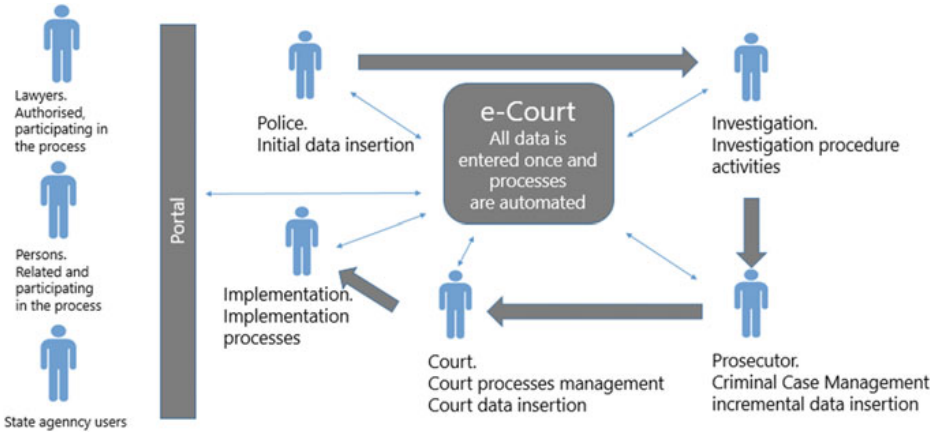

Fig. 1 E-court cooperation

The system has been implemented in all courts under the appellate court of the Sulaimaniyah region.[1]

The system is responsible for case management and, furthermore, for managing several types of certificates at the Civil Primary Court, Personal Status Court, and the Personal Items Court. The procedures of communication in the Sulaimaniyah e-court system are divided into different institutions inside and outside the court. The institutions are the courthouse, three departments in the courts (statistics, notification, and implementation), and external institutions (public prosecution system and police stations). Interdependence between systems and how to communicate includes a group of subsystems that make up the judicial system characterized feature and bonding with each other as an integrated system to perform all the functions and tasks required. There is a linkage between institutions and separate buildings, to facilitate the communication and the electronic transfer of cases between them. Information is entered once, and processes are all automated to allow system users to perform their main function and collaborate efficiently. Moreover, through the implementation of public portal outside court, users have an opportunity to access the system according to their role in the proceedings. The outside users in Sulaimaniyah e-court are categorized into three different types: lawyers, outside agency users, and public users who are case participants can have access to cases according to their relation with the case, see Fig. 1.

Court case management consists of different stages, which all require the user to insert relevant documents and information connected to a specific stage. The system is designed with all required functionalities to assist e-court users to perform all tasks electronically, from the claim submission through generating court decision and case disposal. Figure 2 shows the main cycle of the case proceeding.

[1]Civil Primary Court (6 courts), Personal Status Court (5 courts), Personal Items Court, Labour Court, Investigative Court (12 courts), Misdemeanors Court (6 courts), Felony Court (3 courts), and Juvenile Court.

Fig. 2 Case proceeding cycle

The system provides a wide range of reports that cover the needs of the courts in different terms of judicial reference, giving a simplified way to assess the performance of courts and judges. Hence, these reports provide a clear picture of the amount of work achieved by the courts. Knowing the amount of stress experienced by each court helps the administration department to make appropriate decisions towards court organization.

Separate registers with different purposes for cases at each court provide better case management for judges and court officials, with more efficient record registration compared to handwritten registers, which provide a clear overview of the number of cases at different statuses. Also, for better case tracking purpose, the system is implemented with (13) different states[2] of the case. Moreover, old closed paper cases before implementation are all added to a separate archiving system.

Moving on to main functionalities can be described as the digitization of the legal proceedings process, which includes the following:

Case Registration The claim is submitted, and the case is registered electronically in the prime register of every court. The system automatically creates connections to other registers. All case-related parties can access the case simultaneously. This automatic connection results in the reuse of the data which have already been entered to the system.

Fee Management Digital fee management simplifies the work of clerks and auditors at the fee register. It also helps to acquire better statistics of all paid and unpaid fees. Hence, it enables a better overview of fees (and the dates when they are due).

Court Summons Management Digital form of court summons and notifications functionality helps to keep a better look on undelivered/delivered summonses, which in turn helps plan court hearings.

Hearing Management Hearings digitally is more simplified than a paper system. Selecting judges, and participants are all managed systematically.

Documents Registration Documents are all registered digitally. Digital document templates will improve the process of creating documents in several different aspects: quality of documents, readability of documents, easier to copy, consistent design, and the speed of creating documents.

Document Template Management All system-generated letters, decisions, and certificates are added from the template management section. Digital document man-

[2]Draft, pending, registered, in next instance; closed, unified, canceled, in supreme court; suspended, abrogated, dropped out, dropped out date passed; in implementation.

agement registry will make it easier to create system-generated document templates. Furthermore, the automatically generated templates in the system help clerks in saving time and less possibility for error.

Automatic Case Distribution The allocation of cases becomes more transparent (compared to manual allocation) and enables to consider the complexity of cases (in addition to the number of the cases).

User Management The system designed to have four different types of user groups: court users, lawyers, public users, and agency employees. Hence, the user management section provides a better overview of the roles, views, user, and permissions.

Onscreen Hearing Monitor TV screens are installed in the courthouse, next to courtrooms in order to clarify the schedule of courtrooms for all the visitors. These screens help better monitoring of the hearings in every court and decreasing the waiting time by lawyers and litigants, and more systematic manner.
Case-Law Case-law is the summary of previous court judgments, which will become available online. Presenting the judgment summary is an essential functionality for lawyers/barristers and for judges, who will be able to search for summaries of similar cases and refer to them in their ongoing cases. In the purpose of this, the e-court system has implemented an advanced search capability to find similar cases.

Robust Statistics This functionality provides better possibilities for gathering statistics and the analysis of court statistics regarding the number of incoming and disposed cases. Hence, the backlog will be gathered automatically (instead of manual calculation), and the result will be ready in a matter of seconds.

Digital and Physical Case File Connection Connection between digital case file and physical case file implemented through a bar code. If cases are stored digitally and also parts of it are printed out on paper, there is a need for linking the physical and digital case to one another. This bar code is implemented in order to ease the search of digital case file using the physical case file printed bar code.

Electronic Notification Electronic notification sends immediate notification about case updates to all related users. Specific case updates such as case registration, hearings, fees, case participants, and documents are all notified to related case users.

Public View The system provides a separate view for public users, who are connected to cases. Public users can be (case participants, outside court justice agency users, and lawyers). Through a public portal, they can access their case information, get notifications about updates, submit new cases and certificates, and download and upload documents. This functionality results in building trust, confidentiality, and transparency of the public toward the judiciary.

Multilingual System Current system is implemented with three main languages (Kurdish, Arabic, and English). This functionality will aim at decreasing the cost for participant and court. In the paper system, the used language for reading and writing was Kurdish in most of the courts. Hence, case participants who are not their primary language were Kurdish had to get the official court papers and translate it outside the

court to the language they use, for example, Arabic or English. The current system is equipped with this functionality to generate all court documents in three languages, and this leads to saving the cost of translation.

3 Findings

3.1 Internal Daily Operations

The interviewed experts pointed out that there are significant improvements in internal daily operation inside the court.

3.1.1 Better Case Management

According to our observations, the whole case process cycle with e-court is more efficient. As an example, in the paper system from the case registration until case disposal, clerks should register case participant information multiple times into different registers. Hence, repetition of the same information with handwritten text gives a possibility for a mistake, in addition to time consumption. In the e-court system, information is inserted to the system and registered once. The registered information will consistently appeared in all registers and can be accessed by all case-related parties. The process starts with entering information once into the main prime register. After the registration, the case will automatically be moved to the fee department, no need to be followed and taken by clerks. Then, the case will be automatically sent for hearing registration. The calendar and timer track the exact date and time set for the hearings, to avoid conflicts. An additional enhancement in the hearings is that hearing details and participant are now shown on the screen and published to the public on the court website. Therefore, case participants and lawyers do not need to be in court for the whole day, waiting for their hearing. After the hearing is set, summonses are generated automatically from the system, with all hearing details and case participant information. Then, notification sent to summons department for dispatching and delivering. In the paper system, summons forms were all filled by clerks with handwritten information that led to many mistakes, in addressee information and all other hearing details such as date and time, court name, case type, and participant names.

The final step is case disposal with closing case by adding the final decision. Currently, the system shows a more organized decision register compared to paper decision register. Moreover, the decision summary is automatically added to every case and shown only by mouse click. That saves the clerk time to rewriting the whole decision in the register.

In addition, a judge[3] agreed the e-court implementation promotes daily internal operations and described that: "*Although, the usage of technology in Kurdistan courts and the project is in the beginning, however, we have seen significant improvements in the case registration process, with less time and more accurate information as compared to the paper system; we, as judges, noticed that e-court enhanced speed in our daily work and case disposal, which at the end benefits the litigants.*"

Another judge[4] added: "*Generally, the main task of the court is restoring rights to the oppressed or investigating in a case or crime, the court should solve and conclude with issuing a fair decision very soon. Also, e-court has helped the process to be achieved in less time, compared to the manual process. There are some situation which time plays an essential key in court cases, for example in some civil cases, even if court despised a case with a fair decision, the actual value of returned right may lose due to the time consumed in the process of finalizing the case. Such cases related to financial issues or properties. Similar issue in criminal cases, there are some cases which take long periods and due to that some traces of crime may fade by time or even disappear.*"

Another operation improvement is case movement from one court to another, when cases are appealed, objected, and referred from one court to another court. In a paper system, bulks of case files were moved from one court to another. A considerable amount of time was needed, for example, days if there are distances between courts, in addition to human resources and effort. Currently, the system takes responsibility of case movement more efficiently, and case data instantly shown in the next court along with notification to all related system users.

In support to that, a judge[5] stated: "*Since, I am using the system from 2016 up to today, I have stayed away from paper and pen (% 90) in my daily work as a judge. Moreover, case movements between different related parties and institutions are done in a matter of minutes. For example situations such as referral, and different types of appeal used to be very slow and consuming days to arrive at the next destination.*"

A prosecutor[6] agreed on that and added: "*One of the significant improvements for prosecution is with case movements between courts and prosecution building in case referral situation. In a conventional system, bulks of the paper file were moved from courts to prosecution and returned to court after prosecution documents have been added. Currently, no movements needed, referred cases instantly appear to prosecutors who are involved in the process, and case data will be available. The system sends notification about case referral.*"

Moreover, a judge[7] added: "*This functionality has saved significant time for appeal judges because, in a paper system, opinion was written on a paper and attached to*

[3]Supreme Court judge, previous court president at the Sulaimaniyah Appellate Court.

[4]Judge at the primary court in the Sulaimaniyah Appellate Court, member of the judges advisory board in the e-court project.

[5]Member of the appellate court panel of the Sulaimaniyah Appellate Court.

[6]Prosecutor at the Sulaimaniyah Appellate Court.

[7]Supreme Court judge, a previous member of the appellate court panel at the Sulaimaniyah Appellate Court.

the case file. The case file was moved from one judge to another multiple time. Each judge in the panel had to read all case details and contents and add the opinion. After that, the case will be moved to the next judge in the panel, with a similar procedure, then finally to the head of the panel. This movement of cases was taking significant time, as every judge in order to read case documents and details, was taking a case file to home with days for revision. While now, the case file is accessible for all panel members, they can review the case and add their opinion simultaneously, without moving case file."

Electronic notification is another key to improving internal daily operation. Announcement of each action regarding the case update is sent instantly to all related parties. As an example, when a case is appealed, instant notification sent to the appellate court that new case is coming in pending status to be registered. Moreover, in courts which are managed by a panel of judges, when each judge adds an opinion, other judges in the panel are notified directly. Another example which already enhanced the case management in terms of notification is the summons delivery. When a summons is delivered, at summons department, and clerks mark it as delivered, notification sent to judges about delivery. In the paper system, many hearings were postponed due to an undelivered summons, which resulted in the non-attendance of participants. Moreover, when a case is referred from investigative courts, notification of referral is sent to prosecutors who are connected to competent courts.

In respect of that, judicial investigator[8] explained the importance of electronic notification by saying: "*Time is an essential factor in the investigation process. The system has saved a considerable amount of time in our journey of investigation. As we get instant updates with electronic notifications about orders by judges along with police activities, and all exchanged data and information.*"

3.1.2 Better Overview of Statistics and Flexible Information Retrieval

The system gives better and more accurate statistics. In a paper system, each court has to count court cases manually and fill statistics information into a paper form, monthly and yearly. Currently, the system gives an accurate and instant case statistics for any required period, and This has resulted in saving time and eliminating errors. Moreover, each register provided with a filter section. Information retrieval can be achieved by a case number or other metadata in the case such as case status, judge name, case types, and many more; this capability is not possible with paper systems.

In support of that, a judge (see footnote 3) said: "*Statistics generally is now faster than before, in a way that is not comparable with a paper system. With more quality and accurate result.*"

[8] Judicial investigator at the police station in the Sulaimaniyah Appeal Court.

3.1.3 Case Distribution

The e-court system implements an automatic *case distribution*. In the paper-based system, case distribution was made on a paper manually. As an example, there are six primary courts, when new cases come, they should be equally distributed over judges. The head judge at primary court (1) is usually responsible for that distribution. He makes a table with handwritten information on how to keep track of equal distribution. Currently, this functionality is controlled by the system. Automatically judges are selected with keeping balances of the distribution. Hence, the time used by a judge for manual distribution can be used for other judiciary tasks.

In this respect, a judge (see footnote 4) supports that: "*In paper system one of the main problems was case distribution among judges, which was not fair and there was a room for participant and lawyers to play with judge selection, in order to get the desired judge. While currently, the system functions automatic distribution equally, systematically, and consequently, the process more transparent.*"

3.2 Security

Electronic systems provide a higher level of security of information than paper systems, due to different levels of authentication and authorization, in addition to functionality of user management rights according to groups and individuals. Restricting access to confidential cases to authorized users—even if from the same court—improves court case security. According to observations by authors, another layer of security provided for viewing documents by case participants and lawyers who are connected to the case, the court will decide on the viewing permission. Moreover, the system also provides an audit trail of every action. Getting the record of log about case history is challenging to maintain with a paper document. Moreover, digital systems have an easy way to backup documents for offsite storage providing safe archives and disaster recovery strategy.

A judge (see footnote 3) supports that by saying: "*More security is achieved through e-court system in two aspects. First; security of case information, only authorized users having access to confidential cases. Second; security of documents from losing and damaging.*"

Moreover, from the IT management perspective, the head of the IT department of the Sulaimaniyah Appellate Court added: "*Securing court cases is one of the essential aspects of justice, even with a conventional system. The current system provides a high level of protection from both sides, software, and hardware. Furthermore, the log of actions is a critical source can be used as a piece of evidence for looking at who and when made any changes in the case. The system provides a set of different roles to be used for each user according to what permissions they have in that court, which gives additional security for accessing case data.*"

A lawyer[9] from the court emphasized the security improvements: "*Security in the system is very strong, as every user accesses through a personal credential with user name and password. Moreover, providing a log section at the end of each case gives more control over the security of the case data, by keeping a record who has accessed and made.*"

3.3 Concurrent Access to the Judiciary

E-court systems extend the concurrent access to the judiciary. Current e-court system gives the possibility to be accessed from outside the courthouse with VPN (Virtual Private Network). On the other hand, this allows judges to not carry out bulks of case files for revision at home.

In support of that, a judge (see footnote 4) stated: "*I, personally do most of the tasks outside the court. This is facilitating judges work. For instance, I have used the system even outside Sulaimaniyah, while I was traveling I still had access to my cases and proceeded some tasks and revised case documents as I usually do inside the courthouse in my room. That makes processing work can be done even during our vacation if necessary.*"

Furthermore, another judge (see footnote 5) added: "*Due to the system, I am not taking back old and dirty case files anymore as before. Currently, I can do all my work remotely from home. No need to move paper files between home and court. Now, everything is electronic and remote access to our work is a significant improvement.*"

3.4 Transparency

The e-court system allows case participants, lawyers, and all other case users possibility to track the status of their case online, and view published hearings and decisions by court authorities, this feature increases transparency. Hence, it can result in fighting corruptions.

On the other hand, the automatic allocation equally distributes cases, which can be publicly seen by all users. That does not leave room for lawyers to play with cases by selecting the desired judges, and all procedure is managed automatically and transparently by the system.

Observant noticed that the system fosters transparency in court case proceeding and justice delivery in general.

All respondents confirmed that transparency with e-court is more visible than with paper system, and some responses have described the benefits of this improvement as the following: "*Transparency is an advantage of the system, specifically in case*

[9]Lawyer at the Sulaimaniyah Appellate Court.

distribution and hearings now become more transparent than before. Transparency delivers justice in the court process and gains public trust toward courts."

Moreover, a judge (see footnote 4) added: "*Transparency is essential in courts, specifically in civil courts hearings are obliged to be held publicly and transparently, while for the criminal court there are some situations which investigation process should be kept secret. E-court has improved transparency in a way that case participants are allowed to access their cases from the public portal and track the progress of their cases.*"

Furthermore, another judge[10] supported that by stating: "*Transparency is a crucial point in our work. All none confidential cases has to be maintained transparently. As an example, investigative case detail view provides updated information about accused status such as; (arrested, escaped, disappeared, not detained, on bail, and deferred fate), which is seen by all involved parties in the investigation cycle, makes following up process much more manageable than in the paper system.*"

4 Related Work

Xu [1] states that e-court systems organize and manage collaboration activities executed by different court institutions and other parties related with the court, in order to make court procedures transparent, faster and efficient; in particular, working from outside the office results in "on-call" and "non-stop" judges. With respect to *concurrent access* to the judiciary, they state that the cooperation in information sharing results in time-saving and more efficient collaboration. Furthermore, they analyze that accessibility of case information allows judges to be more convenient and helps to achieve a higher level of transparency.

In [2], Richard Slowes analyzes, concerning *document template management*, that auto-generated templates help clerks in saving time and decrease the risk of error. Furthermore, they find that *electronic notifications* help in building trust, confidentiality, and transparency [2].

Rungruangpattana and Achalakul [3] note that providing electronic data to the general public is considered as delivering better service by the involved stakeholders. In particular, performing an electronic search is found to be a better service for both court personnel and the public. Also in [3], they deal with the improvement of security by e-court systems. In [4], they explain, how automatic *case registration* can improve the service delivery; i.e., once a case is registered, the system automatically shares the case information with related users. Also, in [4], they analyze the advantages of an improved *user management*, i.e., the categorization of user groups allows for better-organized management of the case workflow.

Singh et al. [5] find that e-court systems help to transfer paper-based court processes into a systematic digital process, in addition to speeding up the process of the judiciary and enhancing transparency and cost-effectiveness.

[10] Judge at the investigative courts in the Sulaimaniyah Appellate Court.

In [6], Ursula Gorham finds that simultaneous access to case information yields to a significant improvement of efficiency. Also, she states that greater security is achieved through more reliable electronic backup copies of court documents.

Luzuriaga and Cechich [7] describe how *electronic notification* saves time and cost, and fosters faster publishing.

Bueno et al. [8] identify essential advantages of e-court systems. E-court systems are accessible 24/7 and provide users authorized remote access. Hence, e-court systems make tasks more efficient. The opportunity to track cases from initiation to the disposal phase enhances transparency and the trust of citizens toward the justice system. Automatic case distribution is an efficient solution, as it and guarantees a homogeneous case distribution over judges.

Mandal et al. [9] describe challenges in the implementation of court case systems, e.g., in measuring case similarities.

Hasan et al. [10] find that managing court cases through an e-court system is more secure and efficient, in particular, due to of reuse of data that has already been entered to the system such as case numbers, participants of proceedings, case details.

Hamin et al. [11] describe how e-court systems enable more efficient daily routines. As an example, *online hearing monitors* help to decrease the waiting times.

5 Conclusion

This paper reflects on the implementation of the e-court system in Sulaimaniyah Appellate Court in the Kurdistan region of Iraq. E-court systems currently play an essential role in courts all around the world. They help to deliver justice services in a more organized and systematic manner. Moreover, they enhance the quality of court services and provide the public with an opportunity to access court services concurrently online. This paper presented an overview of the e-court system in the Sulaimaniyah Appellate Court. The study is based on analyzing expert interviews who are direct users of the system in addition to the inside courthouse observations. The findings show significant improvements in the areas of (i) internal daily operations by judges, prosecutors, lawyers, and clerks at different courts and different levels of roles; (ii) security of court cases; (iii) extended access to the judiciary; and (iv) transparency.

References

1. Xu AL (2017) Chinese judicial justice on the cloud: a future call or a Pandoras box? An analysis of the intelligent court system of China. Inf Commun Technol Law 26(1)

2. Slowes R (2012) Benefits of a modern court case management system. Technical Report L-379393/9-12, Thomson Reuters
3. Rungruangpattana P, Achalakul T (2007) The design framework of the civil court case management system in Thailand. In: IEEE region 10 annual international conference, proceedings/TENCON
4. Rungruangpattana P, Achalakul T (2008) The software prototype of civil court case management in Thailand. In: Proceedings of the 2008 advanced software engineering and its applications, ASEA 2008, pp 221–225
5. Singh M, Nehru M, Dwivedi Y, Rana N, Tamilmani K (2018) Success factors for e-court implementation at Allahabad high-court success factors for e-court implementation at Allahabad high-court. In: Proceedings of PACIS'2018–the 22nd Pacific-Asia conference on information systems, association for information systems
6. Gorham U (2012) State courts, e-filing, and diffusion of innovation: a proposed framework of analysis. In: Proceedings of the 13th annual international conference on digital government research, dg.o'12. ACM, New York, USA, pp 232–239
7. Luzuriaga JM, Cechich A (2011) Electronic notification of court documents: a case study. In: Proceedings of the 5th international conference on theory and practice of electronic governance, ICEGOV'11. ACM, New York, USA, pp 45–50
8. Bueno TCD, Bortolon A, Hoeschl HC, Mattos ES, Santos CS, Theiss I (2003) Using rbc to classify judicial petitions on e-court. In: Proceedings of the 9th international conference on artificial intelligence and law, ICAIL'03. ACM, New York, USA, pp 83–84
9. Mandal A, Chaki R, Saha S, Ghosh K, Pal A, Ghosh S (2017) Measuring similarity among legal court case documents. In: Proceedings of the 10th annual ACM India compute conference, Compute'17. ACM, New York, USA, pp 1–9
10. Hassan KH, Yusoff SSA, Mokhtar MF, Khalid KAT (2016) The use of technology in the transformation of business dispute resolution. Eur J Law Econ 42(2):369–381
11. Hamin Z, Othman MB, Mohamad AM (2012) Benefits and achievements of ICT adoption by the high courts of Malaysia. In: SHUSER 2012-2012 IEEE symposium on humanities, science and engineering research, vol 2, no 100, pp 1233–1238

Appendix 2

[II]

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Challenges in the Digital Transformation of Courts: A Case Study from the Kurdistan Region of Iraq

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***Abstract*—The existence of the emerging technologies in the justice domain brought out new opportunities for courts towards better case administration, extended availability, improved service delivery, and enhanced transparency in the daily processes. However, the practical implementation of such e-solution could encounter several issues and challenges. This paper examines the current challenges raised during the implementation of the e-court system in the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq. This research employs a qualitative approach. We use three sources of data based on expert interviews of different stakeholders in the appellate court, personal observation by two of the authors in-site the project, and supported by analyzing current relevant literature. The outcome of this study summarizes numerous challenges in the e-court system implementation. The study presents critical points for decision-makers towards addressing challenges for future consideration in order to eliminate barriers to success.**

***Index Terms*—e-court, e-services, e-government, digital transformation, RQDA**

I. Introduction

Emerging technologies are playing a significant role in the justice domain towards reshaping and modernizing the conventional justice systems [1], [2]. Application of technologies in courts presented various advantages with respect to improving court efficiency, increasing transparency, and providing better justice services to citizen [3]–[9]. E-court systems are considered as one kind of applications of information technology in courts. An e-court system is defined as a technology-based court information system, to modernize the conventional judiciary, in order to enhance the quality of court services and better case management from claim submission to case disposal through automating courts workflow [4], [6]–[8], [10]–[20]. On the other hand, the practical implementation of an e-court system might be challenging [10], [11], [21]. In particular, in none developing countries where the environment suffers from financial crises, security instability, and many more. This paper presents an experience of the e-court system in the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq, and examines the current challenges raised during the implementation of the e-court system.

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The analysis is based on expert interviews with different stakeholders in the appellate court, supported by personal observation from two of the authors in-site the project in addition to analyzing current relevant literature. The outcome of this study is expected to extend the body of knowledge on e-court implementations and presents key points for decision-makers towards addressing identified challenges for future consideration in order to eliminate barriers to success.

This study is limited to address the challenges, however, technical details of the system will be covered in further research.

Section II of this research presents a background of the e-court system implemented in the Sulaimaniyah Appellate Court, with some features of the system. Section III provides information about the approached methodology in the service to this study. Then, section IV, provides the final results of the study and summarizes the issues and challenges defined during the analysis phase. Additionally, section V presents some recommendations.

II. Background of the E-Court System in the Sulaimaniyah Appellate Court

The Sulaimaniyah city is located in the Kurdistan Region of Iraq. The region has four appellate courts. They are located in the four main cities (Erbil, Sulaimaniyah, Duhok, and Kirkuk). The current e-court system is implemented only in the Sulaymaniyah Appellate Court. This solution is aimed to help courts in delivering better services and enhance transparency in the court processes, and be a first e-service in the Sulaymaniyah city. Moreover, this project will be a pilot for a broader plan to integrate all appellate courts from other cites in the Kurdistan of Iraq. Hence, stepping towards digital inclusion and the implementation of e-government in the entire region. The project is initiated in October 2014 [22].

Currently, all court types from civil and criminal jurisdictions that belong to the Sulaimaniyah Appellate Court are operating the e-court system. Number of courts per each court type are presented in the "Fig. 1"

The system is equipped with all the required functionalities to optimize daily operations in all courts [22]. The system

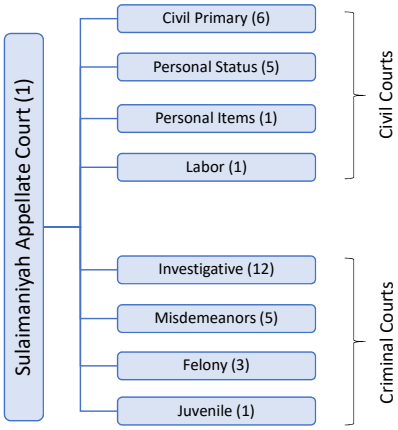

Fig. 1. Courts in the Sulaimaniyah Appellate Court

provides a set of electronic registers to facilitate the case data management for court users. Some features of the system include:

- *Availability* of using the system within three languages, Kurdish, Arabic, and English.
- *Accessibility* with different channels such as the direct connection from the courthouse, remote connection through a virtual private network (VPN) for authorized users, and public portal for public users from outside the courthouse.
- *Flexibility* in searching and indexing of court cases and participant information. Moreover, in terms of searching, the system provides a "Case-Law" to help judiciaries search in decision summaries of previous cases [22]. Besides, the ability to use a bar code on cases for faster searching possibility.
- *Integrity* of information is guaranteed through the implementation of a central database for case records, that assures the accuracy and consistency of information through all the linked registers.
- *Confidentiality* of case data is protected through access limitation to only involved and authorized users.
- *Security* is achieved through presenting different layers of authentication, different user categories, and roles per each court with restricted user privileges according to the specific task [22].

Our previous study [22], presented preliminary results of efficiency improvements of courts, due to optimized internal operations in respect to time and efficiency, improved security of court cases, enhanced transparency of the processes, and extended availability of courts through remote access by judges. In contrast, this study examines the issues and challenges that exist in this digital transformation at the Sulaimaniyah Appellate Court and the implementation of the e-court system.

III. Research Methodology

This research employs a qualitative approach. A triangulation of three data sources is used to strengthen a validly of the study [23].

- *Interviews*: we interviewed eleven experts in the Sulaymaniyah Appellate Court. The selected samples composed of active end-users of the e-court system with a legal and professional background. We interviewed five judges from different courts who process civil, criminal, and appellate cases. Among them, we interviewed a court president, who is the leader of the judge's supervisory board in this e-court system project, and a head of the various panels in the appeal court.
  Two clerks who are performing all daily tasks at the courthouse.
  Besides, a lawyer who has been involved as a representative of case participants for different case types.
  A judicial investigator who is involved in the investigation journey in the criminal cases.
  A prosecutor, who is using the system for a daily process from prosecution institution.
  Additionally, a system administrator, who is the head of the Information Technology (IT) department in the courthouse, has provided his response from the IT perspective.
  We used a structured questionnaire as an instrument for the interview. Questions were constructed to identify issues and challenges that are currently facing the e-court system implementation in the Sulaymaniyah Appellate Court.
- *Personal observation:* we also used a personal observation as a second source for the evidence. As the observation goal is to get an in-depth understanding of the context closely, we used both direct and participant observation types [23]. The first author was a direct observer in the field, and monitored the case-workflow after the e-court system implementation. However, the second author was a participant-observer, he is a judge and experienced in both, the paper-based and electronic court systems.
- *Document analysis:* is used as an additional source of data. We analyzed the current relevant literature. These studies provided us with a better understanding of the situation and challenges encountered technology integration with courts worldwide.

Furthermore, we used an RQDA as an instrument for the data analysis phase. Responses were translated from the Kurdish language to the English language. From processing responses in RQDA, we defined seven main codes to be categorized as the current challenges by interviewees such as, *Digital signature*, *Information Technology (IT) skills*, *Information and Communication Technology (ICT) laws*, *External issues*, *Public portal usage*, *Training*, and *Human resource*.

The research quality carefully considered according to Yin's strategy. Hence, We focused on using multiple sources for data collection in order to *construct validity*. *Internal validity* is also

possible to be achieved by finding the relationship between the outcomes of the challenges as one could affect the other. *External validity*, considered by providing the detail of the procedures taken towards approaching the results, hence, it can be generalized with similar environments by reproducing the same procedures. Furthermore, *reliability* is concerning the independence between researchers and the results. As we presented the procedures and created a database for the documents; therefore, the possibility of getting the same outcome is high, with replicating the same approach.

IV. Results and Discussion

The results of our analysis presented a number of challenges, as it is shown in Table I.

TABLE I
DEFINED CODES AND OCCURRENCES BY RESPONDENTS

No.	Code names	Occurrences	Respondents
1	Digital signature	27	11
2	IT skills	20	9
3	ICT laws	14	9
4	External issues	13	9
5	Public portal usage	9	8
6	Training	7	5
7	Human resource	5	4

A. Digital Signature

The digital signature is defined as a technological tool to be used in courts as a valid signature that is "authentic, unforgeable, non-reusable, tamper-proof and non-repudiable" [2]. It is recognized as an essential part of achieving the security and integrity of the documents [20], [24]. As can be seen from the results, a digital signature is the main concern for the court users. It has explicitly been occurred in the responses 27 times by all participants. They considered it as an influential factor on the daily usage of the e-court system. From observing the case management workflow, it is evident that the lack of a digital signature is reflecting negatively on the daily internal operations. As every document generated by the system requires court authorities' signature and currently this procedure has to go through three steps as described in "Fig. 2".

Availability and validity of digital signature are considered as critical features for implementing the e-court system [3], [7], [25], in order to achieve a paperless court, or "a completely electronic basis" system [26]. Therefore, [13] considered the non-existence of a digital signature as the main challenge in the system. Furthermore, [20] considered a lack of digital signature as a significant issue, as the cost of papers and time consumption for printing and scanning can be saved for other tasks. A response from the judge supports this by stating:

"Digital signature is one of the necessary parts of the system, and without having a digital signature, we cannot say, we have a fully functioning e-court system."

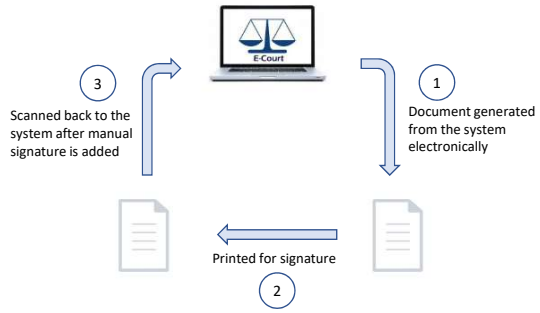

Fig. 2. Court document processing steps

B. IT Skills

Lack of the IT skills among court users counted as another challenge in the e-court system at the Sulaimaniyah Appellate Court. The theme of IT skills is repeated 20 times by 9 of the interviewees. IT skilled staff can perform their daily tasks in the e-court system more efficiently with confident compared to other personals that are not technically savvy [3], [27]. From observations and results of the analysis, it is evident that the court currently lacks an IT skilled staff. In this respect, [28], [29] ensured that a lack of staff with IT skills considered the main challenge in an electronic information system. Moreover, this challenge could be more complex problem and threaten the system administration [30]. Technologically skilled staff is essential for court, not only for the purpose of using the system more easily, but also to be able to recover some hardware and software issues that could counter them during working hours at court. An interviewee supported that by stating: *"IT skills are one of the important issues we should focus on, and work for providing training to improve our staff's IT skills."*

C. ICT Laws

Lack of the existence of ICT related laws in the Kurdistan Region considered as another big challenge. This is evidenced by responses from interviewees, as 9 among 11 confirmed this challenge. The overall occurrence of ICT laws for 14 times assures the importance of this aspect for the implementation of e-court systems. It is observed that current laws that are applied in the Kurdistan Region do not support any ICT usage. Furthermore, concerning ICT related laws, respondents suggested the in addition to adding new laws for digital transaction, amendments needed in current laws to support fully electronic procedures of courts. In particular, two judges from interviewees explicitly focused on the modification needs in the current procedural laws, such as these three laws; civil action law, criminal procedures, and evidence act to allow using electronic courts in a fully paperless format. On the other hand, others emphasized on the need for new ICT related laws

to be established for electronic communications such as emails that are more used by commercial companies recently.

D. External Issues

Lack of external resources such as electricity and internet instability is considered as another challenge by the interviewees that is currently facing the implementation of the e-court system.

The code of external issues defines the lack of electricity, other hardware resources, such as computers, printers, scanners, or any other device used to function the e-court system, and internet connection instability.

Personal observation by the authors made it clear that the lack of electricity and other resources is a real barrier to proper usage of the system. In particular, for the outside institutions that are connected to courts in order to process the criminal cases through the e-court system.

The procedure of criminal cases requires the involvement of different parties, such as police stations, prosecution institutions, investigative courts, and competent courts are all collaborating in the process, in addition to case participants, lawyers, and other related agencies. This collaborative activity is presented in the "Fig. 3"

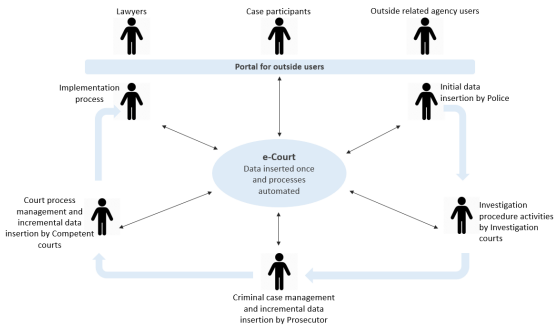

Fig. 3. Collaboration between parties for processing criminal case

Hence, it can be evident that lack of electricity and any hardware resources can be challenging. Furthermore, this is supported by a prosecutor that stated:

"lack of hardware equipment, such as computers and scanners, especially for the police stations and electricity issues and generators, sometimes results in not using the system properly".

On the other hand, instability of the internet connection outside the courthouse is explicitly counted as a significant obstacle to not use the system from outside the courthouse. An interviewee stated that:

"I am not using the system outside the court due to some problems related to the instability of the internet connection."

Hence it can be confirmed that the internet is the key for providing online services. However, instability of the connection could be a barrier of the proper service delivery in any e-services [31].

E. Public Portal Usage

As stated earlier in this research, the system provides a public portal as a separate channel for communication and enhances the accessibility of the system. This public portal allows using the system from outside the courthouse to three different groups of users, such as:

- Public users group who are categorized to be a case participant and can access their case data through a public portal from outside the courthouse.
- Outside agency users group who are involved in the process of case management, such as telecommunication companies, hospitals, educational institutions, and others. For information exchange, they can use a public portal from outside the courthouse and get access to the cases they are involved in.
- Lawyers, who have two possibilities of using the system. The local connection inside the courthouse, and the public portal from outside the courthouse.

The demand for using a public portal to access the e-court system currently is very low. Our observation monitored the number of active users per each of these three groups in the system, and the outcome was, 3 outside agency users, 5 public users, and 495 lawyers out of 1099 of total active users in the system. However, further study needed to clarify if the 495 lawyers use the public portal or local courthouse connection, due to their availability inside the courthouse every day. This low rate of usage of public portal is considered as another issue by 8 interviewees with statement of the code nine times. However, there is no clear definition of the reason for not using this feature of the system. One response indicated that it could be relevant to the lack of ICT related laws. This is clear that exchanging information in electronic format needs to be supported by the law. Moreover, the current lack of digital signature might also be an obstacle due to the time consumption needed for every document to be printed, signed, and scanned back to the e-court system. Consequently, we also find out the lack of electricity, and other resources could also play a role in this challenge. Not to conclude without expecting that IT skills could be another barrier.

F. Training

Training is another challenge described by five of the interviewees. The need for training is stated 7 times in the responses. Due to the lack of technical skills among the court users, hence, training can be considered as an important aspect in the implementation of the e-court system [3]. Two responses from judges assured the need for training by stating:

"There might be a need for providing constant training up to a level when they think they are comfortable with using a computer. "

And

"Training center could be established to provide training sessions in order to improve staff capability with the system usage".

G. Human Resources

The lack of human resources is repeated five times by the interviewees. Observation made inside the courthouse presented the fact that the current situation of requesting more human resource is due to two main reasons:

- First, the complexity to use the system by most of the judges who are not technically savvy, in particular, the old aged. Hence, more technical people were requested to assist judges and to be called Personal IT assistants.
- Second, the experience of the electronic system is new in the Kurdistan Region, and due to the lack of a digital signature and supported laws, the processes still need to be performed in both formats, paper and electronic. Hence, due to the big amount of cases every day, clerks are burden with more tasks by using both systems simultaneously. Therefore, request on more human resource is increased.

This is supported by a statement from the court president by saying: *"Human resources with IT literacy, is vital for developing the e-court system"*

Moreover, another judge is confirming the same statement by saying:

"we are currently in need of more human resources, in general, who are qualified in using technology."

V. Recommendations

The final statement from the authors in the form of recommendation aims to significantly provide a clear conclusion for addressing these challenges and stepping towards integrating other courts in the Kurdistan Region of Iraq, and initiation of e-government implementation.

- The most challenging aspect is the lack of a digital signature in order to end-up at an entirely paperless court system. Establishing digital signature concerns other organizational, administrative, and technical issues [20], that could be initiated by the government. Hence, this issue needs a further plan and government involvement. However, not only availability of the digital signature will solve the problem, but also providing a legal value to the digital signature for signing electronic court documents in the e-court system is a must step to be considered.
- There is a significant need for reforming a current legal framework that exists in the Kurdistan Region justice system. As the current applied laws and regulations is not supporting digital transitions. Therefore, introducing laws and regulations in relevance to ICT application and electronic service provision to allow electronic data exchange and digital transactions is recommended. In addition to adding new laws, some of the current procedural laws might also require amendments. Hence, further studies and analysis need to be conducted to prepare the draft of new legal framework for the government.
- Digital transformation and establishment of e-government require expanding IT skills in all sectors [32], [33]. Hence, putting a long-term strategy for creating more technical skills is needed. For that purpose constant training should be provided to end users, and establishing training centers to expand users capabilities.
- Concerning other external aspects such as lack of electricity, hardware resources, and internet instability is another government-related aspect depending on the fiscal plan for establishing e-government. However, it is recommended that public and private co-operation and shared responsibilities may result in better service provision [34].

VI. Conclusion

Integrating technologies with justice domain modernized and reshaped the conventional justice systems. Technology played a significant role in presenting e-court systems for courts to digitize their manual processes. E-court systems achieved more efficient justice delivery. On the other hand, successful implementation of the e-court systems could be challenging due to the lack of many aspects such as supporting laws, resources from financial, technical, and human. Moreover, the geographical location may play a significant part in these challenges concerning stability and IT awareness issues. This research posed an implementation of the e-court system in the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq. We have defined several issues and challenges that could threaten the successful use of the system. Our analysis with the qualitative approach used a triangulation of three sources of data to get the results and systematically identify the current challenges. The findings showed that there are seven challenges such as, (1) lack of digital signature, (2) lack of IT skilled personals, (3) none existence of ICT related laws, (4) shortcoming in the availability of electricity, the instability of internet connection outside the courthouse, and lack of other hardware resources, (5) law rate of using public portal, (6) need for constant training programs, and (7) lack of human resources. For the successful expansion of the system to other appellate courts, these presented issues should be taken into consideration.

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References

[1] Council of Europe, "Report on European Judicial Systems: Efficiency and Quality of Justice," no. 26, 2014. [Online]. Available: https://rm.coe.int/rapport-avec-couv-18-09-2018-en/16808def9c%0Ahttp://www.coe.int/t/dghl/cooperation/cepej/evaluation/2014/synthese2014_en.pdf

[2] Cepej, "European judicial systems Efficiency and quality of justice Thematic report: Use of information technology in European courts," Tech. Rep. 24, 2016. [Online]. Available: http://www.coe.int/cepej

[3] M. Singh, G. P. Sahu, Y. K. Dwivedi, and N. P. Rana, "Success Factors for e-Court Implementation at Allahabad High-Court Success Factors for e-Court Implementation at Allahabad High-Court," in *22th The Pacific Asia Conference on Information Systems (PACIS*, 2018.

[4] R. Agrifoglio, C. Metallo, and L. Lepore, "Success Factors for Using Case Management System in Italian Courts," *Information Systems Management*, vol. 33, no. 1, pp. 42–54, 2016. [Online]. Available: http://dx.doi.org/10.1080/10580530.2016.1117871 https://doi.org/10.1080/10580530.2016.1117871

[5] W. S. W. M. Saman and A. Haider, "E-Shariah in Malaysia: Technology adoption within justice system," *Transforming Government: People, Process and Policy*, vol. 7, no. 2, pp. 256–276, 2013.

[6] K. H. Hassan, S. S. A. Yusoff, M. F. Mokhtar, and K. A. T. Khalid, "The use of technology in the transformation of business dispute resolution," *European Journal of Law and Economics*, vol. 42, no. 2, pp. 369–381, 2016.

[7] M. Velicogna, "Justice systems and ICT What can be learned from Europe?" *Utrecht Law Review*, vol. 3, no. 1, pp. 129–147, 2007. [Online]. Available: http://www.utrechtlawreview.org/articles/10.18352/ulr.41/

[8] M. Velicogna, A. Errera, and S. Derlange, "Building e-justice in continental Europe: The TéléRecours experience in France," *Utrecht Law Review*, 2013.

[9] Z. Hamin, M. B. Othman, and A. M. Mohamad, "Benefits and achievements of ICT adoption by the High Courts of Malaysia," in *2012 IEEE Symposium on Humanities, Science and Engineering Research*, vol. 2, no. 100. IEEE, 2012, pp. 1233–1238.

[10] D. Reiling, "E-justice : experiences with court IT in Europe," *Buenas prácticas para la implementacion de soluciones tecnologicas en la administracion de justicia*, pp. 79–115, 2011. [Online]. Available: http://www.iijusticia.org/publicaciones.html

[11] G. Lupo and J. Bailey, "Designing and Implementing e-Justice Systems: Some Lessons Learned from EU and Canadian Examples," *Laws*, 2014.

[12] A. L. Xu, "Chinese judicial justice on the cloud: a future call or a Pandora's box? An analysis of the 'intelligent court system' of China," *Information and Communications Technology Law*, vol. 26, no. 1, pp. 59–71, 2017.

[13] M. Velicogna and A. Errera, "e-Justice in France : the e-Barreau experience," *Utrecht Law Review*, vol. 7, no. 7, pp. 163–187, 2011.

[14] E. C. Wiggins, "The courtroom of the future is here: Introduction to emerging technologies in the legal system," *Law and Policy*, vol. 28, no. 2, pp. 182–191, 2006.

[15] C. Bellamy and J. Taylor, "New information and communications technologies and institutional change: The case of the UK criminal justice system," *International Journal of Public Sector Management*, vol. 9, no. 4, pp. 51–69, 1996.

[16] F. Iannacci, "Digitising criminal justice in England and Wales: Revisiting information-growth dynamics," *Transforming Government: People, Process and Policy*, vol. 3, no. 1, pp. 50–64, 2009.

[17] U. A. Oseni and S. O. Omoola, "Prospects of an online dispute resolution framework for Islamic Banks in Malaysia An empirical legal analysis Umar," *Journal of Financial Regulation and Compliance*, vol. 25, no. 1, pp. 39–55, 2017.

[18] A. Andrade and L. A. Joia, "Organizational structure and ICT strategies in the Brazilian Judiciary System," *Government Information Quarterly*, vol. 29, no. SUPPL. 1, pp. S32–S42, 2012. [Online]. Available: http://dx.doi.org/10.1016/j.giq.2011.08.003

[19] D. M. Chada and F. A. Silva, "Visualizing Brazilian Justice : The Supreme Court 2 . 0 Project," in *Proceedings of the 15th International Conference on Artificial Intelligence and Law - ICAIL '15*. ACM, 2015, pp. 176–180.

[20] J. M. Luzuriaga and A. Cechich, "Electronic Notification of Court Documents: A Case Study," in *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, ser. ICEGOV '11. New York, NY, USA: ACM, 2011, pp. 45–50. [Online]. Available: http://doi.acm.org/10.1145/2072069.2072077

[21] M. Velicogna, "In Search of Smartness: The EU e-Justice Challenge," *Informatics*, vol. 4, no. 4, p. 38, 2017.

[22] R. K. Ahmed, K. H. Muhammed, A. Reitsakas, and D. Draheim, "Improving Court Efficiency through ICT Integration : Identifying Essential Areas of Improvement," in *International Conference on ICT for Sustainable Development in Concurrent with ICT Awards the Excellencia*. Lecture Notes in Networks and Systems, vol 93. Springer., 2020.

[23] R. K. Yin, *Case Study Research: Design and Methods*. SAGE, 2014.

[24] Z. Hamin, M. B. Othman, and A. M. Mohamad, "ICT adoption by the Malaysian high courts: Exploring the security risks involved," in *International Conference on Innovation Management and Technology Research*. IEEE, 2012, pp. 285–289.

[25] R. Prakash, T. Mohanty, R. Gupta, and V. Jain, "ICT in Indian Court Challenges & Solution," *International Journal of Internet Computing*, no. 1, pp. 2231–6965, 2011.

[26] A. S. Ferreira, "Electronic delations within Courts of Accounts in Brazil," in *Proceedings of the 3rd International Conference on Theory and Practice of Electronic Governance - ICEGOV '09*. ACM, 2009, pp. 402–403.

[27] I. Al Swelmiyeen and A. Al-Nuemat, "Facebook e-court: Online justice for online disputes," *Computer Law & Security Review: The International Journal of Technology Law and Practice*, vol. 33, no. 2, pp. 223–236, 2017. [Online]. Available: http://dx.doi.org/10.1016/j.clsr.2016.11.006

[28] W. Saman and A. Haider, "Electronic Court Records Management: A Case Study," *Journal of E-Government Studies and Best Practices*, vol. 2012, pp. 1–11, 2012. [Online]. Available: http://www.ibimapublishing.com/journals/JEGSBP/2012/925115/925115.html

[29] A. S. Asonibare and H. T. Akaje, "E-Path to Effective Justice Delivery : The Nigerian Courts in Perspective," *Second Covenant University Conference on E-Governance in Nigeria (CUCEN 2015)*, no. 08062158623, pp. 1–15, 2015. [Online]. Available: eprints.covenantuniversity.edu.ng

[30] W. S. W. M. Saman and A. Haider, "E-Court: Information and Communication Technologies for Civil Court Management," in *Proceedings of PICMET '13: Technology Management for Emerging Technologies.*, vol. 13, no. 2. IEEE, 2013, pp. 2296–2304. [Online]. Available: http://www.journals.cambridge.org/abstract_S1472669613000248

[31] J. Rosa, C. Teixeira, and J. Sousa Pinto, "Risk factors in e-justice information systems," *Government Information Quarterly*, vol. 30, no. 3, pp. 241–256, jul 2013. [Online]. Available: https://linkinghub.elsevier.com/retrieve/pii/S0740624X13000385

[32] V. Reka, B. Kovacs, and A. Gabor, "E-CRIME System: A Knowledge Management Application in Public Administration," in *Knowledge Management in Electronic Government*, 2004, pp. 237–248.

[33] United Nations, "2018 E-Government Survey," 2018.

[34] K. L˜ohmus, K. Nyman-Metcalf, R. K. Ahmed, I. Pappel, and D. Draheim, "The Private Sector ' s Role in e-Government from a Legal Perspective," in *Fourth International Congress on Information and Communication Technology*, London, 2019, pp. 1–15. [Online]. Available: https://www.springer.com/gp/book/9789813293427

Appendix 3

[III]

Rozha K. Ahmed, Silvia Lips, and Dirk Draheim. eSignature in eCourt systems. In *Proceedings WorldS4'2020 - the 4th World Conference on Smart Trends in Systems, Security and Sustainability*, pages 352–356. IEEE, 2020

eSignature in eCourt Systems

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***Abstract*—The use of technological tools helped judicial systems to transform court working processes from paper-based conventional systems to a modern electronic format that is more efficient and effective with the aim to deliver better justice services to citizens. However, implementing a fully electronic paperless court system can be achieved only if all relevant processes are digitized; and no paper is used in the court workflows anymore. This requires a legal, valid electronic signature (eSignature) to authenticate court users and to sign court documents electronically and securely. This research investigates the case of the Sulaimaniyah Appellate Court electronic court (eCourt) system in the Kurdistan Region of Iraq (KRI). An exploratory case study research design is employed through a triangulation of multiple sources of data, expert interviews with court users, personal observation, and document analysis of relevant literature, that is furthermore supported by comparison with the example of the Estonian eCourt system. The results show an essential role of eSignature in eCourt systems and aim to extend the body of knowledge and literature for academic researchers, judiciaries, and practitioners concerning the implementation of eCourt systems.**

***Index Terms*—eCourt, court information system, e-services, e-government, eSignature, eID**

I. Introduction

Judicial systems have recently transformed their working processes from paper-based conventional systems to the more modern and digital format by integrating technological tools with courts through the implementation of electronic court (eCourt) systems, in order to deliver more efficient justice services with presenting various benefits such as online accessibility, timeliness, transparency, data accuracy, secured access to files and information, and others [1]–[8]. Implementing an entirely paperless eCourt system means full digitization of the workflow of case administration from claim submission to case disposal in different phases including electronic case registration, generation of court documents, hearings, summonses, decisions, and other many more.

In order to achieve a comprehensive electronic system, court documents, and their approvals by court authorities need to be signed in electronic format, i.e., the decision document needs to be electronically signed by judges.

There are different types of electronic signatures available. For example, the European Union distinguishes between electronic signatures (no real evidence about the signer), advanced electronic signatures (higher security level and a stronger connection with the signer) and qualified electronic signatures (corresponds to the highest security requirements and contains qualified digital certificate and presumes a qualified electronic signature device) [9]. In government procedures, usually, qualified electronic signatures are used. In the current research, we use the term electronic signature (eSignature) to represent an electronically given signature equal to a handwritten signature [10] that corresponds to the highest security level equal to the EU qualified electronic signature.

In the case of court documentation, it is clear that a signature should be legally valid and equivalent to a handwritten signature. Therefore, the eSignature functionality is considered as a core element in an eCourt system. The existence of eSignature functionality ensures the full implementation of an eCourt system; it also guarantees significant time-saving in the court processes.

Several studies on the implementation of eCourt systems from the United States, Asia, and European courts presented knowledge on the system prototype, system description and design, advantages of the system and improvements in respect with efficiency and effectiveness of courts [3], [5], [7], [11]–[21]. These studies considered the availability of e-government infrastructure in the country and the existence of electronic identity with a valid and legal eSignature.

In contrast, this research investigates the essential role of eSignature for eCourt systems for a country where it lacks an infrastructure of e-government, and where the eCourt system has been implemented as the first pilot information system towards the future implementation of e-government, i.e., the Kurdistan Region of Iraq (KRI). This eCourt system is implemented in the Sulaymaniyah Appellate Court, as a first e-service in the Sulaymaniyah city. The current infrastructure of the KRI lacks the availability of electronic identification management systems and electronic identity; hence, the current eCourt system faces the challenge of the absence of the eSignature. At the same time, while studding the literature and different eCourt implementation cases, we found Estonia to be one of the mature countries that has digitized court processes and have a fully functional eCourt system in place starting from 2006 [22]. Therefore, we briefly look into the Estonian model and try to extract the most important takeaways from their practice and use it as an example for showing how eSignature is used in the eCourt system.

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This research significantly contributes to extend the body of knowledge and literature for academic researchers, judiciaries, and practitioners concerning the implementation of the eCourt systems. Furthermore, this study will serve the decision-makers in the Kurdistan Regional Government (KRG) to draw a plan for digital inclusion in other appellate courts in the KRI and e-government implementation, to address the existing challenges in the early phases.

Considering a research methodology, an exploratory case study design through a qualitative approach was chosen. The triangulation of multiple sources of data was used. An expert interviews, personal observations, and analysis of current relevant literature, supported by examples of the eSignature usage in the Estonian eCourt system.

The outcome of this study is expected to show the significant role of the eSignature in the implementation of eCourt systems and increasing efficiency and effectiveness in the daily operations and case administration from claim submission to case disposal in the Sulaymaniyah Appellate Court. Further research direction will be towards a deeper analysis of the current situation in KRI and mapping the future eID and eSignature implementation.

Section II provides an overview of the relevance work on the significance of eSignature and implementation of eCourt systems. Section III presents the approached methodology, along with an overview of the case of the eCourt system in the Sulaymaniyah Appellate Court. Section IV presents the findings of the analysis followed by discussion in Section V. Section VI concludes the study and provides some limitations and maps the future research direction.

II. Related Work

An eSignature is defined as a technological tool to be used in courts as a valid signature that is "authentic, unforgeable, non-reusable, tamper-proof and non-repudiable" [1], that allows the users to authenticate themselves and sign court documents. While implementing the eSignature it is important to follow the holistic approach and take into account the whole organizational working process [23]. The eSignature is attached to digital documents to ensure security, authenticity, and validity of the document [24].

Improving efficiency and effectiveness of courts are considered as the main goal for adopting technology in judiciaries [1]. It can be noted that many courts recently have implemented eCourt systems and automated court processes and have seen different improvements. The automated systems should be integrated with an electronic digital signature [25], that is securely used as a significant service for communications and authentications in modern information systems [26].

Availability of eSignature in the system and capability of the system to allow electronic documents to be signed electronically is considered as an essential feature that ensures faster processes, hence, increasing efficiency and effectiveness of the courts. Additionally, eSignature provides the validity of the electronic documents to be equal to paper documents and guarantees that documents are not changed by irresponsible users [24].

The current relevant studies on the implementation of eCourt systems have an eSignature functionality integrated as part of the e-government infrastructure and existence of eID. Therefore, the literature showed how the efficiency and effectiveness are enhanced with respect to cost and time saving, through an entirely paperless eCourt system. The fast processing time of cases and cost reduction in paper usage are considered as two of the most significant criteria for measuring the quality of justice [1], [6]. Time and cost in the judiciary are related to the quality of organization and operation of judicial systems. It is noted that some countries implement their eCourt systems while they continuously use the paper system in parallel. This continuous usage of papers in the eCourt systems hinders the paper-less implementation of the system and requires more time to process both electronic and paper formats in parallel [1]. The continuous usage of paper could be for reasons such as testing the eCourt system during the pilot phase, or due to the absence of eSignature, hence, generated electronic documents needs to be printed and signed with hand-written signatures. Therefore, the existence of eSignature in eCourt systems considered an essential issue not only for time and cost-saving but also it is considered as a critical requirement to guarantee "security and reliability of data interchange" in the system [6].

III. Research Approach

A. The Case of the eCourt System in the Sulaimaniyah Appellate Court

The Sulaimaniyah city is located in the north of the KRI. In the Kurdistan region, there are four appellate courts. They are located in the four main cities (Erbil, Sulaimaniyah, Duhok, and Kirkuk). The current eCourt system is implemented for the Sulaymaniyah Appellate Court [27]. This eCourt system aims to enhance the daily operations of courts in delivering higher quality services and better case management—the system developed with all necessary functionalities to assist court users in performing daily operations more efficiently. Furthermore, the system has shown significant improvements in respect to increasing transparency, security, accessibility, case transfer, case registration and administration, and many more [27]. On the other hand, the system has a number of challenges, and lack of the eSignature is considered as the main issue [28]. The process of case administration inside the Sulaimaniyah Appellate Court starts with claim submission and ends with the final decision and case disposal as shown in "Fig. 1".

As can be noted, in the workflow, there are several documents generated at every phase that needs to be signed.

- First, when the case gets registered, the claim template is generated from the system, and needs to be signed by lawyer or claimant, then on the submission to the eCourt system, the claim document needs to be signed by a judge to assure the case acceptance and registration.
- Second, after the case is registered, hearing(s) will start, and for every hearing, multiple summons documents are

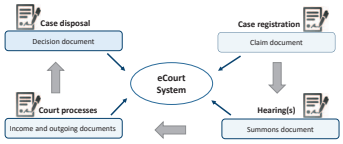

Fig. 1. eCourt system processes in the Sulaimaniyah Appellate Court

generated to be sent to the case participants and relevant parties for hearing attendance; hence, every summons document needs to be signed by a judge at a particulate court.

- Later, when the court processes start, there are many documents exchanged between the court, relevant institutions, litigants, lawyers, prosecutors, and any other party involved in the process. Hence, every document needs to be signed by the author of the document.
- Finally, when the case gets closed, the decision template needs to be generated by the system and to be signed by a judge to be ready for publishing.

This process is repeated at every court and number of documents generated, signed, and exchanged in the system depending on the case type and court type. In the current system, due to the lack of eSignature, at every step, the document is printed on paper, signed manually, and scanned back to the eCourt system that delays the processes and cannot meet the fully paperless system [28].

B. Methodology

This research employs an exploratory case study strategy. We selected a case study strategy as it allows for an in-depth investigation of a contemporary within its real-life context [29], [30], particularly, an exploratory case study aims at exploring a topic while no earlier studies exist to estimate the outcome [30], as well as to investigate the current state [31]. Therefore, this strategy is well-suited to investigate the status quo of the Sulaymaniyah Appellate Court and explore how the daily processes are performed with the absence of eSignabure and its effect on efficiency and effectiveness of the system.

We used a triangulation of multiple sources for data collection to strengthen a validly of the study [30]. We interviewed eleven experts in the Sulaymaniyah Appellate Court. The participants were composed of seven different roles (judges, lawyers, prosecutors, court presidents, clerks, judicial investigators, and the IT department). They are the main end-users in the eCourt system with a legal and professional background. We also used a personal observation as a second source for the evidence to get a deeper understanding of the context closely and monitor the process of case administration in the eCourt system inside the courthouse. Furthermore, we analyzed existing relevant literature as an additional source of data to obtain a better understanding of the situation in the current running eCourt system. We used an RQDA as an instrument for the data analysis.

IV. Findings

Availability and validity of the eSignature are essential issues to be considered for the implementation of eCourt systems, as eSignature ensures the security and integrity of the court document, time and cost-saving, in addition to resulting in a paperless system [2], [6], [8], [21], [32], [33]. A previous study on the eCourt system of the Sulaymaniyah Appellate Court identified the main challenges of the system, and lack of the functionality to sign court documents electronically has been considered as an essential factor on the daily usage of the eCourt system [28]. Our results from analyzing participant responses show how court users from all different roles rely on the signature for processing daily tasks. Results of the interviews on eSignature showed the importance of eSignature availability; our observation inside the courthouse also supports this. During the observation, we have noted the operation of an eCourt system with the absence of eSignature that all documents at every phase in the case processing cycle are signed manually on a paper. Our observation made it clear that the current system is not fully paperless. Furthermore, they use both paper and electronic systems simultaneously. Hence, in addition to time consumed for printing, signing, and scanning with every document, the cost of paper usage has not been reduced yet.

Via a thematic analysis of the interviews we have figured out that the existence of eSignature is the main concern of the users who are involved in the process more intensively, i.e., mostly by judges, this is since judges are higher authorities in the courts and they are responsible for signing court documents, i.e., final decision letters. Responses from judgessupport this with the following statements:

"Electronic signature is vital for making processes faster, and having a paperless decision, testimony, and all court documents."

and

"Adding an electronic signature would help save time for printing and scanning, save paper cost, and prevent modification on the documents after the judge has signed it."

Furthermore, clerks also consider eSignature as an essential component of the system for performing all daily tasks. Clerks at every court are responsible for the process of printing and scanning; hence they spend a considerable amount of time for every case with a number of documents. A response from clerk supports that by stating:

"lack of an electronic signature and current scanning documents makes the process complicated."

It is also noted that the head of the IT department is concerned about the courts' loads for maintaining electronic and paper systems due to the lack of eSignature by stating:

"Electronic signature will reduce loads on courts by 50%, in addition to saving time and cost, with more security of documents."

The reduction of time and cost saved by a digitized fully paperless eCourt system also supported by relevant studies. Singh et al. [2] found that a paperless eCourt system

helps speed up the judiciary process and consider it a cost-effectiveness solution. Luzuriaga and Cechich [21] described how electronic notification system is helping in automated summons generation and saves time and cost and fosters faster publishing. Furthermore, [14] considered a lack of eSignature as the main challenge in the system, as the cost of papers and time consumption for printing and scanning can be saved for other judiciary tasks. [21].

V. Discussion

As research findings show, eCourt user groups' expectations vary. Therefore, it is essential to consider the business process perspective as well as the system management view. In this case, Estonia is a good example of a holistically functioning system corresponding to the different user groups' needs. It is possible to sign documents electronically in the system using ID-card or Mobile-ID or upload electronically signed documents directly to the system. The given signature is equal to the handwritten signature. Remarkable is that according to the statistics received from the Centre of Registers and Information Systems, around 25% of the signatures are given using Mobile-ID and 75% of the signatures using ID-card.

Estonian practice shows that there is a need not only for one eSignature solution but also for an alternative solution to meet different user's needs. Therefore, while considering this new functionality in the KRI eCourt system, it is important to leave room for the integration of alternative solutions.

Another tendency that supports the implementation of the eSignature in the KRI is shortened court case processing time. According to the Estonian practice for example processing time of civil cases in days has dropped from 2013 to 2019 around 40% from 158 days to 95 days [1].

These numbers illustrate how the continuous development of an eCourt system reduces significantly processing time of the court cases.

It has to be noted that becoming completely paperless takes time. It means that even after the implementation of the eSignature solution, some procedures and workflows remain on paper. According to the Estonian Ministry of Justice Development Plan for the years 2019-2022, the aim was to become completely paperless in the end of the year 2019 [2]

Taking into account that the Estonian system was implemented in 2006, the transition period from the beginning to the completely paperless system lasted around 13 years. Therefore, implementation of the eSignature is just one part of the bigger picture.

Of course, every country is different, and it is necessary to find and take into account the specifics of a particular country.

VI. Conclusion

This paper reflects the implementation of the eCourt system in the Sulaimaniyah Appellate Court in the KRI. eCourt systems currently play a crucial role in courts globally. They help to deliver better justice services in a more organized and systematic format in addition to enhancing the efficiency and effectiveness of courts that are achieved through a fully paperless eCourt system. Furthermore, the availability of eSignature ensures faster processes, cost-saving, and more security of the documents and authenticity of the signer. This paper presented an overview of the eCourt system in the Sulaimaniyah Appellate Court and the challenge of a lack of eSignature. The study is based on analyzing expert interviews with the end-users of the system in addition to the inside courthouse observations, supported by analysis of relevant studies. Moreover, exploring the Estonian example to show the significance of the eSignarure in the eCourt system. Estonian case shows that it is important to implement a system that is integrated with an eSignature equal to the handwritten signature in legal terms and if possible enable the variety of different signing options (ID-card, mobile ID, etc.).

One of the biggest limitations concerning the implementation of the eSignature in the KRI is the absence of required infrastructure for e-government, eID, eID management systems, with valid eSignature. Furthermore, missing legal regulation that establishes the requirements for the electronic signatures and equates an electronic signature with the handwritten signature. Another aspect is a specific focus on eCourt systems. It means that offered solutions and findings may not be applicable in the wider context. Therefore, future research direction would be towards knowing the needs and expectations of the KRI eCourt system users it is possible to move to a more detailed and technical level. As a next step, we can start analyzing different technical solutions that can be considered in the KRI eCourt system.

[1] First and Second Court Instance Statistics 2019. Available: https://tinyurl.com/y9g98r8j

[2] The Estonian Ministry of Justice Development Plan for the years 2019–2022. Availabe: https://tinyurl.com/y7xl4uq8

References

[1] Council of Europe European Commission for the efficiency of justice (CEPEJ), "European judicial systems Efficiency and quality of justice Thematic report: Use of information technology in European courts," Council of Europe, Tech. Rep. 24, 2016.

[2] M. Singh, G. P. Sahu, Y. K. Dwivedi, and N. P. Rana, "Success Factors for e-Court Implementation at Allahabad High-Court," in *Proceedings of 22th The Pacific Asia Conference on Information Systems (PACIS)*, 2018.

[3] R. Agrifoglio, C. Metallo, and L. Lepore, "Success Factors for Using Case Management System in Italian Courts," *Information Systems Management*, vol. 33, no. 1, pp. 42–54, 2016.

[4] W. S. W. M. Saman and A. Haider, "E-Shariah in Malaysia: Technology adoption within justice system," *Transforming Government: People, Process and Policy*, vol. 7, no. 2, pp. 256–276, 2013.

[5] K. H. Hassan, S. S. A. Yusoff, M. F. Mokhtar, and K. A. T. Khalid, "The use of technology in the transformation of business dispute resolution," *European Journal of Law and Economics*, vol. 42, no. 2, pp. 369–381, 2016.

[6] M. Velicogna, "Justice systems and ICT What can be learned from Europe?" *Utrecht Law Review*, vol. 3, no. 1, pp. 129–147, 2007.

[7] M. Velicogna, A. Errera, and S. Derlange, "Building e-justice in continental Europe: The TéléRecours experience in France," *Utrecht Law Review*, 2013.

[8] Z. Hamin, "ICT Adoption by the Malaysian High Courts : Exploring the Security Risks Involved," *Proceedings of 2012 International Conference on Innovation Management and Technology Research*, pp. 285–289, 2012.

[9] European Parliament and Council, "{EU Parliament and Council} regulation ({EU}) no 910/2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC," 2014.
[10] F. Buccafurri, L. Fotia, and G. Lax, "Implementing advanced electronic signature by public digital identity system (SPID)," in *Electronic Government and the Information Systems Perspective*. Springer, 2016, pp. 289–303.
[11] D. Reiling, "Technology in Courts in Europe: Opinions, Practices and Innovations," *International Journal for Court Administration*, vol. 4, no. 2, p. 11, 2012.
[12] G. Lupo and J. Bailey, "Designing and Implementing e-Justice Systems: Some Lessons Learned from EU and Canadian Examples," *Laws*, vol. 2, no. 3, pp. 353–387, 2014.
[13] A. L. Xu, "Chinese judicial justice on the cloud: a future call or a Pandora's box? An analysis of the 'intelligent court system' of China," *Information and Communications Technology Law*, vol. 26, no. 1, pp. 59–71, 2017.
[14] M. Velicogna and A. Errera, "e-Justice in France : the e-Barreau experience," *Utrecht Law Review*, vol. 7, no. 7, pp. 163–187, 2011.
[15] E. C. Wiggins, "The courtroom of the future is here: Introduction to emerging technologies in the legal system," *Law and Policy*, vol. 28, no. 2, pp. 182–191, 2006.
[16] C. Bellamy and J. Taylor, "New information and communications technologies and institutional change: The case of the UK criminal justice system," *International Journal of Public Sector Management*, vol. 9, no. 4, pp. 51–69, 1996.
[17] F. Iannacci, "Digitising criminal justice in England and Wales: Revisiting information-growth dynamics," *Transforming Government: People, Process and Policy*, vol. 3, no. 1, pp. 50–64, 2009.
[18] U. A. Oseni and S. O. Omoola, "Prospects of an online dispute resolution framework for Islamic Banks in Malaysia An empirical legal analysis Umar," *Journal of Financial Regulation and Compliance*, vol. 25, no. 1, pp. 39–55, 2017.
[19] A. Andrade and L. A. Joia, "Organizational structure and ICT strategies in the Brazilian Judiciary System," *Government Information Quarterly*, vol. 29, pp. S32–S42, 2012.
[20] D. M. Chada and F. A. Silva, "Visualizing Brazilian Justice : The Supreme Court 2 . 0 Project," in *Proceedings of the 15th International Conference on Artificial Intelligence and Law - ICAIL '15*. ACM, 2015, pp. 176–180.
[21] J. M. Luzuriaga and A. Cechich, "Electronic Notification of Court Documents: A Case Study," in *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, ser. ICEGOV '11. New York, NY, USA: ACM, 2011, pp. 45–50.
[22] Minister of Justice, "Court Information System Statute," 2006.
[23] S. Crook, "Get the full e-signature picture to avoid falling foul of the law," *Computer Fraud & Security*, vol. 2018, no. 8, pp. 12–14, 2018.
[24] A. Finandhita and I. Afrianto, "Development of E-Diploma System Model with Digital Signature Authentication," in *IOP Conference Series: Materials Science and Engineering*, vol. 407, no. 1. Institute of Physics Publishing, sep 2018.
[25] B. Yenlik, U. lga, B. Rustem, and N. Saule, "Development of an automated system model of information protection in the cross-border exchange," *Cogent Engineering*, vol. 7, no. 1, 2020.
[26] S. James and P. V. Reddy, "Efficient Identity-based Signature Scheme with Message Recovery," in *Journal of Physics: Conference Series*, vol. 1344, no. 1. Institute of Physics Publishing, oct 2019.
[27] R. K. Ahmed, K. H. Muhammed, A. Reitsakas, I. Pappel, and D. Draheim, "Improving Court Efficiency Through ICT Integration: Identifying Essential Areas of Improvement," in *Proceedings of ICT4SD 2019 - the 4th International Conference on ICT for Sustainable Development. Lecture Notes in Networks and Systems*, vol. 93. Springer, 2020, pp. 449–461.
[28] R. K. Ahmed, K. H. Muhammed, I. Pappel, and D. Draheim, "Challenges in the Digital Transformation of Courts : A Case Study from the Kurdistan Region of Iraq," in *Proceedings of ICEDEG 2020 –- the 7th International Conference on eDemocracy & eGovernment*. IEEE, 2020.
[29] R. K. Yin, *Case Study Research design and methods*, 4th ed. SAGE, 2009, vol. 1.
[30] ——, *Case Study Research: Design and Methods*. SAGE, 2014.
[31] P. Runeson, M. Host, A. Rainer, and B. Regnell, *Case Study Research in Software Engineering Guidelines and Examples*. WILEY, 2012.
[32] R. Prakash, T. Mohanty, R. Gupta, and V. Jain, "ICT in Indian Court Challenges & Solution," *International Journal of Internet Computing*, no. 1, pp. 2231–6965, 2011.
[33] A. S. Ferreira, "Electronic delations within Courts of Accounts in Brazil," in *Proceedings of the 3rd International Conference on Theory and Practice of Electronic Governance - ICEGOV '09*. ACM, 2009, pp. 402–403.

Appendix 4

[IV]

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Impact of e-court systems implementation: a case study

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Abstract

Purpose – E-court systems automate court processes and provide better case administration with more effective and efficient justice delivery. This paper aims to present the e-court system in the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq as a case study. It identifies significant improvements after adopting the system.

Design/methodology/approach – This study used a qualitative approach with an exploratory case study design. Data collected from a triangulation of three sources through structured expert interviews with 30 stakeholders, personal observations by two of the authors, supported by analyzing current relevant literature. R package for Qualitative Data Analysis was the analysis tool.

Findings – Findings showed 10 improvements that enhanced court efficiency and effectiveness concerning better case administration, a more transparent process and increased court case security.

Research limitations/implications – This research is limited to improvements after adopting an e-court system.

Practical implications – This research provides a foundation for practitioners who are on the way to implement the e-court system and serves the decision-makers in the Kurdistan Regional Government to plan future expansion in the region.

Originality/value – This research focuses on the e-court system in the Kurdistan Region of Iraq. It is implemented as a first e-service to be a pilot for a broader plan to integrate all appellate courts in other cities in the Kurdistan of Iraq, hence, stepping toward the implementation of e-government.

Keywords e-services, Iraq, e-government, Kurdistan region, e-court, e-justice

Paper type Research paper

1. Introduction

Digital transformation provides a new opportunity for governments to modernize service provision to citizens, concerning better service delivery, improved internal administration and increased transparency (Gorham, 2012; Deligiannis and Anagnostopoulos, 2017; Singh *et al.*, 2018; United Nations, 2018). Therefore, demand for e-government implementation is increasing globally (United Nations, 2018) and judiciaries are part of this digitization flow to deliver more efficient justice services (Saman and Haider, 2013; Singh *et al.*, 2018). Justice systems are using emerging technologies to reshape justice administration and improve courts' process efficiency (European Commission for the efficiency of justice (CEPEJ), 2016). The digitalized court processes in the electronic court (e-court) systems present various

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benefits such as online accessibility, timeliness, transparency, data accuracy, secured access to files and information and many more (Saman and Haider, 2013; Agrifoglio *et al.*, 2016; Singh *et al.*, 2018).

The current challenge identified in the relevant literature on the technology integration with justice systems is that they are more concentrated on descriptive studies, presenting knowledge in relevance to the system description and design, system prototype and specifications (Meng *et al.*, 2007; Rungruangpattana and Achalakul, 2008; Saman and Haider, 2013). Marginal studies exist to define the efficiency improvements concerning the time, cost reduction, process efficiency and user satisfaction toward the information system (Motsaathebe and Mnjama, 2009; Luzuriaga and Cechich, 2011; Hamin *et al.*, 2012; Yahya *et al.*, 2013; Rahman *et al.*, 2014; Agrifoglio *et al.*, 2016; Hayashi and Wakabayashi, 2017; Hou *et al.*, 2017; Mosweu and Kenosi, 2018; Singh *et al.*, 2018). Additionally, they only presented experiences from Asia, Africa, America, Europe and Australia, where most countries are developed and technologically advanced governments. This study fills this gap and identifies improvements after implementing the e-court system from a different geographical location. At the same time, differences exist between this region and the developed countries concerning cultural aspects, level of IT literacy and situations related to security and economic stability and others.

This research examines the impact of e-court systems through the case of an e-court system in the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq (KRI), as a first e-service in the Sulaimaniyah city. This project will be a pilot for a broader plan to integrate all appellate courts in other cities in the KRI, hence, stepping toward implementing e-government in the region.

The KRI has independent administration from the Iraqi Government. Simultaneously, it is part of Iraq and faces many challenges such as institutional, economic, social, lack of technological infrastructure, inefficient and un-transparent administrative systems with low performance (The Ministry of Planning, 2018).

This research significantly contributes to extend the body of knowledge and literature for academic researchers, judiciaries and practitioners concerning the implementation of the e-court systems. Furthermore, results will serve the decision-makers in the Kurdistan Regional Government (KRG) to draw a plan for digital inclusion and e-government implementation.

2. Related work

Justice systems globally are using technological tools to increase the efficiency and effectiveness of courts. Studies in Asia showed that Japanese courts used Artificial Intelligence (AI) for a decision support system and Case-Based Reasoning (CBR) to make the judgment process faster and efficient (Hayashi and Wakabayashi, 2017; Hayashi *et al.*, 2019). Philippine courts addressed the case backlog challenge in courts through a system for predicting decisions to generate an automatic decision context (Virtucio *et al.*, 2018). In Thailand, Civil Court Case Management System presented efficient service delivery to the stakeholders, through the availability of the case data digitally to the public and court users from the electronic registers and faster-searching functionality, with improving the security by implementing user groups and privileges (Rungruangpattana and Achalakul, 2008). To accelerate the judgment process, they implemented a so-called "JudgeDoll" to generate the final decision (Kowsrihawat and Vateekul, 2015). Chinese courts proposed an "intelligent court system" to allow remote connection for performing faster collaborative activities between different court institutions and results in "on-call" and "non-stop" judges with a transparent process (Xu, 2017). Furthermore, (Chen *et al.*, 2019) optimized the judgment

process by using AI and implementing the decision support system. The Republic of Indonesia implemented an e-court system for the civil courts to foster case registration at a lower cost (Helmi, 2019). Moreover, (Kharlie and Cholil, 2020; Latifiani *et al.*, 2020) described an electronic litigation system as a new service to provide a more effective and efficient justice. Studies on Malaysian courts noted that e-court systems are significantly improving courts' efficiency by reducing case backlogs, time-saving and increasing transparency, while electronic registers provide faster case data retrieval (Saman and Haider, 2013; Hassan *et al.*, 2016). They considered user authentication and protecting case confidentiality as essential security aspects. Hamin *et al.* (2012) added that the e-court system presents more unified and robust statistics. Indian courts implemented an e-court system to reduce case backlogs, save time and cost in courts (Prakash *et al.*, 2011). They considered remote access significant for document management and data sharing from a distance. They improved security in the system by implementing different types of rights and privileges, while (Singh *et al.*, 2018) also ensured that security is a significant key success factor. Singh (2018) proposed an algorithm for faster case disposal through automatic roster preparation and case scheduling according to cases' complexity. Pakistan courts introduced the case management system to increase transparency and foster the dispensation process. The remote access extends judge availability and the automatic case movement in the system plays an essential role in transferring cases between courts of different levels. They also noted that electronic registers allow tracking and searching more efficiently and transparently while providing robust statistics (Rahman *et al.*, 2014).

African countries showed that Ghana's judiciaries worked on applying decision support systems to eliminate human error to produce a fair judgment (Asamoah, Amaglo and Kester, 2019). Botswana courts emphasized the importance of electronic registers to provide an overview of the case information such as case participant names, case type, date of registration, court name with faster information retrieval. Stored documents centrally in the database will protect information accessibility from any unauthorized user; besides, using backup copies in disaster recovery (Motsaathebe and Mnjama, 2009). Additionally, (Mosweu and Kenosi, 2018) improved court document security by implementing access controls.

North and South American states also digitized court processes where the USA courts emphasized the importance of electronic notification about case acceptance by the court after the case parties submitted the claim or document regardless of the date and time in their e-filling system. They considered electronic documents as more reliable and secure than paper copies (Gorham, 2012). Furthermore, they implemented a decision support system to increase system efficiency and transparency to gain citizen trust (Branting *et al.*, 2019). Los Angeles courts introduced "distributed case management computer-based systems" to improve the case disposal process (Elliott and King, 2005). Argentina implemented an electronic notification system as a reliable communication channel for faster and safer information publishing, increasing the notification process's transparency and being a cost-effective solution (Luzuriaga and Cechich, 2011). Brazilian judiciary addressed the judgment process and even distributing cases over judges using AI (Bueno *et al.*, 2003). Moreover, (Chada and Silva, 2015) showed how the information availability and accessibility electronically facilitate decision document generation. Further study by (Kurtz *et al.*, 2018) considered the existence of transparency as a valuable resource to build public trust and confidence of citizens toward the judiciary by providing online access to case information and tracking status.

European courts also use technology to improve the efficiency of their processes. In particular, Italian courts considered electronic case registration an essential improvement in the court information system by providing fast access to information and re-using the data

through all the connected registers (Agrifoglio *et al.*, 2016). France's e-Justice experience found security an essential key for courts document and remote access allows judges and prosecutors to access the system regardless of the time and location (Velicogna and Errera, 2011). Russian courts focused on system optimization in the decision generation process to improve the quality of knowledge extraction to foster case disposal (Metsker *et al.*, 2020). Ukraine courts implemented the e-court system to build citizen trust toward justice and deliver services more transparently (Stetsenko *et al.*, 2019). Greek justice system moved toward digitization to improve transparency through online information accessibility and remote access (Deligiannis and Anagnostopoulos, 2017). England and Wales introduced a digital criminal justice system to improve decision document generation through electronic data availability by re-using pre-registered data of case participants in the system (Iannacci, 2009).

Australian courtrooms' adopted sophisticated e-court systems to present evidence in a digital format to increase document processing efficiency (Tipping *et al.*, 2014).

This study will present improvements in the KRI e-court system.

3. Research approach

This research adopts an exploratory case study strategy. This strategy is well-suited when the boundaries between a context and phenomenon are not clear (Yin, 2009). An exploratory case study aims to explore a problem with a lack of earlier studies to estimate the outcome (Yin, 2014) and discover new insights and investigate the current state (Runeson *et al.*, 2012). Hence, the chosen single case study is implemented as an e-court system in the Sulaimaniyah Appellate Court.

3.1 The case of Sulaimaniyah appellate e-court system

The Sulaimaniyah Appellate Court is in the Sulaimaniyah city in the north of the Kurdistan Region of Iraq. In the Kurdistan region, one Supreme Court exists [1]. The Supreme Court administers four appellate courts (Erbil, Sulaimaniyah, Duhok and Kirkuk). Moreover, each appellate court administers several sub courts from both civil and criminal jurisdictions. Currently, only the Sulaimaniyah Appellate Court functions through an e-court system within the sub courts, as presented in Figure 1.

The previous study presented an overview of the system description and implemented functionalities to assist e-court users in performing their daily tasks electronically (Ahmed *et al.*, 2020b). The following points present summarized main functionalities:

(1) The availability of multiple electronic registers [2] makes the process faster by eliminating data redundancy.

(2) Implementation of different case statuses [3] provides a better overview of judges' cases, besides faster case tracking and searching.

(3) Electronically generated template contributes to faster case processing due to eliminating typing errors and providing a more organized view than manual documents.

(4) Automatic case distribution functionality presents a more transparent process and provides fair distribution by considering the total number of cases per each court and case type complexity.

(5) The availability of different types of user-groups helps managing of users according to their roles and view permissions. Currently, the system implemented for four main user groups:

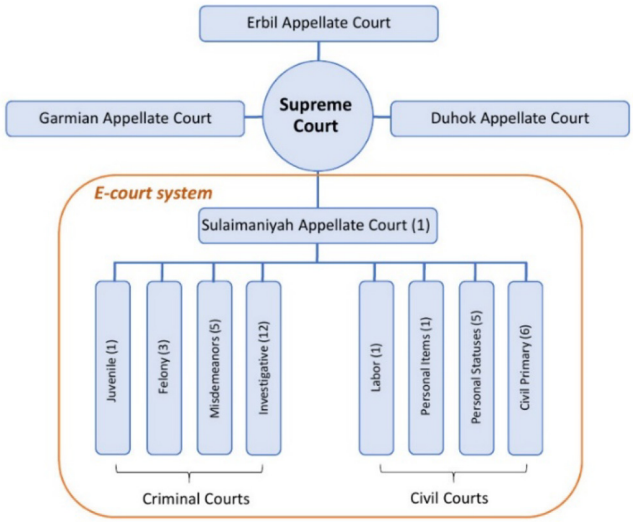

Figure 1.
Structure of courts in the KRI

- Court users are judges, clerks, judicial investigators and prosecutors.
- Lawyers.
- Public users are claimants, defendants, accused persons, complainants, victims, appellants, opponents, experts and other case participant types.
- Agency employees are users involved in the process of case administration from public and private sector agencies.

(6) Case-Law functionality helps better case administration by presenting a summary of previous court judgments.

(7) Electronic calculation of case statistics provides faster calculation and robust results.

(8) Implementation of the bar code for printed documents provides faster case data retrieval.

(9) Electronic notification updates all involved users instantly on every activity performed in the case.

(10) Remote access extends the accessibility to the system through two additional methods besides the local access inside the courthouse:

- Public portal to agency users, public users and lawyers.
- Virtual Private Network (VPN) to judges and prosecutors.

(11) The existence of three languages such as Kurdish, Arabic and English, enhances the system's usability.

3.2 Data collection procedure

Triangulation of multiple data sources was used to provide a more comprehensive picture of the studied context by giving various perspectives on the subject (Runeson *et al.*, 2012).

3.2.1 Interviews. The interview is considered as a significant source of data in case study research (Runeson *et al.*, 2012; Yin, 2014), as the knowledge is provided by the people closely involved in the investigated case; this provides researchers much information that is difficult to obtain from other sources (Runeson *et al.*, 2012).

The general case management process in the Sulaimaniyah Appellate Court starts with claim submission and terminates with a final judgment. The workflow of the process is composed of various phases. At every phase, several users are involved by data and document insertion.

From the four user group types such as court users, lawyers, public users and outside agency employees, samples were selected only from court users and lawyers' groups. Other groups are excluded from this study due to their limited usage of the system at this stage.

Inside the court users' group, four main roles were identified with the most involvement in the case management process such as the judge, clerk, prosecutor and judicial investigator. Figure 2 presents the general workflow in both civil and criminal cases and involved user roles at different phases.

For the sample size selection, commonly saturation is considered a key for defining sample size, where it is the point in which no new information can be obtained and observed (Sandelowski, 1995; Coyne, 1997; Vasileiou *et al.*, 2018).

Therefore, 30 interviewees were selected, with monitoring responses for approaching the saturation through a constant comparative method and "systematic coding procedures" by checking previously collected data and coding with the new data during the data analysis process (Bowen, 2008).

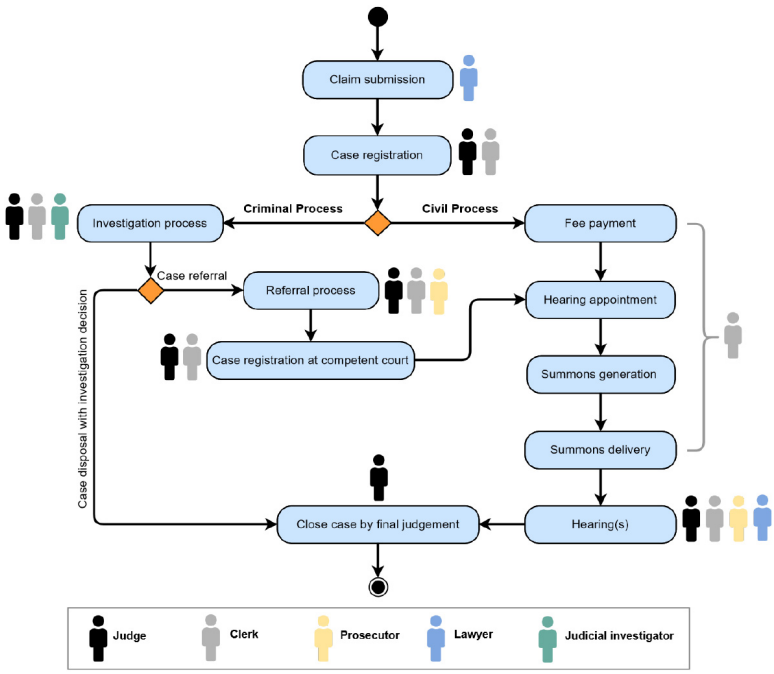

Figure 2.
Civil and criminal case workflow and involved user roles

The following interviewees selected:

- Four judges who are processed civil cases.
- Four judges who are processed criminal cases.
- Four judges who are involved in the appeal processes.
- A court president who was actively using the system and heading multiple appeal panels.
- Four clerks from both civil and criminal courts.
- Four judicial investigators who are involved in the investigation journey for processing criminal cases.
- Four prosecutors who have experienced the system with both civil and criminal cases.
- Four lawyers who are involved in both civil and criminal case types.
- The head of IT department to provide his experience on the improvements from IT perspective as a system administrator.

A purposeful sampling technique was considered to select a particular person or setting for providing sufficient information; therefore, the focus was on the quality of data and information-rich participants (Sandelowski, 1995; Coyne, 1997; Taherdoost, 2018). Additionally, this technique is ideal for in-depth investigation and exploratory research design (Taherdoost, 2018). The interviewees' selection criteria aimed to avoid the potential bias associated with the users' opinions on whether they favor or against an e-court system. The participants have been informed that the interviews will be anonymous, i.e. that their identity will be kept confidential, clearly and transparently informed about the study, its procedures and its methodology. The questionnaire was composed of nine structured questions. Started with open questions, then narrowed to more specific ones following the funnel model (Runeson *et al.*, 2012), as presented in the Appendix section.

3.2.2 Personal observations. Observations provide an in-depth understanding of the subject more closely (Runeson *et al.*, 2012). Having more than one observer is a common practice to be a more reliable data source (Yin, 2014). Therefore, data were collected from both direct and participant observation (Yin, 2014):

(1) The first author made a direct observation of the case workflow on improved areas defined by the interviewees.

(2) The second author was a participant observant; he is a judge and experienced the case processing in both the paper-based and e-court systems.

3.2.3 Document analysis. Information collected from related documents to the subject is relevant for case studies research (Yin, 2014). The current relevant literature was analyzed to obtain information on the existing technology applications in courts worldwide.

3.3 Data analysis procedure

An R package for Qualitative Data Analysis (RQDA) was selected to analyze the textual unit (Chandra and Shang, 2017). A thematic analysis was used with a selective coding method, "where the core category is identified and described" (Runeson *et al.*, 2012).

3.4 Research methodology phases

The research was started with analyzing existing relevant literature to investigate the improvements by e-court systems. From the literature, four efficiency improvement indicators were extracted to construct questions. In total, 30 end-users were interviewed from different roles, as described in Figure 2. Analysis through RQDA identified 10 themes as improvements by the e-court system. The observation was a continuous process. Observers closely observed the court workflow before the interviews to evaluate the responses and after the analysis stage, to validate the results as presented in Figure 3.

3.5 Validity check

The judgment criteria such as *construct validity*, *internal validity*, *external validity* and *reliability* (Yin, 2014), were considered to assure the research design quality:

- *Construct validity* is maintained by taking multiples sources of data to strengthen the validity of the information.
- *Internal validity* is more considered in explanatory case studies. It concerns the causal relationship between outcomes and treatment (Yin, 2014); however, it is possible to establish the relationship between the identified improved areas in further studies in the current exploratory case study design.
- *External validity* is concerned with the ability to generalize the results. The detailed procedure of the approaches is provided. The findings can be generalized by replicating the same process, particularly for a similar environment concerning geographical location.
- *Reliability* is concerned with the researcher's dependency and the data analysis, meaning producing the same outcome within the same procedure by different researchers. For this purpose, a case study protocol and the database are created.

4. Findings

The findings are a list of identified codes that are considered areas of improvement with their occurrence and the number of respondents connected with each code, as presented in Table 1.

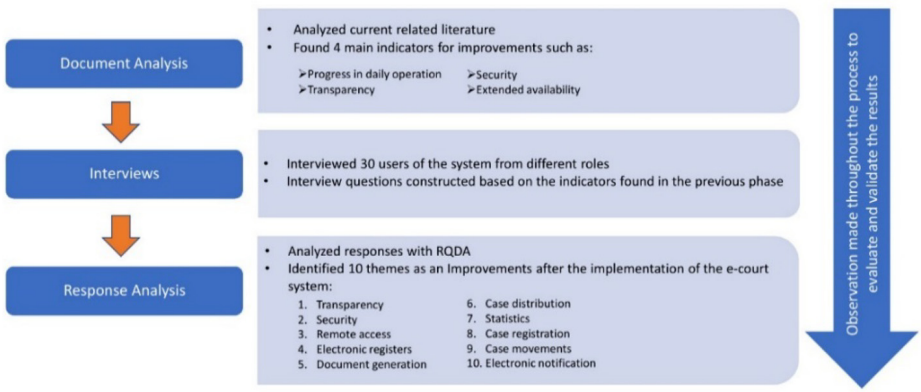

Figure 3.
Research methodology phases

4.1 Transparency

The results showed that interviewees considered transparency one of the most significant improvements, with 82 occurrences by all 30 participants. From analyzing responses and observation, it is clear that transparency improved through:

- Accessible case data.
- Visibile case allocation process.

The accessibility of case data in the current system has increased the court processes' transparency and provided new opportunities to see case data and documents with better tracking of case status.

A Judge from the investigative court confirms that by stating:

> In our work, transparency is crucial for none confidential cases. Now, investigative case detail view provides updated information about accused status such as; arrested, escaped, disappeared, not detained, on bail and deferred fate. All involved parties see information in the investigation cycle, makes the following up process much more manageable and transparent than in the paper systems.

Additionally, automatic case allocation allows the judge selection process to be visible by all case participants and lawyers during the case registration instantly. Two judges supported that by stating.

"The case distribution in all courts is now more transparent, systematic and fair".

And

"Transparency is visible in the system, more specifically in case distribution".

4.2 Security

The posed question through the interview sought to understand the impact of the e-court system on the security of court cases by asking, "What do you think about the security of court cases in the e-court system"? However, security is explored widely. It occurred 49 times by 25 of the interviewees. Security is noticeably improved through:

- Authentications and user groups.
- Protection of case confidentiality.
- Selective document viewing feature.

Case activity log.

- The central database for documents.

Table 1.
Codes ordered by number of occurrences and respondents

No.	Codes	Occurrences	Respondents
1	Transparency	82	30
2	Security	49	25
3	Remote access	37	24
4	Electronic registers	34	17
5	Document generation	20	10
6	Case distribution	18	12
7	Statistics	18	16
8	Case registration	18	14
9	Case movements	10	5
10	Electronic notification	8	6

As stated earlier in Section 3, four user groups [4] and (26) different roles [5] inside the court users group exist. Every user has a role according to the court type. The user gets rights for accessing the information based on access rights; permitted functionalities will be visible as detailed in Figure 4.

Every user logs into the system with the personal credential as an authentication method.

Regarding case confidentiality, the Iraqi laws state some sensitive situations to hold the proceeding confident. The system limits the accessibility of selected confidential cases.

Selective document viewing is another security improvement to give view permission on documents selectively to lawyers and public users who are case participants.

Maintaining the case log history in the conventional system is very difficult or not possible. Respondents considered this functionality an essential security improvement as transparent history shows where and when the modification is performed and by whom.

In this regard, a response stated that:

> I would say the system has a good level of security, as every user has a personal credential for login. Additionally, the case log history records every update about the case to give transparency and security to cases.

Finally, in the e-court system, electronic copies of court cases securely stored in the central database to eliminate risks of damages and loss.

4.3 Remote access

Remote access occurred 37 times in responses from 24 interviewees. The remote access through VPN is currently used only by judges and prosecutors. This feature considered as an improved area regarding:

- Extended availability of judges and prosecutors.

Remote access allows judges and prosecutors to continue managing their tasks regardless of the time and location.

A response supported this by stating:

> This is facilitating the judge's work; for instance, I have used the system even outside the Sulaimaniyah. While I was traveling, I still had access to my cases and proceeded with some tasks and revised case documents as normally I do inside the courthouse in my room.

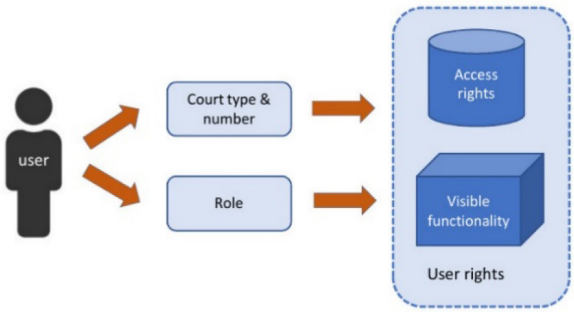

Figure 4.
User rights and accessibility to functionalities in the current e-court system

4.4 Electronic registers

There was no specific question related to the electronic registers; however, 17 interviewees stated the efficiency improvement through electronic registers. It is considered as an improvement of court performance regarding:

- Time-saving.
- Organized presentation of information.
- Flexible searching.

During the case processing from claim submission to case disposal, several registries record case data and status at different stages. Registering the same information multiple times in all paper registers takes a considerable amount of time. The current system addresses this challenge and the inserted data into the prime register is automatically shared with other related registers. Time is saved through eliminated data redundancy.

A judge supports this by stating:

> The electronic data insertion reduces or eliminates errors that could happen with handwritten typing. Where the text needs to be repeatedly added into different registers, now we saved a considerable amount of time.

Electronic registries present a more organized view of the case information that helps clerks to work more comfortably. Moreover, searching and information retrieval in the electronic registers is flexible and faster than in paper registers due to the availability of different searching parameters. The current system allows searching for cases according to case status, case types, case sub-types, judges, dates, participant names and others.

4.5 Document generation

In total, 10 of the participants stated the advantages of automatically generated documents 20 times, in particular with the following aspects:

- Data integrity and consistency.
- The standardized court documents.
- Judgment process acceleration.

Correcting errors and updating information is easily controlled in the e-court system; when data updated in prime registers, all the generated templates present correct and updated information consistently.

Additionally, the electronically generated documents assure standard and organized templates for all courts.

Electronic decision templates accelerated the judgment process in particular for managed cases by a panel of judges. The system generates a single shared template for judges for faster case disposal with accurate case data.

A judge confirmed this by stating:

"E-court has helped me to achieve my daily tasks more efficiently than before, with e-court system issuing decisions are faster".

4.6 Case distribution

Case distribution stated clearly 18 times by 12 interviewees as the efficiency improvement in comparison to the paper-based case distribution system regarding:

- Fair and systematic distribution.

Paper-based case distribution was maintained in a manual table and was prepared and manipulated by the first judge at each court type. For example, in the civil primary courts, a first judge at civil primary one is responsible for case distribution over other judges. The current system's automatic distribution is fair and systematic by considering multiple parameters as critical factors for the allocation process such as the case complexity, case type, number of cases per year and court type (European Commission for the efficiency of justice (CEPEJ), 2016) and transparently seen by all users.

A judge supports this by stating:

> In a paper system, one of the main problems was case distribution among judges, which was not fair and there was room for participants and lawyers to play with judge selection, to get the desired judge.

4.7 Statistics

The results showed that 16 of the interviewees considered obtaining statistics in the system as improvement with:

- Faster calculation.
- Robust results.

The current system uses all case metadata for searching such as judge name, court, case types, dates and case statuses. This functionality is not possible for obtaining statistics with manual calculation.

A response from a judge is stating.

"Statistics generally is now faster than before, in a way that is not comparable with a paper system. With more quality and accurate results".

4.8 Case registration

The case registration repeated 18 times by 14 respondents and assured the efficiency improvements in time with:

- Faster registration process.

The paper registration process was multiple steps. Prepare the claim by entering all case participants' data. Then, take the claim paper to the courthouse in person for the judge's acceptance and case distribution. Next, the clerk re-enters all the case participant data and claim detail in the prime register. This process is shorter and faster in the e-court system. The claimant enters all the data directly into the system; hence, re-typing the same information is not needed at court; instead, only checking information is required. Case distribution is maintained by the system automatically, as presented in Figure 5.

A respondent confirms this by stating.

"We have seen significant improvements in the case registration process, with less time and more accurate information as compared to the paper system".

4.9 Case movements

Among 30 interviewees, 5 of them precisely considered the system's case movements as an essential improvement. Two of the respondents repeated it three times to ensure a positive experience with this feature. The analysis shows that improvement in process time with:

- Faster case transfer between institutions.

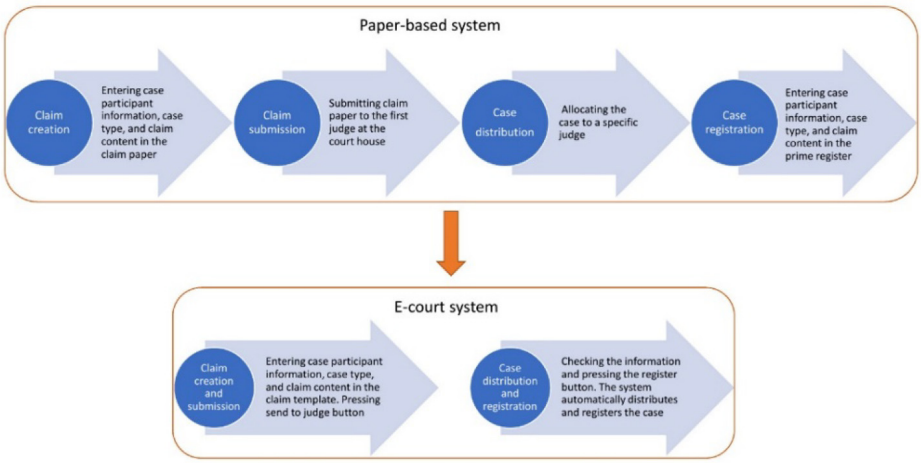

Figure 5.
Case registration process before and after the e-court system

The case file movement between institutions occurs on the following occasions:

- Referring to investigative cases to competent courts.
- Appealing cases from first instance courts to appellate courts.
- Transferring cases between courts based on the specialization or localization.

The case referral process in the conventional system required a considerable amount of time for case files to be moved by human resources between different institutions. In contrast, now the referred cases instantly appear to prosecutors; all case data and documents are instantly shared; the whole process is faster and more efficient.

A prosecutor supports this by stating.

> In a conventional system, bulks of the paper file were moved between courts and the prosecution office. Currently, referred cases instantly appear to prosecutors who are involved in the process, and case data will be available instantly.

4.10 Electronic notification

Results showed that electronic notification eight times explicitly stated. The analysis showed improvement concerning:

- Faster information publishing.

The system is embedded with an internal notification system to alert all involved users about the performed actions on cases. Every user has a personal notification page, set according to that user's role and position in the institution. The system provides various types of notifications related to case status changes.

A judicial investigator supports this by stating:

> During the investigation process, we get instant updates with electronic notifications about orders by judges along with police activities and all exchanged data and information that makes our process much faster.

5. Discussion

Results confirmed that introducing an e-court system has presented several improvements for the Sulaymaniyah Appellate Court. Relevant studies showed that introducing technologies into courts worldwide increases the efficiency and effectiveness of justice administration regardless of the location. Despite the differences between developing countries and developed countries in culture, IT literacy, ICT infrastructure and economics, the need to use technology in courts has become necessary and cannot be neglected. The difference lies in the difficulty of implementation in developing societies and the extent of the governments' insistence due to insufficient financial resources, implementation period and citizen resistance due to lower IT literacy and lack of adequate ICT infrastructure. In developed countries, governments rely mainly on electronic government systems. They are technologically advanced; therefore, the e-court system effects are rapidly visible. Technological obstacles may not exist, which will help them get more advanced and improve their e-court system faster than in developing countries. For instance, Japan, China and Brazil are updating to use AI, stepping toward smarter e-court systems.

By comparing the 10 improvements of this study with 21 relevant literature, it is clear that this study has covered all significant improvements than other experiences worldwide, as presented in Table 2.

The table shows that transparency is a major concern and noticeable improvement through e-court systems in most nations. In the KRI's e-court system, transparency has noticeably increased through the visibility and accessibility of case data and allowing litigants and court users to track the case statuses; this is supported by (Bueno *et al.*, 2003; Saman and Haider, 2013; Xu, 2017; Kurtz, Santos and Rover, 2018). Furthermore, transparency in the current study showed improvement in automatic case allocation where (European Commission for the efficiency of justice (CEPEJ), 2016) highlighted that transparency is a significant aspect of the case distribution process.

The second important improvement in the relevant studies is the generation of the final decision and case disposal. In the current e-court system, the case disposal process is fostered through the automatic generation of decision templates; therefore, in the table, document generation was compared to the decision generation process in other studies. The current system ensured faster case disposal through auto-generated templates that are manipulated with integrated and accurate case data; that is also supported by (Iannacci, 2009; Agrifoglio *et al.*, 2016; Virtucio *et al.*, 2018).

Security comes as the third concern on the table. The security of court cases and data is a significant aspect. Hamin *et al.* (2012) stated that addressing the security risks appropriately in the e-court systems is challenging and presented a list of risks related to authentication, non-repudiation, confidentiality, privacy rights and data integrity as the main current risks to threaten e-court systems. On the other hand, to tackle all the mentioned challenges, the current system implemented different roles and user groups, limited accessibility to case data according to user privileges. Additionally, cases are electronically secured in a central database where (Motsaathebe and Mnjama, 2009; Gorham, 2012) assured that electronic documents could be more secure and reliable.

The other seven improvements in this study helped facilitate the case administration with faster processing time and more efficient and effective processes. These are partially explicitly considered by other studies. It is noted that electronic registers allow re-using of data to prevent information repetition multiple times (Saman and

Table 2.
Comparison of improvements between this study and other relevant literature

Nations	Improvements resulted in this study									
	Transparency	Security	Remote access	Electronic registers	Document generation	Case distribution	Statistics	Case registration	Case movements	Electronic notification
Japan					√					
Philippine					√					
Thailand		√		√		√				√
China	√		√		√					
Indonesia								√		
Malaysia	√	√		√			√			
India		√	√							
Pakistan	√		√	√			√		√	
Ghana	√				√					
Botswana		√		√						√
USA	√	√				√				
Los Angeles										
Argentina	√				√	√				√
Brazil	√									
Italia								√		
France		√	√		√					
Russia										
Ukraine	√		√							
Greek	√			√	√					
England					√					
Australia					√					

Haider, 2013; Hassan *et al.*, 2016) and the presence of information is more organized (Motsaathebe and Mnjama, 2009; Reiling, 2011; European Commission for the efficiency of justice (CEPEJ), 2016; Velicogna, 2017), as well as searching and data retrieval is faster electronically (Prakash *et al.*, 2011). Bueno *et al.* (2003) support that automatic allocation guarantees even distribution of cases over judges. Studies such as (Hamin *et al.*, 2012; Rahman *et al.*, 2014) supported that the automatic generation of case statistics in the court management system provides uniformed reports in addition to robust results. Helmi (2019) supported that electronic registration of cases ensures a faster process. Reiling (2011; Rahman *et al.*, 2014) emphasized the significant role of electronic case movements for the courts. Luzuriaga and Cechich (2011) noted that the electronic notification feature ensures faster information publishing. The presented 10 improvements in this study are valuable and significant for a location such as KRI. The geographical location derived the philosophy of governance in Iraq and the KRI, which were based on the ongoing conflicts and wars that disrupted the political and economic stability. These complex situations in the region led to depriving individuals of technology and government development to delay electronic systems implementation. Additionally, several challenges in this project are presented in a previous study. The lack of ICT infrastructure for digital signature and IT skills were considered major issues (Ahmed *et al.*, 2020a). Therefore, the noticeable improvements in such complicated circumstances are precious.

6. Conclusion

This paper presented the e-court system in the Sulaimaniyah Appellate Court in the KRI as a case study. The results showed 10 significant improvements in the areas of:

(1) transparency in the internal daily operation.
(2) security of court cases.
(3) extended access to the judiciary through remote access.
(4) electronic registers with a more organized view.
(5) document generation that is accelerating the judgment process.
(6) fair and transparent automatic case distribution.
(7) more robust and faster statistics.
(8) more efficient electronic case registration.
(9) faster case transfer between institutions and
(10) electronic notification for faster information sharing.

In conclusion, the e-court system's implementation is advantageous and significant for courts for better justice delivery and a more efficient case administration process.

The practical implication lies in providing a foundation for practitioners who are on the way to implementing the e-court system to understand particular areas that can be improved after implementing such e-solution. Furthermore, the results practically serve the decision-makers in the KRG to expand the solution in other courts from different cities, understand the advantages of digital services and step toward strategic planning to address the obstacles.

This study's limitations were the interview's availability for the interview, particularly judges, due to their work; this has delayed the analysis phase. The difficulty in interviewing all users and getting their perspectives due to the difficulty of

processing textual data in a qualitative approach and time consumption. Further study may target a wider population with the quantitative approach and consider their level of IT literacy.

Notes

1. The Supreme Court is located in the Erbil city, which is the capital of the KRI.
2. Prime register, daily register for hearings, register of decisions, register of referrals, register of fines, register of trusts, register of fees, register of documents.
3. draft, pending, registered, in next instance; closed, unified, canceled, in supreme court; suspended, abrogated, dropped out, dropped out date passed; in implementation.
4. User groups are court users, lawyer, public and outside related agency users.
5. Roles are Administrator, All, Appeal clerk, Assistant judge, Auditor, Certificate clerk, Chief prosecutor, Daily register clerk, Fee clerk, First judge, Implementation department clerk, Judge, Judicial investigator, Juvenile inspector, Notification department clerk, Personal inspector, PITA (Personal IT Assistant), Police officer, Prime register clerk, Prosecution clerk, Prosecution secretary, Prosecutor, Public user, spectator, Statistics department user, Typist.

References

Agrifoglio, R., Metallo, C. and Lepore, L. (2016), "Success factors for using case management system in Italian courts", *Information Systems Management*, Vol. 33 No. 1, pp. 42-54.

Ahmed, R.K., Muhammed, K.H., Pappel, I. and Draheim, D. (2020a), "Challenges in the digital transformation of courts: a case study from the kurdistan region of Iraq", *Proceedings of ICEDEG 2020 – the 7th International Conference on eDemocracy and eGovernment*, *IEEE*.

Ahmed, R.K., Muhammed, K.H., Reitsakas, A., Pappel, I. and Draheim, D. (2020b), "Improving court efficiency through ICT integration: identifying essential areas of improvement", *Proceedings of ICT4SD 2019 – the 4th International Conference on ICT for Sustainable Development*, *Springer*, pp. 449-461, doi: 10.1007/978-981-15-0630-7_44.

Asamoah, L.P., Amaglo, E.W. and Kester, Q.A. (2019), "Using bayesian networks in analysing judgement", *Proceedings of 2019 International Conference on Computing, Computational Modelling and Applications, ICCMA 2019*, *Institute of Electrical and Electronics Engineers*, pp. 110-114.

Bowen, G.A. (2008), "Naturalistic inquiry and the saturation concept: a research note", *Qualitative Research*, Vol. 8 No. 1, pp. 137-152.

Branting, K., Weiss, B., Brown, B., Pfeifer, C., Chakraborty, A., Ferro, I., Pfaff, M. and Yeh, A. (2019), "Semi-supervised methods for explainable legal prediction", in *Proceedings of the 17th International Conference on Artificial Intelligence and Law, ICAIL 2019*, *Association for Computing Machinery*, pp. 22-31.

Bueno, T.C.D., Bortolon, A., Hoeschl, H.C., Mattos, E.S., Santos, C.S. and Theiss, I. (2003), "Using RBC to classify judicial petitions on e-court", *Proceedings of the 9th international conference on Artificial intelligence and law – ICAIL '03*, *ACM*, pp. 83-84.

Chada, D.M. and Silva, F.A. (2015), "Visualizing Brazilian justice: the supreme court 2. 0 project", *Proceedings of the 15th International Conference on Artificial Intelligence and Law - ICAIL '15*, *ACM*, pp. 176-180.

Chandra, Y. and Shang, L. (2017), "An RQDA-based constructivist methodology for qualitative research", *Qualitative Market Research: An International Journal*, Vol. 20 No. 1, pp. 90-112.

Chen, B., Li, Y., Zhang, S., Lian, H. and He, T. (2019), "A deep learning method for judicial decision support", *Proceedings – Companion of the 19th IEEE International Conference on Software Quality, Reliability and Security, QRS-C 2019*, *Institute of Electrical and Electronics Engineers*, pp. 145-149.

Coyne, I.T. (1997), "Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries?", *Journal of Advanced Nursing*, Vol. 26 No. 3, pp. 623-630.

Deligiannis, A.P. and Anagnostopoulos, D. (2017), "Towards open justice: ICT acceptance in the Greek justice system: the case of the integrated court management system for penal and civil procedures (OSDDY/PP)", *Proceedings of 2017 Conference for E-Democracy and Open Government (CeDEM)*, *IEEE*, pp. 82-91.

Elliott, M.S. and King, J.L. (2005), "A common information space in criminal courts: computer-supported cooperative work (CSCW) case management systems", *Proceedings of the 38th Annual HI International Conference on System Sciences*, *IEEE*, pp. 272a-272a.

European Commission for the efficiency of justice (CEPEJ) (2016), "European judicial systems efficiency and quality of justice, council of Europe", available at: www.coe.int/cepej

Gorham, U. (2012), "State courts, e-filing, and diffusion of innovation: a proposed framework of analysis", *Proceedings of the 13th Annual International Conference on Digital Government Research*, *ACM*, *New York, NY*, pp. 232-239.

Hamin, Z., Othman, M.B. and Mohamad, A.M. (2012), "ICT adoption by the Malaysian high courts: exploring the security risks involved", *Proceedings of the International Conference on Innovation Management and Technology Research*, *IEEE*, pp. 285-289.

Hassan, K.H., Yusoff, S.S.A., Mokhtar, M.F. and Khalid, K.A.T. (2016), "The use of technology in the transformation of business dispute resolution", *European Journal of Law and Economics*, Vol. 42 No. 2, pp. 369-381.

Hayashi, Y. and Wakabayashi, K. (2017), "Can AI become reliable source to support human decision making in a court scene?", *Proceedings of the 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing*, pp. 195-198.

Hayashi, Y., Wakabayashi, K., Shimojyo, S. and Kida, Y. (2019), "Using decision support systems for juries in court: comparing the use of real and CG robots", *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*, *IEEE Computer Society*, pp. 556-557.

Helmi, H.R. (2019), "The existence of electronic courts (e-court) in realizing simple, fast and low-cost justice, international journal of innovation, creativity and change", *Primrose Hall Publishing Group*, Vol. 8 No. 9, pp. 270-278.

Hou, Y., Lampe, C., Bulinski, M. and Prescott, J.J. (2017), "Factors in fairness and emotion in online case resolution systems", *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, *ACM*, pp. 2511-2522.

Iannacci, F. (2009), "Digitising criminal justice in England and Wales: revisiting information-growth dynamics", *Transforming Government: People, Process and Policy*, Vol. 3 No. 1, pp. 50-64.

Kharlie, A.T. and Cholil, A. (2020), "E-court and E-litigation: the new face of civil court practices in Indonesia", *International Journal of Advanced Science and Technology*, Vol. 29 No. 02, pp. 2206-2213.

Kowsrihawat, K. and Vateekul, P. (2015), "An information extraction framework for legal documents: a case study of thai supreme court verdicts", *Proceedings of the 12th International Joint Conference on Computer Science and Software Engineering (JCSSE)*. *IEEE*, pp. 275-280.

Kurtz, L.P., Santos, P.M. and Rover, A.J. (2018), "Access to information on websites of Brazilian superior courts of justice", *Proceedings of the 19th Annual International Conference on Digital Government Research Governance in the Data Age – dgo '18*, *ACM*, pp. 1-5.

Latifiani, D., Widyawati, A., Fibrianti, N. and Ningsih, A.S. (2020), "Advocate as law enforcer in the implementation of e-court", *International Journal of Innovation, Creativity and Change*, Vol. 4, pp. 439-449.

Luzuriaga, J.M. and Cechich, A. (2011), "Electronic notification of court documents: a case study", *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*, *ACM*, pp. 45-50.

Meng, L., Yunxing, S. and Xiaohua, L. (2007), "Design and realization of court declaration system based on j2ee", *Proceedings of the International Conference on Convergence Information Technology (ICCIT 2007)*, *IEEE*, pp. 1020-1023.

Metsker, O., Trofimov, E. and Grechishcheva, S. (2020), "Natural language processing of Russian court decisions for digital indicators mapping for oversight process control efficiency: disobeying a police officer case'", *Communications in Computer and Information Science*, Springer, pp. 295-307.

Mosweu, T.L. and Kenosi, L. (2018), "Implementation of the court records management system in the delivery of justice at the Gaborone magisterial district, Botswana", *Records Management Journal*, Vol. 28 No. 3, pp. 234-251.

Motsaathebe, L. and Mnjama, N. (2009), "The management of high court records in Botswana", *Records Management Journal*, Vol. 19 No. 3, pp. 173-189.

Prakash, R., Mohanty, T., Gupta, R. and Jain, V. (2011), "ICT in Indian court challenges and solution", *International Journal of Internet Computing*, No. 1, pp. 2231-6965.

Rahman, A., Nawaz, H., Naeem, O., Zaffar, F., Naseer, F. and Zaffar, A. (2014), "Finding needle in the case-stack: effective remote monitoring of courts", *Proceedings of the Annual HI International Conference on System Sciences*, *IEEE*, pp. 1906-1915.

Reiling, D. (2011), "E-justice: experiences with court IT in Europe", Buenas prácticas para la implementacion de soluciones tecnologicas en la administracion de justicia, pp. 79-115.

Runeson, P., Host, M., Rainer, A. and Regnell, B. (2012), *Case Study Research in Software Engineering*, John Wiley and Sons, Inc.

Rungruangpattana, P. and Achalakul, T. (2008), "The software prototype of civil court case management in Thailand", *Proceedings of the 2008 Advanced Software Engineering and Its Applications*, *IEEE*, pp. 221-225.

Saman, W.S.W.M. and Haider, A. (2013), "E-Shariah in Malaysia: technology adoption within justice system", *Transforming Government: People, Process and Policy*, Vol. 7 No. 2, pp. 256-276.

Sandelowski, M. (1995), "Sample size in qualitative research", *Research in Nursing and Health*, Vol. 18 No. 2, pp. 179-183.

Singh, M. (2018), "Indian judicial system overview and a approach for automatic roster preparation and case scheduling for faster case solving (need of: E-courts)", *Proceedings of the IEEE 2018 International Conference on Advances in Computing, Communication Control and Networking, ICACCCN 2018*, *IEEE*, pp. 128-131.

Singh, M., Sahu, G.P., Dwivedi, Y.K. and Rana, N.P. (2018), "*Success Factors for e-Court Implementation at Allahabad High-Court Success Factors for e-Court Implementation at Allahabad High-Court", in Proceedings of the 22th The Pacific Asia Conference on Information Systems (PACIS)*.

Stetsenko, S., Pylypenko, S., Zghama, A., Sydorova, E. and Shkliar, S. (2019), "E-Justice: European standards and the state of implementation in Ukraine", *Journal of Legal, Ethical and Regulatory Issues. Allied Business Academies*, Vol. 22 No. 5, pp. 1-6.

Taherdoost, H. (2018), "Sampling methods in research methodology; how to choose a sampling technique for research", *SSRN Electronic Journal*.

The Ministry of Planning (2018), "The ministry of planning, T.R. of I", National Development Plan.

Tipping, R., Farrell, G., Farrell, V. and Woodward, C.J. (2014), "From collection to courtroom: perceptions and realities of how the data flows", *Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures the Future of Design – OzCHI '14*, *ACM*, pp. 107-110.

United Nations (2018), "The united nations e-Government survey 2018".

Vasileiou, K., Barnett, J., Thorpe, S. and Young, T. (2018), "Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period", *BMC Medical Research Methodology*, Vol. 18 No. 1, pp. 1-18.

Velicogna, M. (2017), "In search of smartness: the EU e-Justice challenge", *Informatics*, Vol. 4 No. 4, p. 38.

Velicogna, M. and Errera, A. (2011), "e-Justice in France: the e-Barreau experience", *Utrecht Law Review*, Vol. 7 No. 1, pp. 163-187.

Virtucio, M.B.L., Aborot, J.A.., Abonita, J.K.C., Avinante, R.S., Copino, R.J.B., Neverida, M.P., Osiana, V.O., Peramo, E.C., Syjuco, J.G. and Tan, G.B.A. (2018), "Predicting decisions of the philippine supreme court using natural language processing and machine learning", *Proceedings of the IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC)*, *IEEE*, pp. 130-135.

Xu, A. (2017), "Chinese judicial justice on the cloud: a future call or a pandora's box? An analysis of the "intelligent court system" of China", *Information and Communications Technology Law*, Vol. 26 No. 1, pp. 59-71.

Yahya, M., Nadzar, F. and Rahman, B.A. (2013), "Examining user acceptance of E-Syariah portal among syariah users in Malaysia", *Proceedings of the 3rd International Conference on E-Learning*, *Elsevier B.V*, pp. 349-359.

Yin, R.K. (2009), *Case Study Research Design and Methods*, 4th ed., Sage.

Yin, R.K. (2014), *Case Study Research: Design and Methods*, Sage.

Appendix. Sample of interview questions

- Currently, justice systems worldwide are moving toward integration with ICT and e-court implementation; how would you describe this movement?
- Could you explain if ICT integration would affect justice systems in general?
- Would you explain efficiency improvements after e-court implementation in terms of daily internal operations?
- Do you think that transparency is necessary for court processes?
- Does the transparency concept is implemented with the current e-court system?
- What do you think about the security of court cases in e-court systems?
- In your opinion, how satisfied are the public with e-court services?
- As a current e-court user, with your position in the system, to what extent are you satisfied with using e-court in your daily operation?
- As a court user, can you proceed with your work even if you are outside the courthouse? And how do you feel about this functionality?

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Ingrid Pappel holds an MSc in informatics from 2006 and a PhD in informatics from Tallinn University of Technology since 2014. She is CEO of the IT Company Interinx Ltd. that she co-founded in 1998. From 2011 to 2016 she was a reader and since 2016 she is an associate professor in the information systems group at Tallinn University of Technology. Since 2013 she is head of the international study program on E-Government Technologies and Services at Tallinn University of Technology. Ingrid Pappel has (co-)authored numerous publications in international journals and conference proceedings. Her fields of research are e-governance, e-government, e-signature and document management systems. Ingrid Pappel is a member of the Estonian ICT cluster.

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Appendix 5

[V]

Rozha K. Ahmed, Khder H. Muhammed, Awat O. Qadir, Soran I. Arif, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation: A proposal based on a comparative case study. In *Proceedings of EGOVIS'2021 - International Conference on Electronic Government and the Information Systems Perspective. Lecture Notes in Computer Science*, volume 12926, pages 115–128. Springer, 2021

A Legal Framework for Digital Transformation: A Proposal Based on a Comparative Case Study

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Abstract. Digital transformation is crucial for governments to provide better and more efficient services to the citizens. A legal framework is a necessary component of each e-government ecosystem to ensure proper delivery of e-services. This research proposes a legal framework for e-government in the Kurdistan Region of Iraq (KRI). The research started with the KRI's e-Court system project as the first pilot project towards the systematic introduction of e-government in general. The research is based on a qualitative comparative case study of the KRI and Estonia, which is known to have a particularly mature set of e-government regulations. Data have been collected from legal databases, existing literature, and other available legal documentations from both countries. This study aims to provide a foundation for the Kurdistan Regional Government (KRG) to conclude plans for digital expansion and implementation of e-government in the KRI. Beyond that, the authors hope that this study extends the existing body of knowledge and literature in a way that is useful for e-government practitioners in other projects and researchers alike.

Keywords: ICT laws · e-services · e-government · e-Court · e-File · Legal framework · Kurdistan region · Iraq · Estonia

1 Introduction

Governments can provide better and more efficient services to citizens by digital means through the implementation of e-government. However, the decision to move toward digital transformation and e-government implementation requires in-depth analysis and strategy, in particular, to guarantee a clear road map to digital inclusion. Caring for legal issues is crucial to ensure that the necessary

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regulatory framework exists to enable digital transformation while protecting citizens' rights [10,11].

Initiatives of digital transformation have taken place in the Kurdistan Region of Iraq (KRI) since 2014 through the implementation of a Court Information System. This project aimed to digitize court processes to increase efficiency and deliver better justice services to the citizen. The system has been introduced in the Sulaimaniyah Appellate Court at the Sulaimaniyah City as the first step. Next, it is planned to expand the solution to all other courts in the KRI.

This e-Court system has improved court efficiency concerning court internal daily operations, enhanced court cases' security, extended access to the judiciary, and increased transparency in the court processes [3]. On the other hand, the project has faced many challenges; among them, the lack of a digital signature and the absence of supporting laws are considered significant issues [2]. Hence, the authors considered legal issues that support the smooth operation of an entirely paperless e-Court system and to ensure the validity of the process. Furthermore, as there is a clear willingness in the KRI to move toward a comprehensive government transformation with the implementation of e-government and prepare for future missions, this research also considers the relevant laws for e-government implementation.

This research investigates Estonia and the KRI cases from a legal perspective by analyzing existing literature, reviewing available laws and legal documents related to digital transformation. The Estonian case has been selected because the country already has a mature legal framework that supports e-government, and Estonia has implemented a successful e-Court system. The KRI is taking the first steps towards e-government by implementing its e-Court system. Therefore, the comparison of two different practices helps to identify the existing gaps in the KRI case.

As an outcome of this study, the authors propose a legal framework for digital transformation in the KRI through a set of laws essential to regulate technology usage concerning e-Court systems and e-government implementation. The research aims at extending the body of knowledge for academics, practitioners, decision-makers, judiciaries, and regulators. The results will serve the Kurdistan Regional Government (KRG) to prepare digital inclusion concerning legal issues.

In Sect. 2, we present the research questions and methodology. In Sect. 3, we provide a general description of the e-court systems of both Estonia and the KRI. In Sect. 4, we present overview about digital transformation in Estonia and the KRI. In Sect. 5, we present relevant legislation for both e-Court system as domain-specific and e-government as general laws in Estonia and the KRI. In Sect. 6, we present the proposed legal framework for the KRI. We finish with a conclusion in Sect. 7.

2 Research Methodology

Providing government services in electronic format requires an infrastructure that is fully dependent on the use of technological tools, and laws play a crucial

role in determining the legal and valid usage of these all technological components together. Hence, it is necessary to clarify a proper understanding of introducing the necessary new laws and what amendments need to be done to existing ones.

Therefore, this paper answers the following research questions:

- What are the necessary laws for implementing an e-Court system in the KRI as a specific part of the e-government realm?
- What are the necessary laws for the implementation of e-government in the KRI?

This research uses a qualitative, analytical comparative case study approach [17]. This strategy analyzes and compares practices in Estonia and the KRI's different contexts and jurisdictions. In both cases, two types of sources will be analyzed: (i) legal databases and other types of necessary rules and (ii) existing literature and other available documentation (i.e., official documents of public organizations). The research started with an in-depth analysis of the legal environment of the Estonian e-government followed by the analysis of the available relevant laws to e-government implementation in the KRI. By comparing the analyses of both cases it is possible to determine whether new laws or other forms of rules are needed or whether existing ones shall be amended – or perhaps, no change is needed other than a different interpretation for the KRI case.

3 Digital Transformation of Courts

3.1 Implementation of the Court Information System in Estonia

Estonia uses a modern court information management system for all its court types, including the first and the second instance, and the Supreme Court[1]. The system is called the e-File and manages all case types and jurisdictions for civil, criminal, and administrative issues. It is composed of different integrated systems such as the Police Information System, the Court Information System, the Prison Information System, and the Criminal Case Management Register through the Public Prosecutor's Office, in addition to availability of public portal for citizens and lawyers to access their cases, see Fig. 1. The system uses an ID card as an authentication method for actors in the system to access all e-services but with different access rights provided depending on the role. Data are securely exchanged between different parties, and claimants can submit their claims online: the system generates a notification for the addressee. The system went live in 2005.

3.2 Implementation of the Court Information System in the KRI

A court information system called an e-Court system is implemented in the Sulaimaniyah Appellate Court in the Sulaimaniyah city as a first pilot project [3],

[1] https://www.rik.ee/et/node/489.

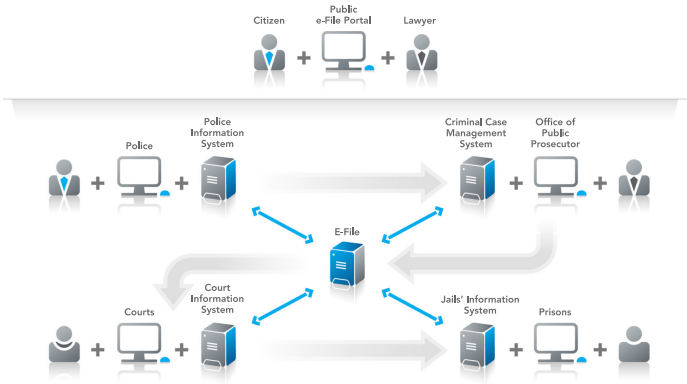

Fig. 1. The Estonian e-File system. (See Footnote 1)

and planned to be extended in other cities of the KRI. The project started in 2014 and launched in 2016, while support and constant improvements of the system last until now. The system manages three types of court proceedings, i.e., court cases from civil and criminal jurisdictions, certificates, and other transactions that are processed similarly to court cases but without disputes between parties.

The system is composed of integrated subsystems that allow smooth communication and secure data exchange between different parties. The collaborative activities are achieved successfully through a central database that allows case management and access by courts, the prosecution office, and police stations. Furthermore, as shown in Fig. 2, outside agencies, lawyers, and case participants (citizens) can access the system through a public portal for case monitoring and status updates.

While the system has increased the efficiency and effectiveness of court processes [3], in contrast, several challenges were identified during the implementation before the system could be extended to other courts. The lack of a digital signature and insufficiency of the legal environment were identified as critical problems [2]. Furthermore, there is a need for an e-government infrastructure, electronic identity (eID) and its management systems to support the KRI e-Court initiative [1].

4 Digital Transformation of Governments

4.1 e-Government

A general common definition of e-government could be the use of technological tools to enhance the government performance, transparency, efficiency, citizen trust, and provision of high-quality services through a single shared infrastructure across the entire private and public governmental sectors, made up of integrated systems with an interoperable data exchange layer [5,6,8,10,16]. On the

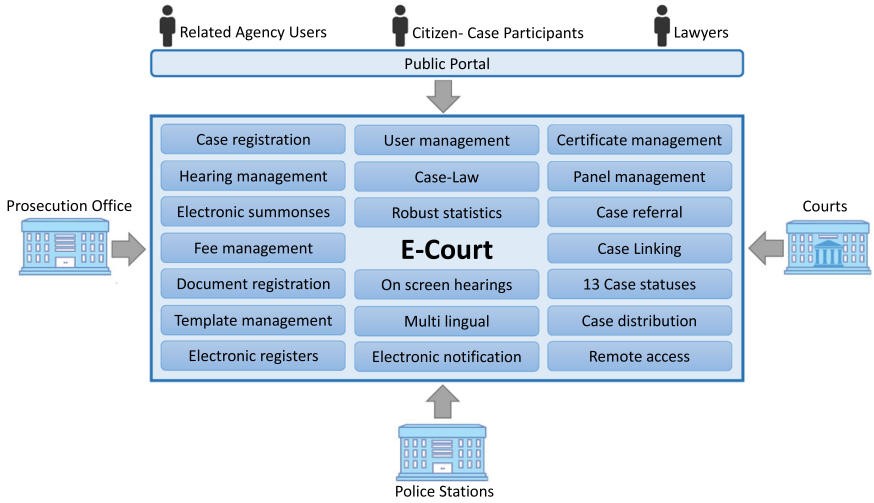

Fig. 2. Kurdistan e-Court system.

other hand, technology usage might expose different risks and challenges compared to the traditional paper-based system, such as security risks, data protection, privacy issues, and others. [9] consider these challenges as significant factors and suggest legislative analysis to mitigate these risks. Therefore, legislation plays a crucial role in regulating the usage of technology and electronic transitions. The working procedures of e-government have to be valid and legally equivalent to the paper world procedures; furthermore, online transactions' legal validity ensures citizen trust towards electronic services [13].

4.2 e-Government in Estonia

In 2001, Estonia started implementing e-government and developed a platform for providing e-services with a secure data exchange layer called X-Road that connects decentralized governmental databases to provide access to the state information systems through a single public portal [4,11,12,14]. X-Road was implemented step by step through different versions once the state was ready from the legal and organizational perspective [6]. Increasing transparency in governance was one of the main goals [5], to achieve a higher quality of service delivery while considering citizen democracy and participation [8], as well as providing a "fully integrated one-stop-shop" for almost 99% of e-services [15] to allow digitalized interaction between citizens and local governments. Estonia has been focusing on digital government ecosystems and investigating technologies that support digital transformation by understanding architectural needs and process re-engineering considering enterprise architecture. Based on experience over decades one most crucial component in Estonian e-governance developments has been digital data exchange [4] as well as digital signing [12] as critical step to move to paperless government.

4.3 e-Government in the KRI

The KRI is located in the northern part of Iraq and from 1992 formed an independent administration; and within this administration, an independent parliament and judicial system have been established. The KRG has planned to move towards digitization and implementation of e-government since 2014 through initiating the following projects:

- Mapping public services: the project aims to map all the government services provided directly or indirectly to citizens to improve service delivery with less bureaucracy. The outcome of this project will identify the number of services, creating a one-stop-shop for providing information and guidelines about the services through a public portal.
- Implementation of eID: this project draws a road map for the implementation of a unique digital identity card through registering the biometric data of all citizens. However, this project will be a long term plan of reform consisting of different phases. In the initial phase of the biometric registration system, data were collected, stored, and validated. The outcome was used to improve government wage earners' salary payment in a scalable and centralized biometric system.
- Building pilot information systems: digital transformation in organizations started by analyzing systems "as is" and re-engineering the current processes. One crucial component of an e-government structure is the availability of integrated information systems to allow digital transactions and electronic data exchange between different sectors. In this regard, the Court Information System is built as a first pilot project. The outcome of this project provides vision for future expansion.

5 Digital Transformation and Relevant Legislation

5.1 The Case of Estonia

It is clear from the literature that Estonia has not created too many laws regarding e-government and there is no centralized legal act regulating the e-government domain. This is a deliberate decision by the relevant decision-makers, as specialized legislation on e-government risks creating a parallel system that the government wants to avoid, in addition, Estonia is a member of the European Union (EU), and EU law applies fully to Estonia (including e-government related regulations such as eIDAS[2] and GDPR[3].

[2] EU Parliament and Council regulation (EU) no 910/2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

[3] EU Parliament and Council regulation (EU) no 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

It is also important to distinguish three types of legal acts: laws, which are legal acts issued by the Parliament of Estonia, legal acts adopted by the government, and legal acts issued by different ministers. As in any jurisdiction, laws are the most important, and other legislation must be in accordance with the law. For e-government, many rules are found in other instruments than laws. Regarding domain-specific laws, several specific acts to the court system regulating the e-Court system and digital information exchange in the court procedures as presented in Fig. 3.

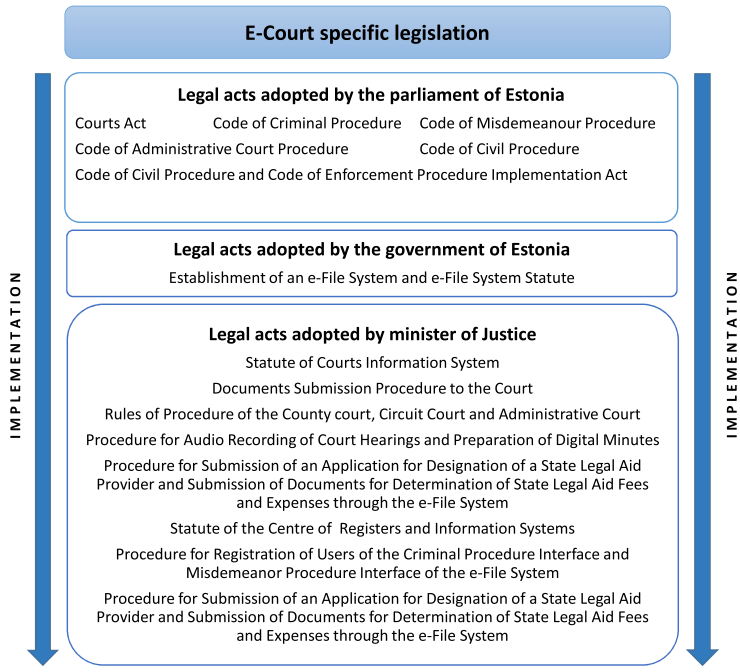

Fig. 3. Estonian e-Court specific legislation.

The Courts Act establishes a court information system. The system aims to organize the work of courts, collect statistics, collect and systematize decisions, and make them available to courts and the public[4]. The Code of Criminal Procedure[5], the Code of Misdemeanour Procedure[6], the Code of Administrative Court Procedure[7], and the Code of Civil Procedure[8] enable processing of digital documents and evidence in the specific procedure in the information system.

[4] https://www.riigiteataja.ee/en/eli/519122019009/consolide.
[5] https://www.riigiteataja.ee/en/eli/507012020008/consolide.
[6] https://www.riigiteataja.ee/en/eli/515012020005/consolide.
[7] https://www.riigiteataja.ee/en/eli/512122019007/consolide.
[8] https://www.riigiteataja.ee/en/eli/512122019004/consolide.

The Code of Civil Procedure and the Code of Enforcement Procedure Implementation Act[9] sets the information system requirements.

One of the most relevant provisions is establishing an e-File system and e-File system statute that enables digital data storage, management, access, and security requirements[10]. Other legal acts named in Fig. 3, issued by the Minister of Justice, specify different data-related procedures and relations and communication between other information systems.

Moving on to the general laws, there are significant laws that allow the smooth electronic transaction and data transfer in e-government in Estonia. Information Society Services Act provides the basic requirements for the information society service providers [11]. Information society services are entirely transmitted, conveyed and received by electronic means of communication. In addition to the previously named comprehensive act, the authors identified four main categories of e-government related legal acts: legal acts related to e-government infrastructure, eID, electronic data management, and business continuity management. Figure 4 presents the essential e-government related laws in Estonia.

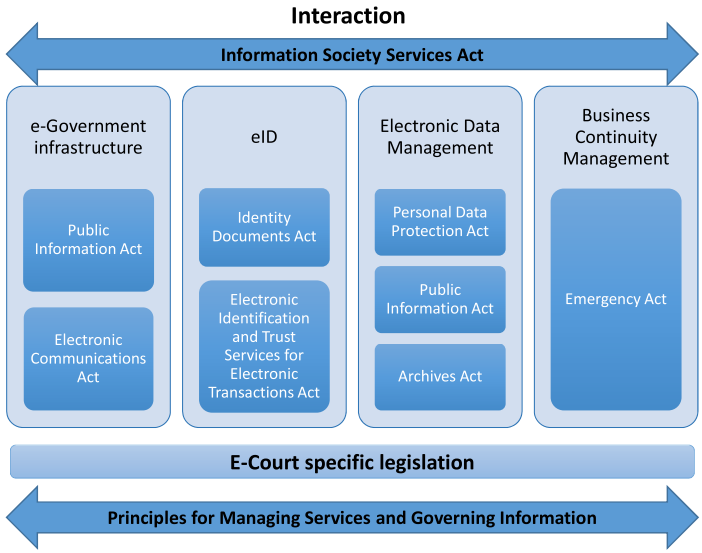

Fig. 4. Estonian e-Government related laws.

– Public Information Act aims to ensure that every person has access to public information. It is also the basis for establishing and administering databases and their supervision[12]. This Act is in force since 2001 and provides a basic

[9] https://www.riigiteataja.ee/en/eli/511042019002/consolide.
[10] https://www.riigiteataja.ee/akt/109032018005.
[11] https://www.riigiteataja.ee/en/eli/515012019001/consolide.
[12] https://www.riigiteataja.ee/en/eli/529032019012/consolide.

regulatory framework for e-government infrastructure and electronic data management. Consequently, the following three Government regulations are derived from the Public Information Act.

  - Information Systems Data Exchange Layer: this regulation is in force since 2016 and contains requirements for the data exchange layer of information systems (also called X Road), its usage, and management[13].
  - Information Systems Security Measures: this regulation is created for managing the security of different public sector information systems and is in force since 2008[14].
  - State Information System Management: this regulation creates the main principles of state information system management and in force since 2008[15].

– Electronic Communications Act is in force since 2005 and establishes the necessary conditions for developing electronic communications and promotes electronic services[16].
– Identity Documents Act states the requirements for all identity documents (including digital documents, eIDs) issued by the Republic of Estonia and in force since 2000[17].
– Electronic Identification and Trust Services for Electronic Transactions Act regulates electronic identification and trust services for electronic transactions. More specifically, the Act contains requirements for the trust service provider and its supervision. It is in force since 2016[18].
– Personal Data Protection Act states the main data protection principles of natural persons, and in force since 2018[19].
– Archives Act is relevant for the management, organization, and preservation of archival records (including digital records). It is in force since 2012 (See Footnote 6).
– Emergency Act ensures the continuity of primary services during emergencies. According to this Act, digital identification and digital signing are vital services. The Act is in force since 2017[20].

All these e-governance related acts complement each other and influence e-Court specific legislative acts. It should be noticed that these acts do not deal only with digital or e-government related matters but also cover, for example, protection of or access to paper-based data, archiving of traditional forms of data, and so on. They, however, contain the necessary provisions for e-government and the e-Court.

[13] https://www.riigiteataja.ee/akt/127092016004.
[14] https://www.riigiteataja.ee/akt/13125331.
[15] https://www.riigiteataja.ee/akt/106082019018.
[16] https://www.riigiteataja.ee/en/eli/513012020007/consolide.
[17] https://www.riigiteataja.ee/en/eli/504022020003/consolide.
[18] https://www.riigiteataja.ee/en/eli/511012019010/consolide.
[19] https://www.riigiteataja.ee/en/eli/523012019001/consolide.
[20] https://www.riigiteataja.ee/en/eli/511122019004/consolide.

5.2 The Case of the KRI

The KRI generally follows the Iraqi legal system, and some laws of the Iraqi government are used in the KRI. However, the KRI has an independent judicial system, government, and parliament, so there is a set of laws issued by the Kurdistan Parliament. The legal pyramid is the traditional one, consisting of the constitution, which forms the basis of laws. Laws which are passed by the parliament about a particular subject. The next stage consists of regulations that are detailed by the Council of Ministers or a specific ministry. Finally, instructions, policies, and orders are issued by a specific ministry or institution based on a specific law to regulate a particular issue relevant to that sector.

Considering the relevant laws for an e-Court system, no law exists to support and regulate the electronic court system's operation. Hence, the current implemented court information system in the Sulaimaniyah Appellate Court is designed to operate with old existing laws that govern the physical world. However, the system is very flexible and can adapt to new changes easily. Furthermore, from analysis, It is found that the primary laws that are used in courts for solving court cases are very old laws meant to govern the paper world and do not support technological advancements and usage of e-Court systems. Examples of these laws include the Criminal Procedure Law, the Civil Procedure Law, the Civil Law, the Penal Code, the Labour Law, the Personal Status Law, the Evidence Law, the Civil Status Law, the Care of Minors Law, the Juvenile Welfare Law, and the Penal Code for the Internal Security Forces[21].

Moving on to the general laws for e-government, only one ICT relevant law exists that is used and issued in the KRI, as described in the following:

- Law of Banning the Misuse of Communication Devices describes the era of technology and how communication mediums such as phone devices, electronic mail, social media, and related issues can be appropriately used, and what punishment will be the consequence for the wrong usage and crimes committed through them, it is in force since 2008 (See Footnote 21)[22].

6 Findings

Creating a legal framework needs careful analysis and study of laws in any country that wants to start the digital transformation. It is also advisable that over-regulation should be avoided. New laws might not be needed for every matter, but existing laws can be amended if required to fit the smooth transformation of the government towards digitization, providing legal validity of electronic data and transactions.

As the e-Court system is one kind of information system that is considered a component of the whole e-government infrastructure, hence, the relevant laws that support the operation of e-government apply to specific domains like e-Courts as well. All general laws established at the higher level are generic, and

[21] http://iraqld.hjc.iq.
[22] https://www.parliament.krd/english/.

each specific domain will use them. The KRI does not have a constitution, while new laws can be issued, and amendments in the existing laws can be made through the Kurdistan Parliament that was established in 1992 (See Footnote 19).

6.1 Domain-Specific Laws

Concerning an e-Court system, authors found that, in general, courts operate through two categories of laws: procedural laws to organize court operations and substantive laws that detail how to solve disputes in courts. The e-Court system is more related to procedural laws, particularly the Criminal Procedure Law and the Civil Procedure Law, as well as the Evidence Law. It needs to be analyzed what amendments needed to be made in these three laws to support the case management procedures from claim submission, electronic hearings, video conferencing, electronic notifications to final case disposal in the e-Court system.

6.2 General e-Government Laws

Regarding the legal framework of e-government for the KRI, after the Estonian case is analyzed, it can be concluded that dealing with the legal aspect can be made by identifying essential key enablers for the digital transformation. The results present main key enablers along with necessary legal acts to ensure expected quality and liability of the e-service delivery in the following points:

Electronic Identity Document. eID is one of the main enablers in the digital environment. It is crucial to uniquely identify every citizen through an electronic identity to ensure the citizen's ability to sign digitally in electronic transactions. Hence, a new law is needed to regulate electronic identification and trust services and give such legal validity to the digital signatures that are equivalent to the manual signature while furthermore establishing rights and obligations related to the use of the signature [7].

Interoperability. One of the critical enablers of e-government is interoperability between interconnected registers and information systems and a set of technological tools. Data exchange and electronic transactions are the core factors to be considered and access to the public information shared through the e-government environment. For that purpose, the following findings can be applied to the case of the KRI.

– New legislation that includes an Electronic Transactions Law. Although such specific law does not exist in Estonia and it is not advisable for countries with more advanced e-government systems to have it, as amendments to existing law are often sufficient. For the KRI, authors feel that a law needs to be issued, regulating how institutions should organize their business processes according to the advancement of technology. This can be done by issuing

a very general law to validate electronic transactions while giving authority to the Council of Ministers and the relevant ministers to create instructions and regulations to regulate each particular ministry without referring to the issuance of separate specific main laws.
- Relevant laws for banks and electronic payments are needed. Transforming government digitally involves business sectors and banks. Giving validity to electronic payment is essential along with regulating banks in the digital environment.
- Amendments can be made to the Access to Information Right Law. The Kurdistan Parliament already issued this law in 2013 (See Footnote 19). It governs the rules for obtaining public information in the physical world, enhancing transparency in the government. However, it can be amended to suit electronic information and control access to government databases and systems.
- New law for archiving electronic data and documents needed to define rules for preservation, access, and protection of archival records.

Cybersecurity. The availability of public services digitally, information systems, interconnected databases, networking, and electronic transactions, creates, shares and exchanges a massive amount of data. Hence, security concerns such as privacy, individual data protection, confidentiality, trust, service continuity, cyber attacks, data integrity, identity protection, and authentication will become increasingly important issues. Legal measures allow defining reaction mechanisms to these cybersecurity aspects by adopting a "harmonized set of laws" that can guarantee the proper usage of ICT [15]. From this viewpoint, it can be seen that the followings changes are needed in the case of the KRI:

- Amendments in the Law of Banning the Misuse of Communication Devices, to guarantee the proper usage of ICT tools in particular within the e-government infrastructure. Currently, the law defines only limited devices.
- A Personal Data Protection Law needs to be adopted to ensure proper protection of individual data and user privacy in the e-world.
- Adoption of a new law for cybercrime may be considered. The law should define service providers' rights and obligations, cyber incidents, privacy, and liability of the systems.

Figure 5 presents the proposed legal framework for both the e-Court system and e-government for the KRI.

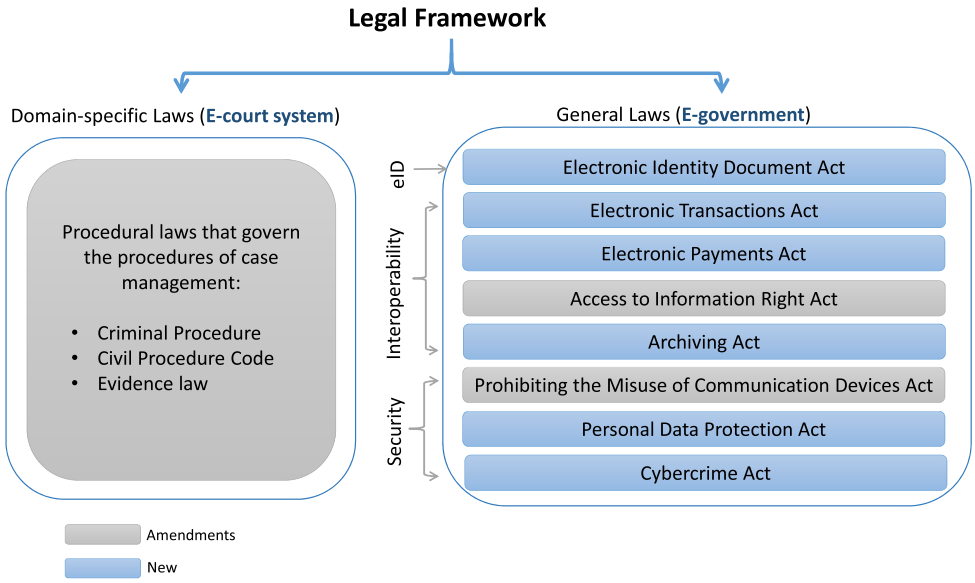

Fig. 5. Legal framework proposal for the Kurdistan Region.

7 Conclusion

Legislation plays a significant role in the digital transformation process. The existence of a regulatory framework ensures the validity of the electronic format's business processes and supports technological tools' right usage. It increases citizens' trust and helps the government to deliver better services in accordance with the law. The results of this study presented a proposal of a legal framework that can be established for specific domain laws such as an e-Court system and general laws relevant to the e-government in light of a comparative analysis with Estonia's case. The Estonian case can be used to evaluate the legal readiness to implement different e-governance initiatives in the KRI.

Some limitations of this research include limited availability of legal databases in the English language in the KRI case.

The future research direction would be towards conducting more in-depth analysis and validation of the proposed legal framework based on the KRI legal environment by a team of selected legal experts and making needed changes in the laws content as well as preparing regulation drafts for the successful implementation of e-government in the KRI.

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References

1. Ahmed, R.K., Lips, S., Draheim, D.: eSignature in eCourt Systems. In: Proceedings of 2020 Fourth World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4), pp. 352–356. IEEE (2020)
2. Ahmed, R.K., Muhammed, K.H., Pappel, I., Draheim, D.: Challenges in the digital transformation of courts: a case study from the Kurdistan region of Iraq. In: Proceedings of ICEDEG 2020—The 7th International Conference on eDemocracy & eGovernment, pp. 74–79. IEEE (2020)
3. Ahmed, R.K., Muhammed, K.H., Pappel, I., Draheim, D.: Impact of e-court systems implementation: a case study. Transform. Gov. People Process Policy **15**(1), 108–128 (2021)
4. Draheim, D., Koosapoeg, K., Lauk, M., Pappel, I., Pappel, I., Tepandi, J.: The design of the estonian governmental document exchange classification framework. In: Kő, A., Francesconi, E. (eds.) EGOVIS 2016. LNCS, vol. 9831, pp. 33–47. Springer, Cham (2016). https://doi.org/10.1007/978-3-319-44159-7_3
5. Goede, M.: E-Estonia: the e-government cases of Estonia, Singapore, and Curaçao. Arch. Bus. Res. **7**(2), 216–227 (2019)
6. Kalja, A., Reitsakas, A., Saard, N.: eGovernment in Estonia: best practices. In: Portland International Conference on Management of Engineering and Technology 2005, pp. 500–506 (2005)
7. Kim, H.: Globalization and regulatory change: the interplay of laws and technologies in E-commerce in Southeast Asia. Comput. Law Secur. Rev. **35**(5), 105315 (2019)
8. Kitsing, M.: An evaluation of E-government in Estonia. In: Internet, Politics and Policy 2010: An Impact Assessment Conference at Oxford University (2010)
9. Layne, K., Lee, J.: Developing fully functional E-government: a four stage model. Gov. Inf. Q. **15**(18), 122–136 (2001)
10. Nyman-Metcalf, K.: e-Governance: a new reality for legislative drafting? Int. J. Legis. Draft. Law Reform **6**, 39 (2017)
11. Nyman-Metcalf, K.: How to build e-governance in a digital society: the case of Estonia. Revista Catalana de Dret Public **58**, 1–12 (2019)
12. Pappel, I., Pappel, I., Tepandi, J., Draheim, D.: Systematic digital signing in Estonian e-government processes. In: Hameurlain, A., Küng, J., Wagner, R., Dang, T.K., Thoai, N. (eds.) Transactions on Large-Scale Data- and Knowledge-Centered Systems XXXVI. LNCS, vol. 10720, pp. 31–51. Springer, Heidelberg (2017). https://doi.org/10.1007/978-3-662-56266-6_2
13. Rikk, R., Roosna, S.: e-Estonia: e-Governance in Practice. eGA (2016)
14. Tsap, V., Pappel, I., Draheim, D.: Key success factors in introducing national e-identification systems. In: Dang, T.K., Wagner, R., Küng, J., Thoai, N., Takizawa, M., Neuhold, E.J. (eds.) FDSE 2017. LNCS, vol. 10646, pp. 455–471. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-70004-5_33
15. United Nations: The United Nations e-government survey 2018. Technical report, United Nations, Department of Economic and Social Affairs (2018)
16. Wirtz, B.W., Daiser, P.: A meta-analysis of empirical e-government research and its future research implications. Int. Rev. Adm. Sci. **84**(1), 144–163 (2018)
17. Yin, R.K.: Applications of Case Study Research. Sage, Los Angeles (2011)

Appendix 6

[VI]

Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, and Dirk Draheim. e-court system evaluation through the user ' s perspective : Applying the end-user computing satisfaction (EUCS) model. In *Proceedings of DGO' 2022 - 23rd Annual International Conference on Digital Government Research*, pages 293–299. ACM, 2022

E-Court System Evaluation through the User's Perspective: Applying the End-User Computing Satisfaction (EUCS) Model

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ABSTRACT

The End-User Computing Satisfaction (EUCS) model by Doll and Torkzadeh has played an essential role in evaluating users' satisfaction and perspectives on change management, which will help governments in assessing the information system's success and making efficient decisions about digital transformation and improving the quality of services provided to citizens. This research uses the EUCS model to assess the end-user satisfaction with a court information system and evaluate its success from the users' viewpoint. The authors applied the EUCS model to the implemented court information system of the Sulaimaniyah Appellate Court in the Kurdistan Region of Iraq (KRI). The authors employed a quantitative approach and collected data from 66 respondents from the group of active end-users of the court systems with different roles, i.e., judges, clerks, prosecutors, judicial investigators, lawyers, police officers, and typists. The results showed that the EUCS model could be considered a reliable and valid tool for assessing the court information system. Most of the participants of the currently implemented system showed their overall satisfaction and considered it a successful system.

CCS CONCEPTS

• **Computer systems organization** → **Embedded systems**; *Redundancy*; Robotics; • **Networks** → Network reliability.

KEYWORDS

e-Court, Court Information System, EUCS, Kurdistan Region, Iraq.

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1 INTRODUCTION

Judiciaries use emerging technologies to reshape the conventional justice administration system and improve the process efficiency of courts [17]. The workflow in courts is modernized through the implementation of the court information system (CIS), which can also be referred to as the electronic court (e-court) system, to improve the efficiency and effectiveness of the court's internal daily operations in terms of extending access to the judiciary, increasing transparency, enhancing court cases' security and many more [4, 6, 13, 18, 30, 32]. This research will use the term e-court system.

Initiatives of digital transformation in the justice domain have taken place in the Kurdistan Region of Iraq (KRI) since 2014, with the implementation of the first e-court system project to digitize court processes. The system is now running in all courts under the administration of the Sulaimaniyah Appellate Court in the Sulaimaniyah City; however, the initial plan was to expand the solution to all other courts in the KRI [4, 6]. Hence, the system's success becomes a crucial factor in understanding whether to move forward with this e-court replication in other cities of the KRI or not.

Studies showed a common understanding that users play a major role in identifying the success of the implemented information system through their evaluation, satisfaction, and acceptance of the use of the available system [12, 15, 16, 21, 22, 26, 29]. Among the variety of available models and frameworks to assess the information system, user satisfaction is considered a significant success factor to rely on. Many researchers approached evaluation of user satisfaction through different measures [9, 12, 14, 16, 21, 33]. However, the End-User Computing Satisfaction (EUCS) model by Doll and Torkzadeh [16] is considered one of the significant tools in evaluating the system users' expectations of the implemented system and their satisfaction. This model has been used and validated through different information systems, including the assessment of government financial administration integrated system [31], a number of different hospital information systems [1, 19, 28, 29],

online banking system [23], online marketplace [25], others applied EUCS to different web-based academic learning environments, and library systems [7, 8, 10, 20, 24, 26, 27, 34], and data warehouse system [11]. However, the application of EUCS in the justice domain and validation of the model through e-court systems remains a research gap to be filled.

Therefore, this research measures the user satisfaction level of the implemented e-court system based on the End-User Computing Satisfaction (EUCS) model introduced by Doll and Torkzadeh [16]. The research is based on the quantitative approach, and data were collected from court users and analyzed with the SPSS application. After the validity and reliability of the tool, results showed that end-users of the court information system are satisfied with the system and confirmed the improvements in efficiency and effectiveness of their daily processes by considering the system as a successful project.

This research significantly contributes to extending the body of knowledge and literature for academic researchers, judiciaries, and practitioners concerning implementing the e-court systems. Furthermore, this study will serve the decision-makers in the Kurdistan regional government to draw an expansion plan for the e-court system implementation in other cities.

In sectin 2 we provide an overview of the e-court system in the Sulaimaniyah Appellate Court. In section 3 we present the relevant theoretical framework to assess information system success and user satisfaction level. Then, we explain our research approach and data analysis processes in section 4. In section 5 we present the results of our analysis and discuss them, and finally, we finish with our concluding statements, research limitations, and future direction in section 6.

2 DIGITAL TRANSFORMATION OF COURTS IN THE KRI

Earlier studies on the digital transformation of courts in the KRI [2–6], reported that the e-court system in the Sulaimaniyah Appellate Court in the Sulaimaniyah city was introduced as a first pilot project and planned to be extended in other cities of the KRI. The project started in 2014 in six different stages (planning, system analysis/master plan, prototyping, building infrastructure, piloting, and implementation) and launched in 2016. The system is composed of integrated subsystems that allow smooth communication and secure data exchange between different parties. Information is entered once, and processes are automated to allow system users to perform their main functions and collaborate efficiently. As shown in Figure 1, the collaborative activities are achieved successfully through a central database that allows case management through the implemented functionalities to assist court users in performing their daily judiciary tasks electronically by courts, the prosecution office, and police stations. Furthermore, outside agencies, lawyers, and case participants (citizens) can access the system through a public portal for case monitoring and status updates.

3 RELEVANT THEORETICAL MODELS

Related studies have proposed several evaluation models to assess the success of the information systems and acceptance of the technology integration into an organization's business processes.

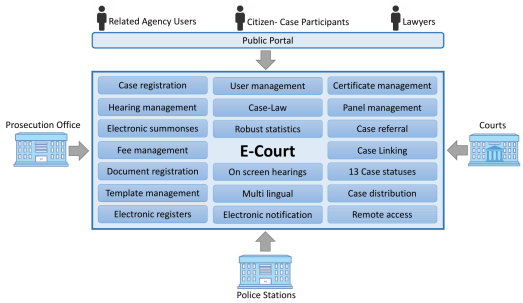

Figure 1: Sulaimaniyah Appellate Court System

Among researchers, user satisfaction has received a notable consideration as a success indicator of the information system and their acceptance of the change management. Bailey and Pearson in [9] developed an instrument for measuring and analyzing the overall computer user satisfaction, that was revised by Ives et al. in [21] and developed a user information satisfaction (UIS) model that has been accepted among researchers to assess users' view as to which extend they are satisfied with the information they get from the system if they fulfill their requirement or not, and accordingly this will examine the effectiveness of the organization. Doll and Torkzadeh in [16] designed their instrument to measure the end-user computing satisfaction (EUCS) based on the (UIS). They argued for a five-factor model composed of content, accuracy, format, ease of use, and timeliness to measure the satisfaction of end-users who are directly interacting with specific computer systems. Davis's technology acceptance model (TAM) also considered user acceptance of information technology as a measure of system success by studying perceived usefulness and ease of use in [12]. (TAM) was revised in [33] and with a unified theory of acceptance and use of technology (UTAUT) that tended to estimate and explain the usage of the information systems. Later, DeLone and McLean's model was introduced in [14], which is adopted as a model that allows us to assess the performance of an information system and considered user satisfaction as a vital variable for the system's success. User satisfaction is one of the crucial factors in understanding the user's perception of the effectiveness and efficiency of the adopted system [16, 21, 29]. Consequently, users' willingness to accept and use the system will positively affect a newly launched information system [29], as if users like the system, they use it, and in turn, higher system usage leads to higher satisfaction level [22, 26]. Therefore, to understand the success of the implemented current e-court system, we measure user satisfaction through the EUCS model.

4 RESEARCH APPROACH

This research seeks to answer the following research question; *What is the level of user satisfaction of the e-court system and its success from users' perspectives ?*

In order to answer the research question and estimate the success of the e-court system and measure the level of its user satisfaction, this study employs the quantitative approach and uses the EUCS

instrument by Doll and Torkzadeh [16] as a theoretical framework. Authors selected this model because it is widely used and accepted by researchers, is easy to use with confidence, and "has adequate reliability and validity across a variety of applications" [16]. Furthermore, this instrument can be applied to measure the success of the current system where court users work in an environment where they directly interact with the system composed of a central database and model base [16]. The EUCS model is composed of five indicators as presented in Figure 2

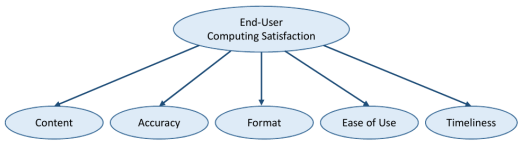

Figure 2: End-User Computing Satisfaction Model [16]

To achieve the aim of this research of answering the research question, in addition to filling the research gap, the authors set the following objectives:

- Validate the EUCS model applicability to the e-court systems.
- Understand end-users perspectives towards the system implementation in the five EUCS items.
- Identify the system's success through an end-user point of view with their acceptance of its usage and their expectation of success rate.

4.1 Data Collection

To make results more generalized, the data were collected from seven different role types using the court system to perform their daily tasks: judge, clerk, lawyer, prosecutor, judicial investigator, police officer, and typist.

The total number of active users of all the role types in the system is 875, and 66 responded to the survey. The authors considered the number of responses N= 66 as valid, presenting a confidence level of 95 % with a margin of 12 %.

4.2 Instrument

The authors designed an online survey questionnaire and sent it out to the end-users of the court system. The questionnaire was composed of 17 questions, three of them relevant to the user profile information to define the role of the participant, their computer skills, and their gender, further 12 questions were relevant to measuring content, accuracy, format, ease of use, and timeliness and the format of the standard questions of Doll and Torkzadeh were used [16]. Finally, two additional questions were posed to assess the system's success and evaluate its overall satisfaction. All questions were measured through a five-point Likert scale. A sample of the questionnaire is presented in the appendix section.

4.3 Data Analysis

IBM SPSS Statistics software was used for the data analysis phase, and for the validity and reliability test of the EUCS model. Results are presented in descriptive statics in the next sections.

5 RESULTS AND DISCUSSION

5.1 Validity and Reliability Test Results

The validity and reliability test was conducted to ensure that the EUCS model is suited for this study and can be applied to the e-court systems.

For the validity, Pearson Correlation was considered [24–26], by comparing the value of Pearson Correlation to the value obtained from r table, where the samples N = 66, and degree of freedom (df) = N-2 =64, and the significance level for two-tailed test 0.05 = 0.2423. Hence, if the item's Pearson Correlation value is > 0.2423, then the model is valid.

For the reliability, Cronbach Alpha was used as the items can be reliable if the Cronbach Alpha value is > 0.8 [23, 24].

As presented in Table. 1, results showed that across all items correlation value of r is > 0.2423, as well as Cronbach Alpha values are > 0.8. This concludes that the EUCS model can be considered a valid and reliable tool to assess user satisfaction with the e-court systems.

5.2 Descriptive Statistics Results from the EUCS Items

Our analysis showed that from the sample size of 66 participants, 51 were male, which represents (77.3 %) and 15 were female, which represents (22.7 %) of the population. Additionally, the IT skills of participants were mostly considered at a good level which was 29 participants that know fundamentals and how to use computers generally. Further, 18 of them had an intermediate level, 16 were considered their level to be advanced users, and only 3 of them clearly showed that they were at a poor level. Furthermore, results of the role analysis of respondents showed that 16 of them were judges that are the main users in the system, 14 of them were clerks that are responsible for most daily operations of the court processes, next 12 were judicial investigators that are responsible for investigation processes in the criminal courts and using the system on a daily basis, additionally, 12 lawyers responded as playing a big role in the system for their active participant in cases from all jurisdictions in all courts. Further participants are performing fewer tasks in the system; however, they are considered active users when performing specific tasks and participating in the case management process, 5 of them from prosecutors, five from typists, and the last two participated as police officers.

Regarding the results of the items analysis, the authors used a scale such as 1= Strongly Unsatisfied, 2= Unsatisfied, 3=Neutral, 4= Satisfied, and 5= Strongly Satisfied. As presented in Table. 2, results showed that end-users of the court system are satisfied with the system content and information extracted from the system, with an overall mean (3.79) that can be considered at level 4 (Satisfied). The accuracy of the data produced by the court system is also considered to be at a satisfactory level by users, with the mean of (3.66) at level 4 (Satisfied). Furthermore, the format factor indicates the provision

Table 1: Validity and reliability test of the items

Item ID	Pearson Correlation Value	r Table Value	Validity Result	Cronbach Alpha's value	Reliability Result
C1	0.697	0.2423	Valid	0.936	Reliable
C2	0.789	0.2423	Valid	0.934	Reliable
C3	0.772	0.2423	Valid	0.934	Reliable
C4	0.847	0.2423	Valid	0.932	Reliable
A1	0.774	0.2423	Valid	0.934	Reliable
A2	0.450	0.2423	Valid	0.943	Reliable
F1	0.770	0.2423	Valid	0.934	Reliable
F2	0.843	0.2423	Valid	0.932	Reliable
E1	0.748	0.2423	Valid	0.936	Reliable
E2	0.749	0.2423	Valid	0.936	Reliable
T1	0.770	0.2423	Valid	0.937	Reliable
T2	0.761	0.2423	Valid	0.936	Reliable

Table 2: Descriptive Statistics Results

Items	N	Mean	Level	Satisfaction Level
Content	66	3.79	4	Satisfied
Accuracy	66	3.66	4	Satisfied
Format	66	3.86	4	Satisfied
Ease of Use	66	4.03	4	Satisfied
Timeliness	66	2.71	3	Neutral

of information and its appearance to court users, and the results of format with a mean (3.86) means that users are satisfied with the information provided and the way they access it by level 4 (Satisfied). Moreover, the ease of use factor indicates the ability of the system to be understood and how easy to be learned and used by the end-users; as can be seen, it has got a greater number of mean is (4.03), considering that users are satisfied with the operation of the system and can learn it easily with level 4 (Satisfied). The final factor analyzed was the timeliness, which indicates the system response in terms of information updating on time and the availability of requested information on time; as can be seen from the results, users were not very much satisfied with this item and recorded the mean of (2.71) considered at level 3 (Neutral).

Table. 2 presented the results of the EUCS items analysis. It can be concluded that end-users of the court system were satisfied with the content, accuracy, format, and ease of use. However, they were not satisfied or dissatisfied with timeliness. Their responses were considered to be at level neutral, and that could be an indicator for the system improvement for future system replication regarding the system performance and time needed for previewing the court data.

5.3 Overall System Evaluation

To ensure the overall satisfaction of the system, the authors posed general questions to understand the system's success from the end-users perspective and their overall satisfaction with the daily case management processes. A similar satisfaction scale of the EUCS items was used for the overall satisfaction question with levels 1= Strongly Unsatisfied, 2= Unsatisfied, 3=Neutral, 4= Satisfied, and 5= Strongly Satisfied. While for the other question in relevance to the system success, the authors used a scale of 1= Very Unsuccessful, 2= Unsuccessful, 3=Fair, 4= Successful, and 5= Very Successful. Figure 3 shows the result of the first general question and concludes that most of the users with (48.5 %) of the population were generally satisfied with the system performance, (30.3%) of the population were strongly satisfied with the system and mainly considered it as a proper tool for processing their daily tasks. Others were (7.6%) neutral and preferred not to rate it, while only (4.5%) were unsatisfied, and (9.1%) of the population were strongly unsatisfied. It is clear that the system is becoming a necessary tool for the majority of the end-users, who are satisfied with the system performance and accept the change management in their daily tasks. On the other hand, the participants showed less satisfaction or were unsatisfied because they might have limitations or challenges when using the system or not have enough skill to use it properly. All these should be considered, and further investigation is required to understand their views.

The additional general question concerned the end-users opinion on the system's success and its stability in court. As presented in Figure 4 result of data analysis showed that the majority of the participants with (43.9%) of the population considered the system as a successful system, and (6.1%) of the population rated it as a very successful implementation, this is a significant sign for the decision-makers to plan for the future replication of the system in other cities. However, (39.4%) also considered the current e-court system a good system and rated it as a fair system. Moreover, (4.5%) rated it as an unsuccessful system, and (6.1%) considered it very unsuccessful for daily processes. It can be again concluded that further studies could be necessary to understand the reason for unhappy end-users with this e-court system.

Overall findings showed that the effort and resources put into this project by all parties are worthwhile and ensure the government that the budget allocated for this project has been appropriately utilized. Table. 3 presents the results of all items separately.

Table 3: Descriptive Statistics Results of Separate Items

Item ID	N	Mean	Std.Deviation	Level	Satisfaction Level
C1	66	3.98	0.963	4	Satisfied
C2	66	3.86	1.036	4	Satisfied
C3	66	3.62	0.989	4	Satisfied
C4	66	3.71	1.064	4	Satisfied
A1	66	3.79	1.000	4	Satisfied
A2	66	3.55	0.880	4	Satisfied
F1	66	3.97	0.976	4	Satisfied
F2	66	3.76	1.124	4	Satisfied
E1	66	4.06	0.943	4	Satisfied
E2	66	4.02	1.000	4	Satisfied
T1	66	2.74	1.460	3	Neutral
T2	66	2.70	1.358	3	Neutral
G1	66	3.86	1.175	4	Satisfied
G2	66	3.39	0.909	4	Successful

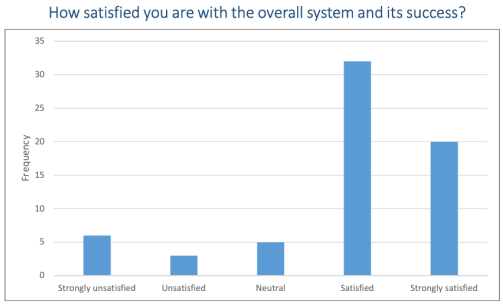

Figure 3: General Question on Overall User Satisfaction

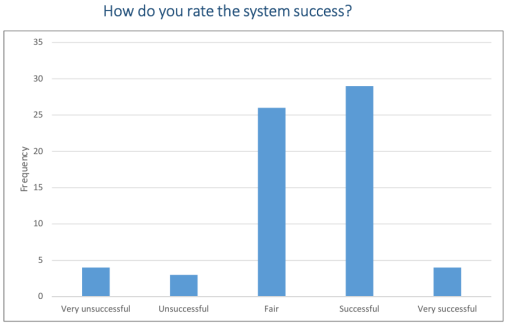

Figure 4: General Question on the System Success

6 CONCLUSION

This research tested the End-User Computing Satisfaction model on the e-court system with a survey sample of 66 respondents. Findings revealed that the main constructs of EUCS, such as content, accuracy, format, ease of use, and timeliness, are valid and reliable for measuring end-user satisfaction with the e-court systems. Further data analysis showed that end-users were mainly satisfied with the current e-court system implementation, and the majority considered it a successful system for the case management process in courts.

The presented findings aim to contribute to justice digital transformation and implementation of e-court systems. Results help to understand the users' perspective and their satisfaction with different aspects, which helps the future vision of how to design the system, for example, how users can be satisfied with the content, the format of the data to appear, how easy to be designed, and make the EUCS model relevant for the electronic court systems both practically and theoretically.

6.1 Limitation

The time limitation and low response affected the data collection phase, and it seems that initially, users were not very interested in participating in the questionnaire, mainly because of their limited time and being busy with their daily duties, or it could be due to the reason that they have participated in the different questionnaire as this project is new and researchers and practitioners are willing to investigate it with variety of research studies. Time limitation also bounded authors to not being able for detailed factor analysis between items and more investigation of the users' rate of the questions.

6.2 Future Work

Authors suggest that future direction could be towards having more sample sizes through multiple case studies that have implemented the e-court system so that results would be more generalizable. An additional wish of the authors includes further research on studying

the correlation between factors and a more detailed analysis of the user perspectives on the system.

REFERENCES

[1] Vassilios P. Aggelidis and Prodromos D. Chatzoglou. 2012. Hospital Information Systems: Measuring End User Computing Satisfaction (EUCS). *Journal of Biomedical Informatics* 45, 3 (2012), 566–579. https://doi.org/10.1016/j.jbi.2012.02.009

[2] Rozha K. Ahmed, Silvia Lips, and Dirk Draheim. 2020. eSignature in eCourt Systems. In *Proceedings of 2020 Fourth World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4)*. IEEE, 352–356. https://doi.org/10.1109/WorldS450073.2020.9210309

[3] Rozha K Ahmed, Khder H Muhammed, Ingrid Pappel, and Dirk Draheim. 2020. Challenges in the Digital Transformation of Courts : A Case Study from the Kurdistan Region of Iraq. In *Proceedings of ICEDEG 2020 –– the 7th International Conference on eDemocracy & eGovernment*. IEEE, 74–79. https://doi.org/10.1109/ICEDEG48599.2020.9096801

[4] Rozha Kamal Ahmed, Khder Hassan Muhammed, Ingrid Pappel, and Dirk Draheim. 2021. Impact of E-Court Systems Implementation: a Case Study. *Transforming Government: People, Process and Policy* 15, 1 (2021). https://doi.org/10.1108/TG-01-2020-0008

[5] Rozha K. Ahmed, Khder H. Muhammed, Awat O. Qadir, Soran I. Arif, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. 2021. A Legal Framework for Digital Transformation: A Proposal Based on a Comparative Case Study. In *Electronic Government and the Information Systems Perspective*. Springer International Publishing, 115–128. https://doi.org/10.1007/978-3-030-86611-2_9

[6] Rozha K Ahmed, Khder H Muhammed, Aleksander Reitsakas, Ingrid Pappel, and Dirk Draheim. 2020. Improving Court Efficiency through ICT Integration: Identifying Essential Areas of Improvement. In *Proceedings of ICT4SD 2019 - the 4th International Conference on ICT for Sustainable Development. Lecture Notes in Networks and Systems*, Vol. 93. Springer, 449–461. https://doi.org/10.1007/978-981-15-0630-7_44

[7] Ahmed Al Kuwaiti. 2020. Evaluating Medical Students' Satisfaction towards Library Resources and Services offered at Saudi Universities using Six Sigma approach. *Library Philosophy and Practice* 2020 (2020), 1–27.

[8] Muhammad Azwar, Ika Surandari, and Hasnul Insani Djohar. 2020. Evaluating The Library Website Of The Indonesian Ministry Of Education And Culture Through The End-User Computing Satisfaction (EUCS) Model. *Library Philosophy and Practice* 2020 (2020), 1–19.

[9] James E. Bailey and Sammy W. Pearson. 1983. Development of a Tool for Measuring and Analyzing Computer User Satisfaction. *Management Science* 29, 5 (1983), 530–545. https://doi.org/10.1287/mnsc.29.5.530

[10] Beatriz Valadares Cendón, Juliana Lopes, and Almeida Souza. 2015. A Method for Measuring Satisfaction of Users of Digital Libraries: a Case Study with Engineering Faculty. *Qualitative and Quantitative Methods in Libraries (QQML)* 4 (2015), 11–19.

[11] Lei Da Chen, Khalid S. Soliman, En Mao, and Mark N. Frolick. 2000. Measuring User Satisfaction with Data Warehouses: An Exploratory Study. *Information & management* 37, 3 (2000), 103–110. https://doi.org/10.1016/S0378-7206(99)00042-7

[12] Fred D. Davis. 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly* 13, 3 (1989), 319. https://doi.org/10.2307/249008

[13] Athanasios P. Deligiannis and DImosthenis Anagnostopoulos. 2017. Towards Open Justice: ICT Acceptance in the Greek Justice System: The Case of the Integrated Court Management System for Penal and Civil Procedures (OSDDY/PP). In *2017 Conference for E-Democracy and Open Government (CeDEM)*. IEEE, 82–91. https://doi.org/10.1109/CeDEM.2017.26

[14] William H . DeLone and Ephraim R . McLean. 1992. Information Systems Success : The Quest for the Dependent Variable. *Information Systems Research* 3, 1 (1992), 60–95.

[15] William H. DeLone and Ephraim R. McLean. 2004. Measuring E-Commerce Success: Applying the DeLone and McLean Information Systems Success Model. *International Journal of Electronic Commerce* 9, 1 (2004), 31–47. https://doi.org/10.1080/10864415.2004.11044317

[16] William J Doll and Gholamreza Torkzadeh. 1988. The Measurement of End-User Computing Satisfaction. *MIS Quarterly* 12, 2 (1988), 259–274. https://doi.org/10.2307/248851

[17] European Commission for the Efficiency of Justice (CEPEJ). 2016. *European Judicial Systems Efficiency and Quality of Justice*. Number 24. 178 pages. https://rm.coe.int/european-judicial-systems-efficiency-and-quality-of-justice-cepej-stud/1680788229

[18] Ursula Gorham. 2012. State Courts, e-Filing, and Diffusion of Innovation: A Proposed Framework of Analysis. In *Proceedings of the 13th Annual International Conference on Digital Government Research (dg.o '12)*. ACM, 232–239.

[19] Thair M. Hamtini, Fawaz Ahamd M. Al Zaghoul, and Nizar Mahmoud Mohssen. 2010. An Assessment of End User Computing Satisfaction at a Hospital. *WMSCI 2010 - The 14th World Multi-Conference on Systemics, Cybernetics and Informatics, Proceedings* 1 (2010), 391–396.

[20] Nur Aeni Hidayah, Eri Rustamaji, and Purusotama. 2019. Determining User Satisfaction Factors on University Tuition Fee Systems Using End-User Computing Satisfaction (EUCS). *2018 6th International Conference on Cyber and IT Service Management, CITSM 2018* Citsm (2019), 1–5. https://doi.org/10.1109/CITSM.2018.8674378

[21] Blake Ives, Margrethe H Olson, and Jack J Baroudi. 1983. The Measurement of User Information Satisfaction. *Commun. ACM* 26, 10 (1983), 785 – 793.

[22] Amdan Bin Mohamed, Mohd Rushdan Bin Yasoa, Azleen bte Ilias, and Mohd Fahmi Bin Ghazali. 2006. The Study of End-User Computing Satisfaction (EUCS) on Computerised Accounting System (CAS) Among Peninsular Malaysia Public Universities: A Survey in Bursar's Office. In *International Borneo Business Conference (IBBC)*. 594 – 608. https://doi.org/10.5848/csp.1487.00001

[23] Kari Pikkarainen, Tero Pikkarainen, Heikki Karjaluoto, and Seppo Pahnila. 2006. The Measurement of End-User Computing Satisfaction of Online Banking Services: Empirical Evidence from Finland. *International Journal of Bank Marketing* 24, 3 (2006), 158–172. https://doi.org/10.1108/02652320610659012

[24] T. A. Prasetya, C. T. Harjanto, and Andri Setiyawan. 2020. Analysis of Student Satisfaction of E-Learning using the End-User Computing Satisfaction Method during the Covid-19 Pandemic. *Journal of Physics: Conference Series* 1700, 1 (2020). https://doi.org/10.1088/1742-6596/1700/1/012012

[25] Beny Prasetyo, R. Windi Eka Yulia, and Felisia. 2018. Measuring End-User Satisfaction of Online Marketplace using End-User Computing Satisfaction Model (EUCS Model) (Case study: Tokopedia.com). *Proceedings of the 2017 4th International Conference on Computer Applications and Information Processing Technology, CAIPT 2017* (2018), 1–5. https://doi.org/10.1109/CAIPT.2017.8320710

[26] Purwanto and P. B. Deden Hedin. 2020. Measurement of User Satisfaction for Web-Base Academic Information System using End-User Computing Satisfaction Method. In *International Conference on Advanced Mechanical and Industrial engineering*, Vol. 909. 012044. https://doi.org/10.1088/1757-899X/909/1/012044

[27] W. A. Putera and I. M. Candiasa. 2021. Analysis of E-Learning User Satisfaction itb Stikom Bali using End User Computing Satisfaction (eucs) Method. *Journal of Physics: Conference Series* 1810, 1 (2021). https://doi.org/10.1088/1742-6596/1810/1/012017

[28] Saeed Rouhani, Shooka Zamenian, and Sayna Rotbie. 2018. A Prototyping and Evaluation of Hospital Dashboard through End-User Computing Satisfaction Model (EUCS). *Journal of Information Technology Management* 10, 3 (2018), 43–60. https://doi.org/10.22059/JITM.2019.282572.2362

[29] Özel Sebetci. 2018. Enhancing End-User Satisfaction through Technology Compatibility: An Assessment on Health Information System. *Health Policy and Technology* 7, 3 (2018), 265–274. https://doi.org/10.1016/j.hlpt.2018.06.001

[30] Monika Singh, Ganesh P. Sahu, Yogesh K. Dwivedi, and Nripendra P Rana. 2018. Success Factors for e-Court Implementation at Allahabad High-Court Success Factors for e-Court Implementation at Allahabad High-Court. In *22th The Pacific Asia Conference on Information Systems (PACIS)*.

[31] Janilson Antonio da Silva Suzart. 2013. End-User Satisfaction with the Integrated System of Federal Government Financial Administration (SIAFI): a Case Study. *Journal of Information Systems and Technology Management* 10, 1 (2013), 145–160. https://doi.org/10.4301/s1807-17752013000100008

[32] United Nations. 2018. 2018 E-Government Survey. (2018).

[33] Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis, and Fred D. Davis. 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* 27, 3 (2003), 425 – 478. https://doi.org/10.2307/30036540

[34] Firman Wijaya, Siti Alvi Solikhatin, and CImam Tahyudin. 2021. Analysis of End-user Satisfaction of Zoom Application for Online Lectures. *3rd 2021 East Indonesia Conference on Computer and Information Technology, EIConCIT 2021* (2021), 348–353. https://doi.org/10.1109/EIConCIT50028.2021.9431903

7 APPENDIX

Survey questions for measuring user satisfaction level of e-court system in the KRI adapted from Doll and Torkzadeh's EUCS instrument are presented in Table. 4

Table 4: Survey Questions

Item	Code	Question
PERSONAL		
		1: What is your role in the system?
		2: Please select you IT skill level.
		3: Please select you gender.
CONTENT		
	C1	4: Does the system provide the precise information you need?
	C2	5: Does the system information meet your needs?
	C3	6: Does the system provide reports that seem to be just about exactly what you need?
	C4	7: Does the system provide sufficient information?
ACCURACY		
	A1	8: Is the system accurate?
	A2	9: Are you satisfied with the accuracy of the system?
FORMAT		
	F1	10: Do you think the output is presented in a useful format?
	F2	11: Is the information clear?
EASE OF USE		
	E1	12: Is the system user friendly?
	E2	13: Is the system easy to use?
TIMELINESS		
	T1	14: Do you get the information you need in time?
	T2	15: Does the system provide up-to-date information?
GENERAL		
	G1	16: How satisfied you are with the overall system and its success?
	G2	17: How do you rate the system success?

Appendix 7

[VII]

Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, Aleksander Reitsakas, and Dirk Draheim. The role of digital transformation in fostering transparency : An e-court system case study. In *Proceedings of I3E'2022 - the 21st IFIP Conference on e-Business, e-Services, and e-Society*, volume 13454 of *Lecture Notes in Computer Science*, pages 219–230. Springer, 2022

The Role of Digital Transformation in Fostering Transparency: An e-Court System Case Study

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Abstract. Transparency is a crucial element in the judiciary to promote citizen confidence in courts and ensure fair case administration by court staff. Therefore, digital transformation of courts is becoming a mandatory step to increase transparency by providing a new opportunity for court data to be open, visible, and accessible to the citizen. Digital transformation of courts is initiated through digitizing court processes and implementing e-court systems to enhance transparency, efficiency, and effectiveness of court processes. The objective of this research is to explore the role of e-court systems in fostering transparency in justice administration by delving into the e-court system of the Sulaymaniyah Appellate Court in the Kurdistan Region of Iraq (KRI) as a case study. The analysis was based on the mixed method of both quantitative and qualitative approaches, with a triangulation of multiple data sources including surveys, expert interviews, observations, and document analysis. The results show that implementing an e-court system enhances transparency in the court processes and results in a more efficient and effective court system with improved justice delivery to the public.

Keywords: e-Court · Digital transformation · ICT · Transparency · Kurdistan Region · Iraq

1 Introduction

The concept of transparency is considered one of the key foundations for building citizens' trust in governments [5,9,10,16]. Transparency is referred to as the availability of public data to citizens and engaging them in the decision-making processes to promote democracy and good governance [16]. "Transparency is experienced when citizens' desire for such knowledge is met easily on their terms

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in respect to format, time, location, and level of aggregation, and at an affordable cost" [16], and this transparency can be achieved through the digital transformation of governments. Globally [9,10], governments are increasingly integrating information and communication technologies (ICT) into their processes and shifting towards the implementation of e-government [11,23], aiming to enhance the transparency of government processes. ICT tools tend to positively affect government service delivery processes in terms of increasing transparency in public sector management, and the reduction of the level of corruption [5], as "the digital platform establishes a high benchmark for transparency and accountability" [14]. In the same vein, they increase trust in ICT as a means to solve governmental tasks and trust in the government as a reliable party. As part of the e-government realm, Judiciaries are also engaged in the flow of digital transformation to deliver better justice services to the citizen. Transparency in courts is essential to show the public how court proceedings apply the law and ensure fair justice administration [13,19].

Relevant literature showed that the justice sector is investing in the implantation of e-court systems to ensure transparency and enhance efficiency and effectiveness of court processes [6,8,15,17–19,22,24–26,28,29,32,37]. However, all the available research showed a marginal study. The concrete focus with a systematic study on the impact of e-court systems on increasing transparency remains a research gap to be filled. Therefore, this research aims to identify the impact of justice digital transformation on fostering transparency through delving into the implementation of the e-court system in the Kurdistan Region of Iraq (KRI) as a case study, as no previous studies have been conducted in this area before.

The analysis is based on a mixed-method of both qualitative and quantitative approaches. Results of this research aims to extend the body of knowledge and literature for judiciaries and practitioners concerning the digital transformation in the justice sector, academic researchers, and serve the decision-makers in the Kurdistan regional government towards expanding the project to all other courts in the KRI.

Section 2 presents literature views on the impact of digital transformation on enhancing transparency. Section 3 provides an overview of the case of the e-court system in the Sulaymaniyah Appellate Court in the KRI. Section 4 includes detailed information on the research design, data collection, and analysis phase. Then, Sect. 5 presents the result of the analysis and discusses them. Finally, Sect. 6 delivers concluding remarks with research limitations and future direction.

2 Relevant Studies

The United Nations survey of 2018 emphasizes the importance of trust between government and citizens that can be achieved through principles of "transparency, inclusion, and collaboration" [9]. Transparency is considered a critical key to gaining citizens' trust in government [16]. Recent studies show

that transparency can be achieved in government processes by utilizing technological tools in the government service delivery processes and adopting e-government [9,10,16].

Delivering government services in electronic format offers a new way for citizens to access data and processes easily and transparently. Hence, it positively affects their trust in government and makes "government more trustworthy and making the "right to know" a salient democratic value" [16]. The United Nations survey of 2018 also considered ICT as important tool to enhance transparency by providing a new opportunity for the citizen to access government data and decisions and assess the quality of the processes, which provides an additional resource for the government to engage citizens in policy-making. Moreover, the survey also showed a noticeable shift of governments globally towards Open Government Data (OGD) to increase transparency and referred to as "government information proactively disclosed and made available online for all to access, without restriction" [9]. A further survey of the United Nations of 2020 showed a vital role of ICT during the COVID-19 crisis that allowed keeping societies connected while collecting and sharing health and safety information served governments in making better and faster decisions depending on the analysis of real-time data. Additionally, The survey revised 193 government portals that have used different platforms to share health statuses and reports at a very high level of transparency [10]. Additionally, this latest survey of 2020 outlined the importance of (OGD) and a citizen-oriented approach to ensure greater transparency in the e-government and increases citizen trust by engaging them in the decision-making processes [10]. In broad terms, ICT and technological tools "can be used for the creation of applications and software that increase transparency, reduce corruption, streamline e-procurement, and improve overall governance while minimizing the potential risks" [10].

Hence, within the same flow, judiciaries are integrating ICT tools in court processes through the implementation of e-court systems to increase transparency, ensure better justice delivery and allow the public to access data and contents [19]. Lopucki outlined several benefits of transparency for the justice sector, including "exposing and reducing corruption and impropriety, enhancing legislative control over the courts, apprising the public of the real rules by which they are governed, enabling lawyers and parties to predict the outcomes of their cases, providing a substantial new source of general knowledge, reducing legal malpractice and increasing court-system efficiency" [19]. Furthermore, the Transparency International report explicitly stated that "transparency in the judiciary leads to increased efficiency and effectiveness and promotes confidence in the judicial system and the fair administration of justice" [13]. Also, [28] added that "transparency is assisting individuals in obtaining fair redress in the courts."

Concerning the importance of transparency for judiciaries, relevant studies ensured that digitization of court processes gives possibility to increase transparency and delivers better justice services to the citizen [28,33]. In the study of assessing e-justice smartness and evaluation of public values for the justice

domain, Lupo referred to transparency as a "fundamental value of justice" and defined it as the accessibility to information and procedures in the digital justice systems that can be achieved through the implementation of e-court systems [20]. Relevant studies have a common understanding that digital justice transformation leads to increased transparency in processing court cases. [21] introduced an electronic notification system to increase the transparency in the notification process of the court cases. Moreover, [6] explored a technology integration with court systems and implementation of the new visualization tool to enhance the transparency of court docket and processes. [22] considered an ICT integration to courts as an innovation in managing court cases that tends to increase transparency in the whole process. [32] viewed ICT as a significant key to improving transparency and assisting courts in providing better services. [8] also considered ICT adoption as a potential tool towards openness in government data and justice systems and enhancing transparency in the processes. [24] implemented a remote monitoring system for judges to follow cases emphasized the transparency improvement through the system, and they considered that lack of transparency is a key for late case dispensation. [25] noted that technology integration into court processes increases the transparency of court processes which is essential for courts and the public. [15] outlined the transparency enhancement after implementing the electronic filing system. [26] considered that transparent justice is a key to democracy, as transparent court information systems allow accessibility of citizens to their data. In turn, this transparency in data and processes increases their trust in government and justice systems. [18] added that ICT has a critical role in improving transparency in the judicial institutions to provide an opportunity for data accessibility of legal information. [17], stated that through online court systems, data would be available to litigants, which can increase transparency. [29] also appointed that the implementation of electronic court systems improves the transparency of court processes. [37] considered that transparency is one of the notable benefits of the implementation of decision support systems in the court systems, in addition to providing transparent algorithms in the decision-making processes. And finally, [28] noted that implementation of e-court systems increases transparency and fairness in resolving public disputes.

Relevant studies presented marginal studies on the ICT integration with court processes and transparency enhancement, while the current study presents the role of the e-court system in increasing transparency of the court's daily processes with a systematic and in-depth study through the case of the e-court system in the Sulaymaniyah Appellate Court in the KRI. There is no previous studies have been conducted in this area before.

3 The Case of e-Court System in the KRI

Studies appointed that the initiatives of digital transformation in the KRI started in 2014 with the implementation of the e-court system as a pilot project for the Sulaymaniyah Appellate Court in the Sulaymaniyah city [1–4]. This project

was implemented in 2014 in six stages (planning, system analysis/master plan, prototyping, building infrastructure, piloting, and implementation) and launched in 2016.

The system comprises integrated subsystems to provide smooth and efficient communication and secure data exchange between different parties. The system manages both civil and criminal cases. All the case management processes are digitized through a central database with various functionalities to assist users in performing all daily tasks. In addition to the courthouse users, the prosecution office and police stations use the system for collaborative activities. At the same time, citizens, lawyers, and outside agencies can also access it through a public portal. Figure 1 shows the e-court system of the Sulaymaniyah Appellate Court.

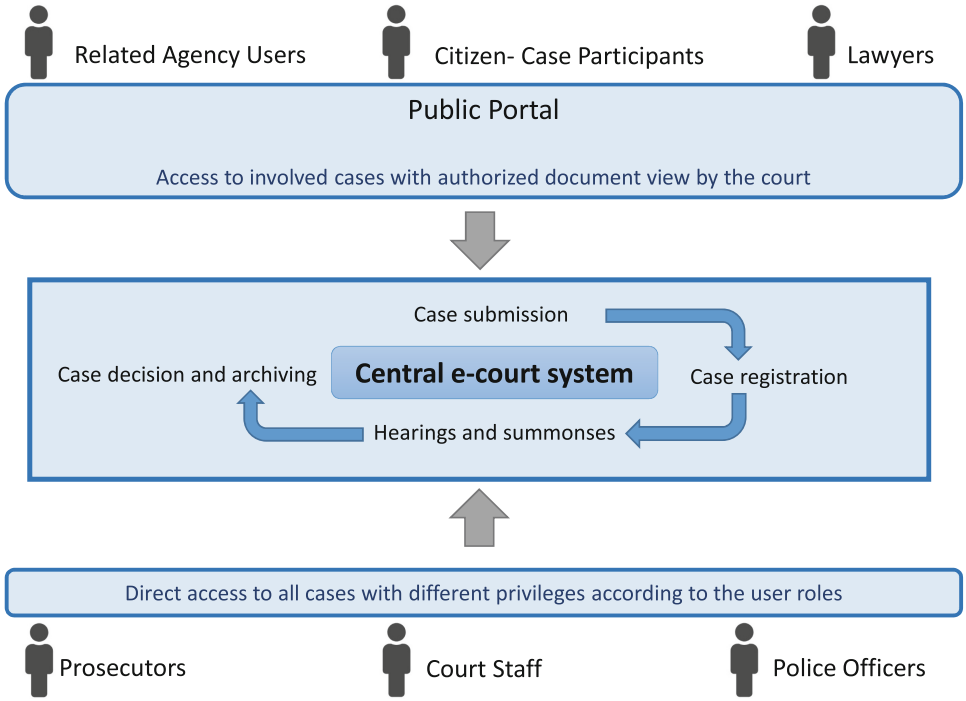

Fig. 1. Sulaymaniyah appellate court system

4 Research Methodology

This study aims to investigate the role of implementing an e-court system in fostering transparency in the court's daily operations. This is through answering the following research question:

Does the implementation of the e-court system foster transparency in court processes?

To answer the research question authors employed an exploratory case study strategy with a mixed method of both qualitative and quantitative approaches [35]. Combinations of qualitative and quantitative methods provide a "richer and stronger array of evidence" [36].

The authors used a triangulation of multiple data sources such as surveys, expert interviews, personal observations, and document analysis to strengthen the result and get a more comprehensive picture of the context by providing various perspectives on the subject.

For the quantitative survey, a questionnaire was designed for the system users, and 66 responses were collected from different roles such as judge, clerk, lawyer, prosecutor, judicial investigator, police officer, and typist who are actively using the system daily. The authors considered this sample valid and generalizable as the total population number of active users is 875; while calculating the margin of error % 12 and the confidence level of % 95 valid minimum sample size would be N = 63.

For the qualitative data, the interview is a significant data source in case study research [35,36] to provide more profound knowledge about the subject from the people who are closely involved in the investigated case. Therefore, the authors interviewed 30 end-users of different roles in the system where the saturation is approached [7,27,31], and with a purposeful sampling technique to focus on the quality of data and information-rich participants [7,27,30]. The interview participants have been informed that the interviews will be anonymous, and their identity will be confidential, they have been informed about the study, its methodology, and procedures clearly and transparently.

Furthermore, both observation types, direct observation, and participant observation [35] were conducted as a reliable source of data to provide an in-depth understanding of the subject more closely [35]. Observation aimed at observing the case workflow before and after implementation of the e-court system to monitor areas of transparency improvements.

Finally, collected data from relevant studies on transparency and digital transformation of courts provided a better understanding of the topic [35,36].

For the analysis phase, the authors used RQDA software for analyzing qualitative data and IBM SPSS Statistics software for quantitative data. Figure 2 shows the research methodology process.

5 Results and Discussion

Transparency is considered a core aspect of justice to ensure gaining citizen trust in court processes and decisions [20,26]. In this regard, respondents assured the importance of transparency for courts through various statements from Judges in different courts, saying: *"Transparency will prevent corruption in judiciaries"*. and *"Transparency in courts and judicial systems is not only important, but it is also obliged by the law"*. Furthermore added by judges from civil courts with stating:

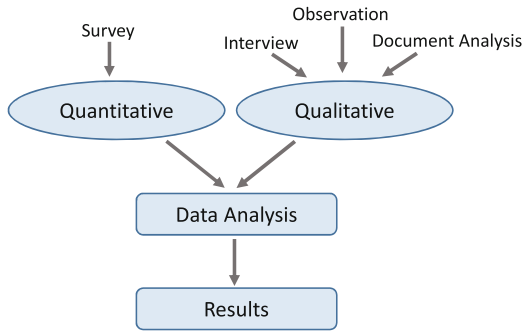

Fig. 2. Research methodology

"Transparency is very important in courts, specifically in civil courts hearings are obliged to be held publicly and transparently, while for the criminal court there are some situations which investigation process should be kept secret". and *"Transparency is one of the key points in justice systems."* Several respondents confirm the same point of view from criminal courts by saying: *"Transparency is important in every field, yet, is more important in courts."* and *"Speaking broadly, as transparency is increased, in turn, citizen trust is increased, and suspicions are decreased side by side."*

As a consequence, judiciaries are approaching new technologies to achieve transparency in courts through integrating different technological tools into court processes and implementing e-court systems to ensure delivering better justice services to the citizens [6,8,22,28,28,29,32,33]. The role of implementing e-court systems in fostering transparency also confirmed by interviewees with number of statements such as: *"With the e-court system, we eliminate corruption and foster transparency."* and *"Transparency which is achieved through digitizing court processes is very important".* Next response added: *"Transparency can be clearly seen in the e-court system. I can say that all system users can notice this improvement in compression to the old conventional system."* And further confirmation with another statement saying: *"e-Court is more transparent and fair, it provides better services to the public and finally, presents a justice without corruption".*

Transparency is seen by many studies as openness of court data and providing a new opportunity for case data, documents, and legal information to be visible and accessible by participants [17,18,20,34]. The current e-court system allows case details and documents to be visible by authorized related users who are case participants to track the case statuses.

Interviewees outlined that the accessibility of case data in the current e-court system has enhanced the court processes' transparency by stating: *"In our system, all necessary data will be visible to participants according to their role equally."* A further respondent said: *"e-Court has improved transparency in a way that case participants are allowed to access their cases from the public portal and track the progress of their cases."*

Furthermore, analysis of data showed that transparency in the current e-court system is not only achieved through visibility and accessibility of data but also transparency enhancement was tangibly seen in case distribution processes that interviewees clearly outline by stating that: *"The most important property in the e-court system is systematic and transparent case distribution."* and *"In the system, transparency is implemented well, more specifically in case distribution"*. And the court president finally added that:

"The case distribution in all courts is now more transparent, systematic and fair." While there were many claims with the previous paper-based system case allocation process due to unfair distribution and manual distribution processes could leave room for lawyers to select the desired judge. The importance of transparency in case distribution over judges is highlighted by [12]. This study also confirms the significance of a transparent case allocation system in the e-court system, which is already achieved in the implemented system. Now judge selection is made automatically, systematically, and visible by lawyers and case participants during the case registration process.

In general, increasing transparency by the current system is visible to all court users, which is also confirmed by a statement from an interviewee by saying: *"Now, transparency is implemented by 95%"*

Moreover, the results of quantitative data analysis of 66 responses of court users showed that the system is now more transparent than a paper-based system. One of the survey questions sought to know the participant's opinions to what extent they agree with the transparency enhancement with the current e-court system. As shown in Fig. 3, the majority of the responses agreed that transparency of court processes is now increased with the current e-court system. In contrast, 21 responses strongly agreed that transparency is now clearly noticeable in the system. Further, 11 participants from 66 stayed neutral and preferred not to show their views on this aspect. However, only three disagreed, and six strongly disagreed with the system's transparency enhancement.

Another question in the survey was about rating the transparency in the current e-court system by the participants. As can be seen from Fig. 4, major responses of 22 participants rated the transparency of the processes in the system as good, while further 19 considered it as very good. Another 17 participants thought that the system's transparency was acceptable, and only 4 participants from 66 responses considered it a poor level, and the last 4 rated it as very poor.

Analysis of quantitative data supported the results from the qualitative data and confirmed that the current e-court system had increased the transparency of court processes. Notably, open question answers showed that almost all participants agreed on the visible transparency enhancement in the case distribution and case data visibility. At the same time, some other responses also added that case statics is now more transparent and robust.

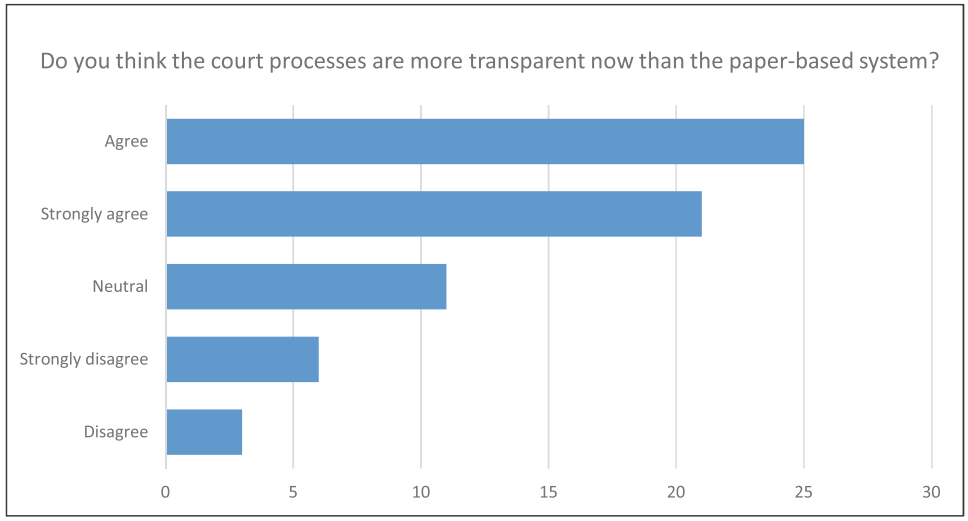

Fig. 3. Participants view on transparency enhancement through the e-court system

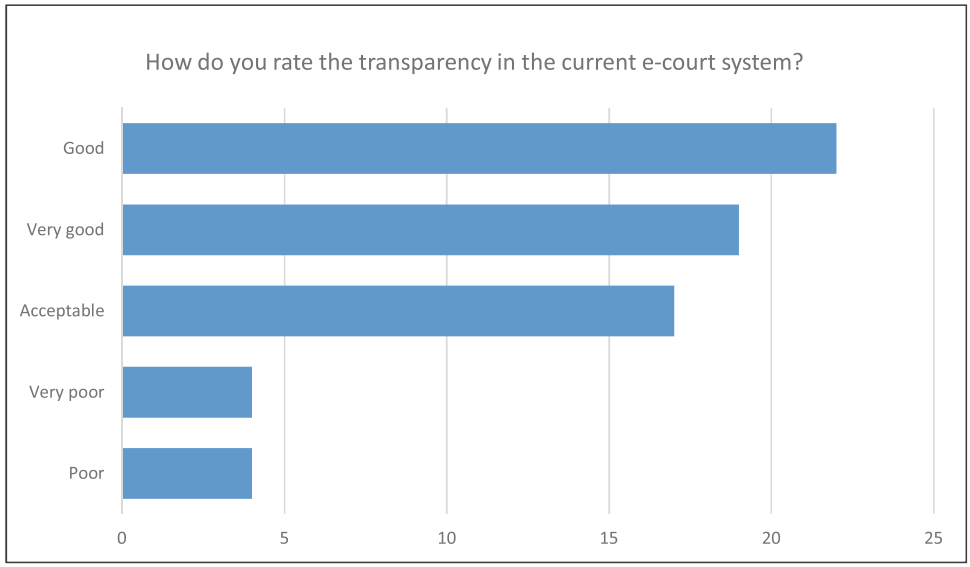

Fig. 4. Participants rate on transparency enhancement through the e-court system

6 Conclusion

Transparency is considered one of the valuable aspects of the justice domain; therefore, judiciaries are using technological tools to deliver more transparent services to the citizen through the digitization of court processes and implementation of the e-court system. This study explored the role of the e-court system in fostering transparency in the court case management processes through the

case study of an e-court system from the Sulaymaniyah Appellate Court in the KRI. Analysis was based on the mixed method of qualitative and quantitative approaches with triangulation of multiple data sources such as surveys, expert interviews, observation, and document analysis. Results revealed that implementation of the e-court system has significantly increased transparency in court processes due to making data open to litigants and case participants. More particularly, transparency in the current system is noticeable through making case data and documents visible and accessible, automatic case distribution on judges, and case statistics. Further results confirmed that court users were satisfied with the notable transparency enhancement in the current system.

The findings of if this research aims to practically serve the decision-makers in the KRI to expand the solution in other courts from different cities and other practitioners who are on the way to implement e-court system. Furthermore, the study aims to theoretically expand the body of knowledge and literature for academic researchers in the justice domain to provide a better overview of justice digital transformation and how the implementation of the e-court systems fosters transparency in courts.

This study's limitations were mainly in the data collection phase due to the lack of available literature on transparency for the justice domain in the KRI. Furthermore, the late response of the participants to the survey and unavailability of interviewees for the interviews have delayed data analysis phase. Future research direction could be towards more detailed analysis to identify more areas of the processes that transparency is increased and further study of the negative views to understand factors and investigate how and why some respondents were not mainly satisfied with the transparency in the system. A further interest of the authors includes more validation and assessments with more scenarios and targeting a wider population for interview and survey.

References

1. Ahmed, R.K., Muhammed, K.H., Pappel, I., Draheim, D.: Challenges in the digital transformation of courts: a case study from the Kurdistan Region of Iraq. In: Proceedings of ICEDEG 2020 - the 7th International Conference on eDemocracy and eGovernment, pp. 74–79. IEEE (2020)
2. Ahmed, R.K., et al.: A legal framework for digital transformation: a proposal based on a comparative case study. In: Kö, A., Francesconi, E., Kotsis, G., Tjoa, A.M., Khalil, I. (eds.) EGOVIS 2021. LNCS, vol. 12926, pp. 115–128. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-86611-2_9
3. Ahmed, R.K., Muhammed, K.H., Reitsakas, A., Pappel, I., Draheim, D.: Improving court efficiency through ICT integration: identifying essential areas of improvement. In: Fong, S., Dey, N., Joshi, A. (eds.) ICT Analysis and Applications. LNNS, vol. 93, pp. 449–461. Springer, Singapore (2020). https://doi.org/10.1007/978-981-15-0630-7_44
4. Ahmed, R.K., Muhammed, K.H., Pappel, I., Draheim, D.: Impact of e-court systems implementation: a case study. Transforming Gov. People Process Policy 15(1) (2021)

5. Bhattacherjee, A., Shrivastava, U.: The effects of ICT use and ICT laws on corruption: A general deterrence theory perspective. Gov. Inf. Q. **35**(4), 703–712 (2018)
6. Chada, D.M., Silva, F.A.: Visualizing Brazilian justice: the supreme court 2.0 project. In: Proceedings of ICAIL 2015 - the 15th International Conference on Artificial Intelligence and Law, pp. 176–180. ACM (2015)
7. Coyne, I.T.: Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? J. Adv. Nurs. **26**(3), 623–630 (1997)
8. Deligiannis, A.P., Anagnostopoulos, D.: Towards open justice: ICT acceptance in the Greek justice system: the case of the integrated court management system for penal and civil procedures (OSDDY/PP). In: Proceedings of CeDEM 2017 - the 2nd Conference for E-Democracy and Open Government, pp. 82–91. IEEE (2017)
9. Department of economic and social affairs: E-Government survey 2018 - Gearing E-Government to support transformation towards sustainable and resilient societies. United Nations (2018)
10. Department of economic and social affairs: E-Government survey 2020 - digital government in the decade of action for sustainable development. United Nations (2020)
11. Draheim, D., Krimmer, R., Tammet, T.: On state-level architecture of digital government ecosystems: from ICT-driven to data-centric. Trans. Large-Scale Data-Know.-Centered Syst. **48**, 165–195 (2021)
12. European commission for the efficiency of justice: European judicial systems - efficiency and quality of justice, CEPEJ STUDIES No. 24. Council of Europe (2016)
13. France, G., Costantino, F.: Transparency of court proceedings. Transparency Int. (2019). https://www.jstor.org/stable/resrep20468
14. Goede, M.: E-Estonia: The e-government cases of Estonia, Singapore, and Curaçao. Arch. Bus. Res. (2), 216–227 (2019)
15. Gorham, U.: State courts, e-filing, and diffusion of innovation: a proposed framework of analysis. In: Proceedings of dg.o 2012 - the 13th Annual International Conference on Digital Government Research, pp. 232–239. ACM (2012)
16. Halachmi, A., Greiling, D.: Transparency, e-government, and accountability. Public Perform. Manag. Rev. **36**(4), 572–584 (2013)
17. Hou, Y., Lampe, C., Bulinski, M., Prescott, J.J.: Factors in fairness and emotion in online case resolution systems. In: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, pp. 2511–2522. ACM (2017)
18. Kurtz, L.P., Santos, P.M., Rover, A.J.: Access to information on websites of Brazilian superior courts of justice. In: Proceedings of dgo 2018 - the 19th Annual International Conference on Digital Government Research Governance in the Data Age, pp. 1–5. ACM (2018)
19. Lopucki, L.M.: Court-system transparency. Iowa Law Rev. **94**(2), 481–538 (2009)
20. Lupo, G.: Assessing e-justice smartness: a new framework for e-Justice evaluation through public values. In: Rodriguez Bolivar, M.P. (ed.) Setting Foundations for the Creation of Public Value in Smart Cities. PAIT, vol. 35, pp. 77–113. Springer, Cham (2019). https://doi.org/10.1007/978-3-319-98953-2_4
21. Luzuriaga, J.M., Cechich, A.: Electronic notification of court documents: a case study. In: Proceedings ICEGOV 2011 - the 5th International Conference on Theory and Practice of Electronic Governance, pp. 45–50. ACM (2011)
22. Machado, M., Sousa, M., Rocha, V., Isidro, A.: Innovation in judicial services: a study of innovation models in labor courts. Innovation Manag. Rev. **15**(2), 155–173 (2018)

23. Pappel, I., Tsap, V., Draheim, D.: The e-LocGov model for introducing e-governance into local governments - an Estonian case study. IEEE Trans. Emerg. Top. Comput. **9**(2), 597–611 (2013)
24. Rahman, A., Nawaz, H., Naeem, O., Zaffar, F., Naseer, F., Zaffar, A.: Finding needle in the case-stack: effective remote monitoring of courts. In: Proceedings of HICCS 2014 - the 47th Hawaii International Conference on System Sciences, pp. 1906–1915 (2014)
25. Reiling, D.: Technology in courts in Europe: opinions, practices and innovations. Int. J. Court Adm. **4**, 11–20 (2012)
26. Rosa, J., Teixeira, C., Sousa Pinto, J.: Risk factors in e-justice information systems. Gov. Inf. Q. **30**(3), 241–256 (2013)
27. Sandelowski, M.: Sample size in qualitative research. Res. Nurs. Health **18**(2), 179–183 (1995)
28. Schmitz, A.J.: Expanding access to remedies through e-court initiatives. Buff. L. Rev. **67**(1), 89 (2019)
29. Singh, M., Sahu, G.P., Dwivedi, Y.K., Rana, N.P.: Success factors for e-Court implementation at Allahabad High-Court. In: Proceedings of PACIS 2018 - the 22th Pacific Asia Conference on Information Systems. AIS (2018)
30. Taherdoost, H.: Sampling methods in research methodology; how to choose a sampling technique for research. Int. J. Acad. Res. Manag. **2**, 18–27 (2018)
31. Vasileiou, K., Barnett, J., Thorpe, S., Young, T.: Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. BMC Med. Res. Methodol. **18**(1), 1–18 (2018)
32. Velicogna, M.: Justice systems and ICT: what can be learned from Europe? Utrecht Law Rev. **3**(1), 129–147 (2007)
33. Watson, A.C., Rukundakuvaga, R., Matevosyan, K.: Integrated justice: an information systems approach to justice sector case management and information sharing. Int. J. Court Adm. **8**(3), 1–9 (2017)
34. Xu, A.L.: Chinese judicial justice on the cloud: a future call or a Pandora's box? an analysis of the 'intelligent court system' of China. Inf. Commun. Technol. Law **26**(1), 59–71 (2017)
35. Yin, R.K.: Case Study Research: Design and Methods. SAGE (2014)
36. Yin, R.K.: Case Study Research and Applications: Design and Methods. SAGE (2018)
37. Zolbanin, H.M., Delen, D., Crosby, D., Wright, D.: A predictive analytics-based decision support system for drug courts. Inf. Syst. Front. **22**, 1–20 (2019). https://doi.org/10.1007/s10796-019-09934-w

Appendix 8

[VIII]

Rozha K. Ahmed, Khder H. Muhammed, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation. *SSRN Electronic Journal*, pages 1–20, 2022

A Legal Framework for Digital Transformation

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Abstract

Information and Communication Technologies (ICTs) provide a modern way of government service delivery to the citizens and enhance the efficiency and effectiveness of the processes. An ICT regulatory framework is crucial for successful digital transformation to ensure legal validity and proper usage of ICT tools and electronic processes. This research proposes a regulatory framework for relevant ICT laws to introduce an e-court system and, beyond, e-government in general in the Kurdistan Region of Iraq (KRI) through a comparative analysis with the case of Estonia. The research employs a qualitative comparative case study approach with collected data from existing literature, legal databases, and all relevant legal documentation of both cases.

1. Introduction

Governments are transforming a conventional paper-based service delivery system to the citizens into a digital format using Information and Communication Technologies (ICT). ICT tools tend to enhance the efficiency and effectiveness of the service provision processes. However, the movement towards digital transformation and integration of ICT with government services requires in-depth analysis and strategy to ensure a clear road-map for successful implementation. It is also important to note that digital inclusion and service provision in electronic format is not only about the application of ICT, but there are other aspects to be considered, more significantly, the reform of relevant laws. Therefore, caring for legal issues is critical to ensure that the necessary regulatory framework exists to enable digital transformation while protecting citizens' rights (Nyman-Metcalf, 2017, 2019) and define the standards of "what can and cannot be done" (United Nations, 2018). ICT laws regulate citizen interaction with ICT by providing a framework for using, sharing, and saving information in electronic transactions, increasing citizen trust towards the validity of transactions, and protecting their privacy and security (Bhattacherjee & Shrivastava, 2018). Therefore,

reforming the law to control the integration of ICT in service delivery is essential for building secure and successful e-government.

This research focuses on developing a legal framework for the digital transformation in the Kurdistan Region of Iraq (KRI), based on the experiences of Estonia as one of the matured countries in the implementation of e-government. The KRI is stepping towards implementing e-government and creating the first e-services with the introduction of court information systems. This project was initiated in 2014 and aimed to digitize court processes to increase efficiency and deliver better justice services. The system was introduced in the Sulaymaniyah Appellate Court in Sulaymaniyah City as the first step. Next, it is planned to be diffused in all other courts in the KRI.

This ICT integration into court processes tends to be used as a pilot project for the digital transformation assessment and future implementation of e-government in the KRI. The e-court system implementation has presented many improvements to the daily processes, such as increasing efficiency and effectiveness of case management process, enhancing transparency in all daily operations, extending access to the judiciary, and providing more security to court cases (Ahmed, Muhammed, Reitsakas, et al., 2020). On the other hand, the lack of a digital signature and the absence of supporting relevant ICT laws are considered significant challenges in this project (Ahmed, Muhammed, Pappel, et al., 2020). ICT laws are very significant for the e-court systems to guide the investigation processes, particularly with criminal court cases, to ensure the validity of electronic evidence and authenticate and legally validate digital signatures and time stamping in corruption cases (Bhattacherjee & Shrivastava, 2018).

As part of the court digitization project, the authors considered legal issues that support the smooth operation of an entirely paperless e-court system. Furthermore, as there is a clear willingness in the KRI to move toward a comprehensive government transformation with the implementation of e-government and prepare for future missions, this research also considers the relevant laws for e-government implementation.

Preliminary results of this work have been presented earlier in (SELFCITATION, 2021); moreover, the current study presents an additional new analysis for the existing laws, with a more comprehensive explanation of e-government development stages, in addition to new materials on the practical implementation of the framework.

Therefore, this research aims to propose a legal framework for ICT laws that helps the digital transformation process in the KRI, both the e-court system as domain-specific laws and general e-government laws and establishes a guideline for the application process of the proposed framework.

The authors employed a comparative analysis with a case-based approach. They investigated both Estonia and the KRI cases from a legal perspective through analysis of the existing literature, a revision of all legal documents and laws relevant to the ICT and digital transformation in both cases.

The second section presents an overview of the relevant studies on ICT laws and their importance in digital transformation. The third section presents research questions and methodology. Then, the fourth section provides a general description of the e-court systems of both Estonia and the KRI. The fifth section presents an overview of e-government, its definition, main enablers, and development stages. Then, the sixth section presents relevant legislation for both domain-specific and general laws in Estonia and the KRI. The seventh section presents the outcome of the analysis as a framework for the necessary ICT laws and the practical application of the framework. Finally, the research will be concluded with research limitations and future directions in the last section.

2. Relevant Studies

Relevant studies since 2003 have considered establishing an ICT legal framework as a priority task in the government's digital transformation plan (Kiškis & Petrauskas, 2003; Saarenpää, 2003).
Saarenpää considered that even with the difficulty of the legal framework to support conventional paper-based systems, it gets more difficult with the introduction of e-government due to the uncertainty of the contents of the e-government. Therefore, multi-level analysis was suggested for understanding the e-government processes and components from the legal perspectives to establish a new legal framework that complies with the state constitution, and citizens' rights must be well protected (Saarenpää, 2003).

With the recent advancements of ICT tools and rapid diffusion of digital transformation, reforming relevant laws became the primary enabler for the smooth implementation of e-government and enhancing the efficiency and usage of government services (Sarantis, 2017). Hence, technological tools are not the only player in government transformation. Therefore, ICT relevant laws are also needed to regulate the accessibility and usability of technologies when delivering government services in electronic format, give legal validity to electronic communications, and ensure the success of e-government adoption (Albrecht & Novak, 2021; Garad & Qamari, 2021). The United Nation's government survey focused on the legal framework for digital transformation. Accordingly, it concerned the cybercrime law and defined it as "legal measures that allow governments and other stakeholders to define basic response mechanisms to cyberattacks, including within e-government systems" (United Nations, 2018). Furthermore, Lentner & Parycek explored the e-government component from a technical view and considered electronic identities (eIDs) and electronic signatures as key players to identify entities in the digital environment. However, laws to ensure the authenticity and legal validity of entities and the signatures during online communication are a desperate need (Lentner & Parycek, 2016). (Khan et al., 2020) examined 83 countries and found that the existence of the ICT laws is significant for achieving a broader diffusion of ICTs and their usage among citizens and improving well-being. They reported that, as ICT law regulates and protects bad and destructive usage during electronic transactions through IT standards, it increases citizens' trust towards the ICT usage and online services through the Internet by ensuring the protection of their data, privacy, and security. Additionally, they noted that more matured ICT laws positively affect ICT diffusion in the country and more citizens' intention to use it. (Glyptis et al., 2020) noted that the existence of the legal framework ensures the success of the e-government adoption plan by the country, as laws define the legal basis and manners for the digital transformation process. Additionally, (Wierzbowski et al., 2021) on the transformation of the governments to the e-state and delivering government services in digital formats and implementation of e-adminstration systems, the"implementation of a regulatory framework in practice" is a crucial aspect that needs to be improved by governments. Moreover, with the digital revolution and introduction of digital coins, blockchain, and distributed ledger technologies, (Silva, 2020) stated that legal framework is critical to ensure "legal certainty of processes" and mitigate relevant problems to data integrity, data protection, data privacy, and information security in the digital environment.

It can be seen that almost all studies have a common understanding that the protection of users' rights is the most critical aspect in the digital world. Therefore, laws should be very solid to preserve security and privacy for citizens' data; consequently, increasing citizen trust in online services guarantees the usage and success of the e-government implementation (Almatarneh, 2011; Khan et al., 2020; Paskaleva-Shapira, 2006; Posch et al., 2011; Saarenpää, 2003; Sarabdeen et al., 2014; Silva, 2020; Srivastava & Teo, 2005).

On the other hand, particular studies focused on the e-court systems and justice domain (Henning & NG, 2009) concerned with the importance of a legal framework for relevant justice e-projects to legitimize the electronic processes in courts, such as video conferencing. (Bhattacherjee & Shrivastava, 2018) empirically investigated ICT influence on the level of corruption in court cases. Their study found that ICT tools help identify and mitigate corruption risks. However, they noted that the existence of the ICT is not adequate alone. Still, the availability of solid ICT laws is necessary to control the validity of electronic evidence in

criminal cases relevant to corruption. (Andrade et al., 2012), analyzed the e-government implementation and usage of ICT tools for the judiciary system and confirmed the significance of the legal framework to ensure valid case management processes in electronic court systems.

A strategic vision is needed for each country to introduce a legal framework for new policies, regulations, and relevant ICT laws as needed when digital transformation is planned. The current research develops a new framework for the necessary ICT laws to allow the smooth operation of e-court systems and the establishment of e-government in the KRI.

3. Research Methodology

Regarding the digital transformation of governments, there should be a state strategy, action plan, and analysis of the current state of affairs, allowing us to know where we are and where we need to be. However, this is not a one-step process; it requires long-term planning and even sector-specific strategies (Lips et al., 2019). The legal aspect is considered one of the significant steps that should be taken at the beginning of the process, i.e., as soon as the government decides to move toward digital transformation. Providing government services in electronic format requires an ICT infrastructure such as internet connection, digital identity to authenticate actors in the system, databases, electronic forms of data to be transmitted and archived, as well as integrated information systems from different governmental sectors such as health, education, and justice among many others. Laws are critical to defining the standards and parameters for these components' legal and valid usage together. However, there are some issues relevant to the legal framework to be clarified, such as:

- The potential absence of a proper understanding of introducing the necessary new laws and what amendments need to be done to existing ones.
- The legal framework from one country may not be easily transferable to another country due to the differences in their structure and legal systems.
- An analysis of components of e-government is needed. Consequently, each specific part may need a particular law or regulation and policy to support its proper usage, which means no single law or regulation applies to all information systems. Therefore, each particular information system needs a separate analysis.

This research focuses on the Estonian experience and presents possibilities for transferring the knowledge to the KRI through a legal analysis of both cases. The Estonian case has been selected because the country already has a legal framework that supports e-government, and Estonia has implemented a successful e-court system. The KRI is taking the first steps towards e-government by implementing its e-court system. Therefore, comparing two different practices helps identify the existing gaps in the KRI case.
The research conducts a two-step legal analysis, exploring the legal framework for ICT laws needed in the e-court systems and how it is connected to the legal framework of e-government. Furthermore, it is possible to make a second step analysis and show how different information systems can have their laws and regulations while being a part of the e-government infrastructure.

Therefore, this paper answers the following research questions;

- What are the necessary ICT laws for the e-court system in the KRI as a specific part of the e-government realm?
- What are the necessary ICT laws for the e-government implementation in the KRI?
- How can the new ICT regulatory framework be established in the KRI?

This research uses a qualitative, analytical comparative case-study approach (Agranoff & Radin, 1991; Yin, 2011). This strategy analyzes and compares practices in Estonia and the KRI's different contexts and jurisdictions. Fig.1 presents the research design. In both cases, two types of sources will be analyzed: (i) legal databases and other types of necessary rules and (ii) existing literature and other available documentation (i.e., official documents of public organizations). Based on this, it is possible to determine whether new laws or other forms of rules are needed or existing ones shall be amended – or perhaps, no change is needed other than a different interpretation.

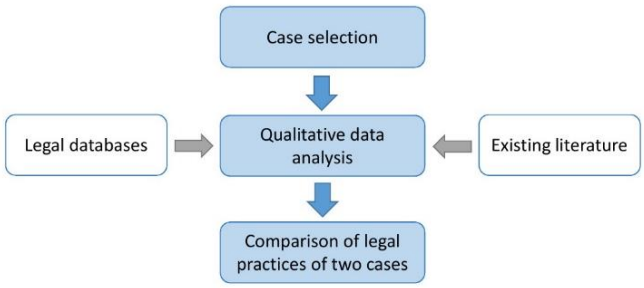

Figure 1. Research design

4. Digital Transformation of Courts

4.1. Implementation of the Court Information System in Estonia

Estonia implemented its court information system in 2005 for all court types, including the first and the second instance and the Supreme Court (Somer, n.d.). The Estonia court information system is named e-File system; it manages all civil, criminal, and administrative cases. Furthermore, to achieve more efficiency in collaborative activities, the system is integrated with other systems such as the Police Information System, the Prison Information System, and the Criminal Case Management Register through the Public Prosecutor's Office, as presented in Fig. 2.

Each actor in the system is authenticated through an ID card to allow usage of e-services; access is provided with different rights depending on the user's role. Information is securely exchanged between different case participants.

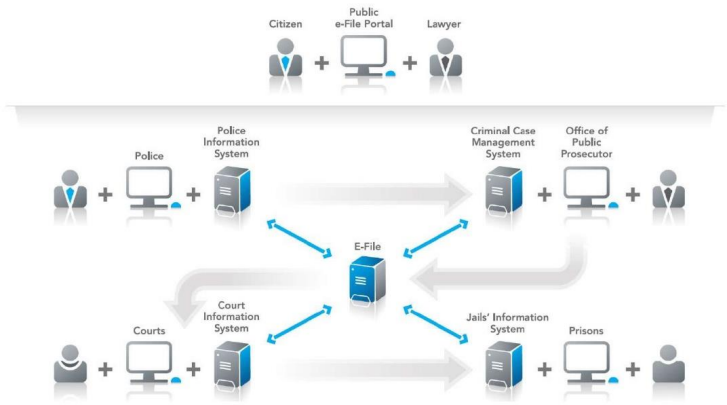

Figure 2. Estonian e-file system (Somer, n.d)

4.2. Implementation of the Court Information System in the KRI

The first court information system in the KRI is implemented in the Sulaymaniyah Appellate Court in Sulaymaniyah city as a first pilot project (Ahmed, Muhammed, Reitsakas, et al., 2020). This project started in 2014 and went live in 2016 through different stages (planning, system analysis/master plan, prototyping, building infrastructure, piloting, and implementation). The e-court system manages all jurisdictions of civil, and criminal cases and processing court certificates and other court transactions. The collaborative activities are achieved between different participants securely and efficiently through a central database system, and data is exchanged between courts, prosecution offices, and police stations. In addition, the system is equipped with a portal to allow public participants such as citizens, lawyers, and related agencies to access the system and involve in the case management process, as presented in Fig. 3.

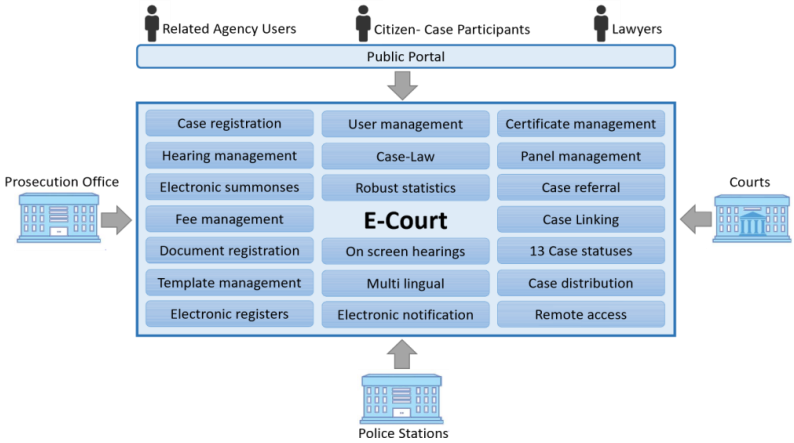

Figure 3. Kurdistan e-court system

While the system has increased the efficiency and effectiveness of court processes, in contrast, several challenges were identified during the implementation before the system could be extended to other courts. The lack of a digital signature and the absence of a legal framework and supportive laws were considered significant issues (Ahmed, Muhammed, Pappel, et al., 2020).

5. Digital Transformation of Governments

5.1. E-Government

The term e-government is widely used nowadays with various definitions. A general common definition of e-government could be the use of technological tools to enhance government performance, transparency, efficiency, citizen trust, and provision of high-quality services through a single shared infrastructure across the entire private and public governmental sectors, made up of integrated systems with an interoperable data exchange layer (Goede, 2019; Kalja et al., 2005; Kalvet, 2012; Kitsing, 2010; Nyman-Metcalf, 2017; Wirtz & Daiser, 2018).

Successful implementation of e-government relies on different elements. The eGovernance Academy of Estonia categorizes these elements into two main sets that complement each other, i.e., "digital elements" and "analogue elements." (Astok, 2017).
Successful implementation of e-government and data exchange layer can be achieved through several prerequisites, i.e., the existence of a legal framework, systematic efforts in building citizens' awareness, political will, availability of technical resources, the existence of a well-defined identity principle, systematic efforts in building capacity and skills, sufficient power of the governing authority, presence of valuable digital assets such as digital records and information systems, support from IT industry, availability of financial resources, and a higher level of agreement between the involved organizations (Saputro et al., 2020).

Concerning the development of e-government, current studies share a common understanding that development is not just a single process but goes through different stages (Fan, 2018; Layne & Lee, 2001; Moon, 2002; Zarei et al., 2008).
(Layne & Lee, 2001) have defined a four-stage model that shows the growth phases starting from basic steps with the presentation of information to the stage of transactions by the citizen and ending at vertical and horizontal integration to end up with the full government transformation. Further models developed by (Moon, 2002) consist of five stages of development. This model also starts with presenting information to become more complicated with a final step that allows all stakeholders' participation. Moreover, as the implementation of e-government is experienced more and more worldwide, the development stages have also become more detailed, as presented by (Zarei et al., 2008), with a nine-stage model that starts with building infrastructure and concludes with final integration and transformation of the government. These different models are presented in Fig. 4.

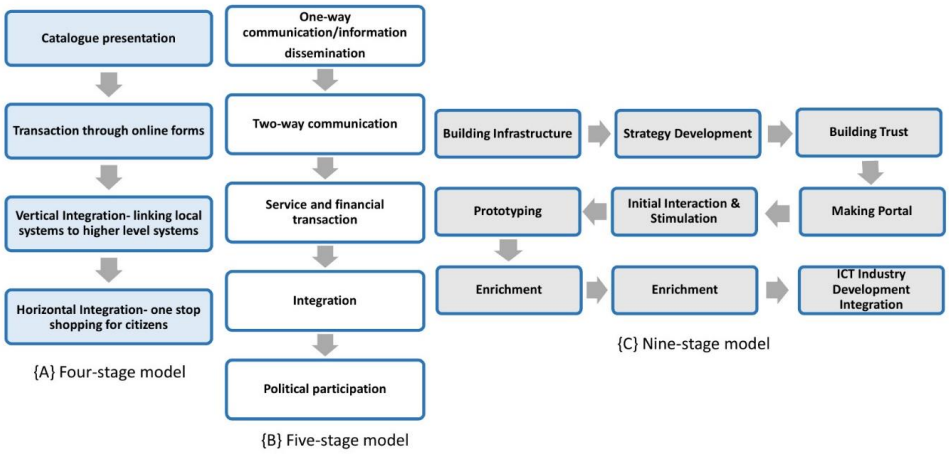

Figure 4. E-Government development models (Layne & Lee, 2001; Moon, 2002; Zarei et al., 2008)

E-Government implementation enhances governance efficiency and effectiveness through technological tools (Fan, 2018; Wirtz & Daiser, 2018). On the other hand, technology usage might expose different risks, and challenges than the traditional paper-based system, such as security risks, data protection, privacy issues, etc. (Layne & Lee, 2001) consider these challenges as significant factors and suggest legislative analysis to mitigate these risks. Therefore, legislation plays a crucial role in regulating the usage of technology and electronic transitions. Furthermore, the working procedures of e-government have to be valid and legally equivalent to the paper world procedures; furthermore, online transactions' legal validity ensures citizen trust towards electronic services (Rikk & Roosna, 2016).

Additionally, governments should consider failure and attacks of the infrastructure, liability of the systems, integrity of the data and, individual privacy issues as crucial factors. At this point, laws and regulations can determine the boundaries of the proper administration of electronic government, minimize the potential risks, and protect stakeholder rights. Therefore, it is essential to engage legal experts in the early stages of planning for e-government implementation to avoid future obstacles that create barriers for successful implementation and usage (Nyman-Metcalf, 2019; United Nations, 2018).

5.2. E-Government in Estonia

Estonia is confirmed by the United Nations survey with a high E-Government Development Index (EGDI) (greater than 0.75) (United Nations, 2018). In addition, Estonia has recorded notable success stories in e-Government (Kalvet, 2012). In 2001, Estonia started implementing e-government and developed a platform for providing e-services with a secure data exchange layer called "X-Road" that connects decentralized governmental databases to provide access to the state information systems through a single public portal (Dirk Draheim, Kaarel Koosapoeg, Mihkel Lauk, Ingrid Pappel, Ingmar Pappel, 2016; Ingrid Pappel, Ingmar Pappel, Jaak Tepandi, 2017; Karoline Paide, Ingrid Pappel, Heiko Vainsalu, 2018; Nyman-Metcalf, 2019; Valentyna Tsap, Ingrid Pappel, 2017).
X-Road was implemented step-by-step through different versions once the state was ready from the legal and organizational perspective (Kalja et al., 2005). The main goal was to increase transparency in governance (Goede, 2019) to achieve a higher quality of service delivery while considering citizen

democracy and participation (Kitsing, 2010) as well as providing a "fully integrated one-stop-shop" for almost 99 percent of e-services (United Nations, 2018). Fig. 5 presents Estonian e-government architecture.

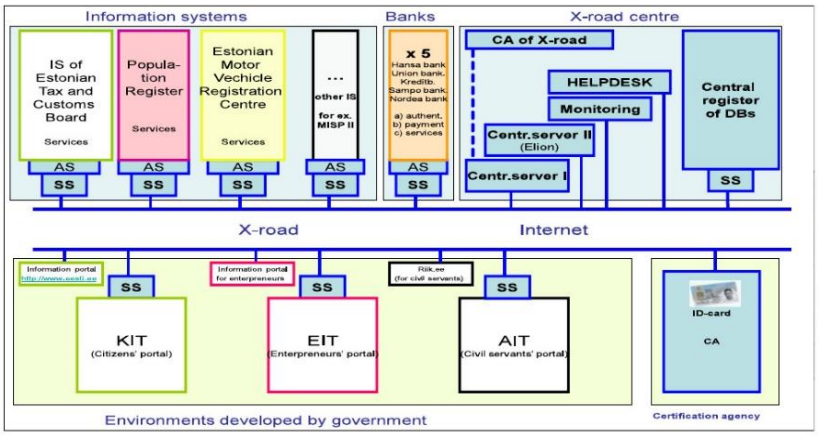

Figure 5. E-Government architecture (Ahto Kalja1 & Vallner, 2015)

5.3. E-Government in the KRI

The KRI is located in the northern part of Iraq and has four provinces, Sulaymaniyah, Dohuk, Halabja, and Erbil, the latter being the capital city. The KRI formed an independent administration in 1992, and independent Parliament and judicial system were established.
The KRG has planned to move towards digital transformation since 2014. According to the information obtained from the KRG office, during the last years up to now, the following projects have been initiated, and they are continuously progressing:

- Mapping public services: the project allows the government to identify the number of services provided to the citizens to prepare them in digital format for improving service delivery with less bureaucracy. Moreover, creating a one-stop-shop for providing information and guidelines about the services through a public portal.
- Implementation of eID: this project will establish a plan for future implementation of a unique digital identity. The project started with registering the biometric data of all citizens. However, this project will be a long-term plan of reform consisting of different phases. In the initial phase of the biometric registration system, data were collected, stored, and validated. The outcome improved government wage-earners' salary payment in a scalable and centralized biometric system. The future mission will be directed towards establishing a unique Electronic Identity Card.
- Building pilot information systems: The purpose is to deliver better services to the citizen through the implementation of different information systems. One crucial component of an e-government structure is the availability of integrated information systems to allow digital transactions and electronic data exchange between different sectors. In this regard, the Court Information System is built as a first pilot project. The outcome of this project serves by providing a future vision for expansion. However, addressing the challenges before moving to the next information system is a significant task to be considered.

- Building ICT infrastructure: recent updates from the KRG office emphasized the preparation of ICT infrastructure for e-government implementation. They started by creating appropriate data-centers equipped with necessary and modern hardware devices in the Erbil city as initiatives for digital transformation and future digital inclusion.

6. Digital Transformation and Relevant Legislation

This section focuses on the relevant legal framework of Estonia and KRI cases. First, to identify specific laws that regulate e-court system processes and then conduct further analysis to identify general laws that regulate e-government.

6.1. The Case of Estonia

It is clear from the literature that Estonia has not created too many laws regarding e-government. This is a deliberate decision by the relevant decision-makers, as specialized legislation on e-government risks creating a parallel system that the government wants to avoid. A further reason can be that Estonia is a member of the European Union (EU), and EU law applies fully to Estonia (including e-government related regulations such as eIDASi and GDPRii.
It is also essential to distinguish between three types of legal acts: laws, which are legal acts issued by the Parliament of Estonia, legal acts adopted by the government, and legal acts issued by different ministers. As in any jurisdiction, laws are the most important, and other legislation must be in accordance with the law. However, for e-government, many rules are found in other instruments than laws.
Regarding domain-specific laws, several specific acts to the court system regulate the e-court system and digital information exchange in the court procedures. Fig. 6 presents Estonian e-court-related legal acts.

Figure 6. E-Court specific legislation

The Courts Act establishes a court information system. The system aims to organize the work of courts, collect statistics, collect and systematize decisions, and make them available to courts and the public (Riigikogu, 2002b). The Code of Criminal Procedure (Riigikogu, 2004a). The Code of Misdemeanour Procedure (Riigikogu, 2002a), the Code of Administrative Court Procedure (Riigikogu, 2012), and the Code of Civil Procedure enable the processing of digital documents and evidence in the specific procedure in the information system (Riigikogu, 2006). The Code of Civil Procedure and the Code of Enforcement Procedure Implementation Act sets the information system requirements (Riigikogu, 2005a).

One of the most relevant provisions is establishing an e-file system and e-file system statute that enables digital data storage, management, access, and security requirements (Government of the Republic of Estonia, 2008a). Other legal acts named in Fig. 6, issued by the Minister of Justice, specify different data-related procedures, relations, and communication between other information systems.

Moving on to the general laws, significant laws allow the smooth electronic transaction and data transfer in e-government in Estonia. Information Society Services Act provides the basic requirements for the information society service providers (Riigikogu, 2004b). Information society services are transmitted, conveyed, and received by electronic means of communication. In addition to the previously named comprehensive Act, the authors identified four main categories of e-government related legal acts: legal acts related to e-government infrastructure, eID, electronic data management, and business continuity management. Fig. 7 presents the essential e-government-related laws in Estonia.

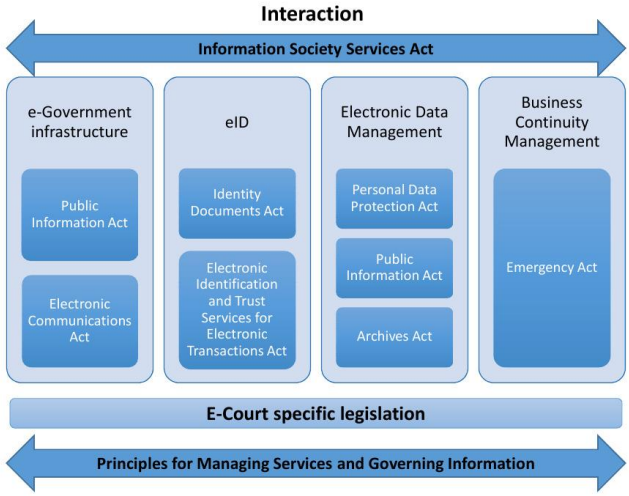

Figure 7. E-Government related laws

- Public Information Act aims to ensure that every person has access to public information. It is also the basis for establishing and administering databases and their supervision (Riigikogu, 2001). This Act has been in force since 2001 and provides a basic regulatory framework for e-government infrastructure and electronic data management. Consequently, the following three Government regulations are derived from the Public Information Act.

    - Information Systems Data Exchange Layer: this regulation is in force since 2016 and contains requirements for the data exchange layer of information systems (also called X-Road), its usage, and management (Government of the Republic of Estonia, 2016) .
    - Information Systems Security Measures system: this regulation is created to manage the security of different public sector information systems and has been in force since 2008 (Government of the Republic of Estonia, 2008b).
    - State Information System Management: this regulation has created the main principles of state information system management and in force since 2008 (Government of the Republic of Estonia, 2008c).
- Electronic Communications Act has been in force since 2005 and establishes the necessary conditions for developing electronic communications and promoting electronic services (Riigikogu, 2005b).
- Identity Documents Act states the requirements for all identity documents (including digital documents, eIDs) issued by the Republic of Estonia and in force since 2000 (Riigikogu, 2000b).
- Electronic Identification and Trust Services for Electronic Transactions Act regulates electronic identification and trust services for electronic transactions. More specifically, the Act contains requirements for the trust service provider and its supervision. It is in force since 2016 (Riigikogu, 2016).
- Personal Data Protection Act states the main data protection principles of natural persons (Riigikogu, 2018) .
- Archives Act is relevant for managing, organizing, and preserving archival records (including digital records) (Riigikogu, 2000a).
- The emergency Act ensures the continuity of primary services during emergencies. According to this Act, digital identification and digital signing are vital services. The Act has been in force since 2017 (Riigikogu, 2017).

These e-governance-related acts complement each-other and influence e-court specific legislative acts. It should be noticed that these acts do not deal only with digital or e-government-related matters but also cover, for example, protection of or access to paper-based data, archiving of traditional forms of data, and so on. They, however, contain the necessary provisions for e-government and the e-court.

6.2. The Case of the KRI

The KRI generally follows the Iraqi legal system, and some laws of the Iraqi government are used in the KRI. However, the KRI has an independent judicial system, government, and Parliament, so there is a set of laws issued by the Kurdistan Parliament. The legal pyramid is the traditional one, consisting of the constitution, which forms the basis of laws. Laws which are passed by the Parliament about a particular subject. The next stage consists of regulations that are detailed by the Council of Ministers or a specific ministry. Finally, a specific ministry or institution issues instructions, policies, and orders based on a particular law to regulate a specific issue relevant to that sector. None of the regulations, instructions, and orders should contradict the primary laws in the hierarchical formation.

Considering the relevant laws for an e-court system, no law exists to support and regulate the electronic court system's operation. Hence, the current implemented court information system in the Sulaymaniyah Appellate Court is designed to operate with old existing laws that govern the physical world. However, the system is very flexible and can adapt to new changes easily. Today courts function through an e-court

system, while all documents generated from the system are printed, signed, and scanned back to the system due to lack of a digital signature and laws to support this. (Ahmed, Muhammed, Pappel, et al., 2020).

Furthermore, from analysis, It is found that the primary laws that are used in courts for solving court cases are very old laws meant to govern the paper world and do not support technological advancements and usage of e-court systems. Examples of these laws include the Criminal Procedure Law, the Civil Procedure Law, the Civil Law, the Penal Code, the Labour Law, the Personal Status Law, the Evidence Law, the Civil Status Law, the Care of Minors Law, the Juvenile Welfare Law, and the Penal Code for the Internal Security Forces (The Supreme Judicial Council of the Republic of Iraq, 2015).

Moving on to the general laws for e-government, only one ICT relevant law exists that is used and issued in the KRI, as described in the following:

- Law of Banning the Misuse of Communication Devices describes the era of technology and how communication mediums such as phone devices, electronic mail, social media, and related issues can be appropriately used, and what punishment will be the consequence for the wrong usage and crimes committed through them, it is in force since 2008 (The Kurdistan Parliament of the Federal Republic of Iraq, n.d.).

Furthermore, from analysis, two other laws found in the Iraqi Federal Government laws are relevant to ICT. However, these laws are not used in the KRI such as,

- The Electronic Signature and Electronic Transactions Law is in force since 2012 and governs the validation of electronic signature and electronic transactions; however, it excludes the courts (The Supreme Judicial Council of the Republic of Iraq, 2015).

- Cybercrime Law was passed in 2011 by the Iraqi government. However, the law is not in force yet. This law is aimed at providing legal protection for the usage of communication devices and networking. Hence, it defines the different punishments for cyber-related crimes done through the use of limited communication mediums (The Supreme Judicial Council of the Republic of Iraq, 2015).

7. Findings

In broad terms, when transferring the experience and knowledge of digital transformation from one country to another, it is essential to define a strategy and plan according to this particular area's needs. For example, Technology-wise, transferring know-how and infrastructure design is manageable aspects. In contrast, the legislative part relevant to ICT and the implementation of e-government is a more sensitive area that cannot be copied from one country to another, as legal structures differ. Consequently, when any country plans the digital transformation, an intensive legal analysis plan is needed to establish a clear ICT regulatory framework while considering the avoidance of over-regulation issue, as new laws could be not required for every aspect, but amendments in existing laws might fit the needed changes.

This section presents our analysis results by providing an overview of the essential laws needed to regulate technology usage concerning the e-court system and how to start regulating e-government implementation in the KRI. The outcome will be a proposal for a legal framework for the KRI, and this study also presents the guideline for practical implementation of the framework in the KRI.

Information systems are one of the components of the e-government infrastructure; therefore, relevant ICT laws that govern the operation of e-government at a higher general level will apply to all information

systems in different specific domains. However, each specific domain needs relevant regulations and policies that ministries can define.

7.1. Domain-Specific Laws

For every specific domain, the establishment of related ICT laws requires a deep analysis of that domain, as no new laws may be needed for every aspect, but existing regulations and policies could be sufficient.

Concerning this study, the authors investigated the laws relevant to the operation of the e-court system and found that the daily operation of courts and the case management process mainly relies on two types of laws they are procedural laws for organizing court operations and substantive laws for defining how to solve disputes in courts. Electronic transactions and processes in the e-court system are directly related to procedural laws, such as Civil Procedure Law, Evidence Law, and Criminal Procedure Law. These laws' analysis shows that they need amendments to support the process of case management, starting from the claim submission, electronic hearings, video conferencing, and electronic notifications to the final stage of the case disposal with decision generation in the e-court system.

7.2. General e-Government Laws

To establish the ICT regulatory framework for the implementation of e-government in the KRI, authors identified essential key enablers for the digital transformation with necessary legislations in the following points:

Electronic Identity Document: eID is considered a significant enabler for the digital transformation to identify citizens uniquely and authenticates their digital signature in electronic transactions. Therefore, a new law needs to be created to regulate electronic identification and trust services while giving legal validity to the digital signature equivalent to the manual signature and defining the rights and obligations for using the signature (Kim, 2019).

Interoperability: electronic transactions and data exchange between interconnected registers are core functionalities in the e-government environment. Concerning the interoperability, the following changes are needed:

- Electronic Transactions Law needs to be created. While this law does not exist in the case of Estonia and is not advisable for advanced countries because amendments in the existing laws might be sufficient, however, for the KRI case, authors suggest it. This law can regulate the business process organization to fit ICT tools.
- Electronic Payment Law need to be created to regulate the payment processes and validate the electronic payments in the electronic environment and banks
- Access to Information Right law exists and was issued by the Kurdistan Parliament in 2013 (The Kurdistan Parliament of the Federal Republic of Iraq, n.d.). The law defines the rules for accessing public information from governmental institutions; therefore, it can be amended to suit the electronic information access from databases in an electronic government environment.
- The Archiving Act needs to be created to regulate the archival of electronic data and government documents to organize their access, preservation, and protection.

Cybersecurity: security is a crucial aspect in digital transformation as due to the provision of public services in electronic format, massive amounts of data are created, exchanged, transferred, shared, and stored. Hence, security concerns such as privacy, individual data protection, confidentiality, trust, service continuity, cyber-attacks, data integrity, identity protection, and authentication will become very important issues in e-government. Legal measures allow defining reaction mechanisms to these cybersecurity aspects by adopting a" harmonized set of laws" that can guarantee the proper usage of ICT (United Nations, 2018). From this viewpoint, it can be seen that the followings changes are needed in the case of the KRI:

- Prohibiting the Misuse of Communication Devices Act exists and limits the usage of some electronic devices illegally. Therefore, it can be amended to guarantee the valid and proper usage of ICT tools together in e-government infrastructure as well.
- The Personal Data Protection Act needs to be created to ensure individuals' privacy and data protection when using e-services.
- Cybercrime Act needs to be created to define the rights and obligations of services providers and parameters for cyber incidents, privacy, and systems liability. However, an alternative solution could be amendments in the Penal Code to support the security protection of information systems and cybercrimes. But, this option would less suit the case of the KRI, even if amendments are more advisable than the creation of new laws. Therefore, creating separate cybercrime laws is more recommended by the authors for two reasons; first, the difficulty in changing the laws created by the Iraqi government, this Penal Code No.111 was created in 1969 by Iraq. Second, relevant laws to crimes are not combined in one law; it's difficult to cover all changes.

Based on the analysis, this research proposes the following legal framework, as presented in Fig. 8, for the relevant ICT laws that facilitate establishing an e-court system and e-government for the KRI case.

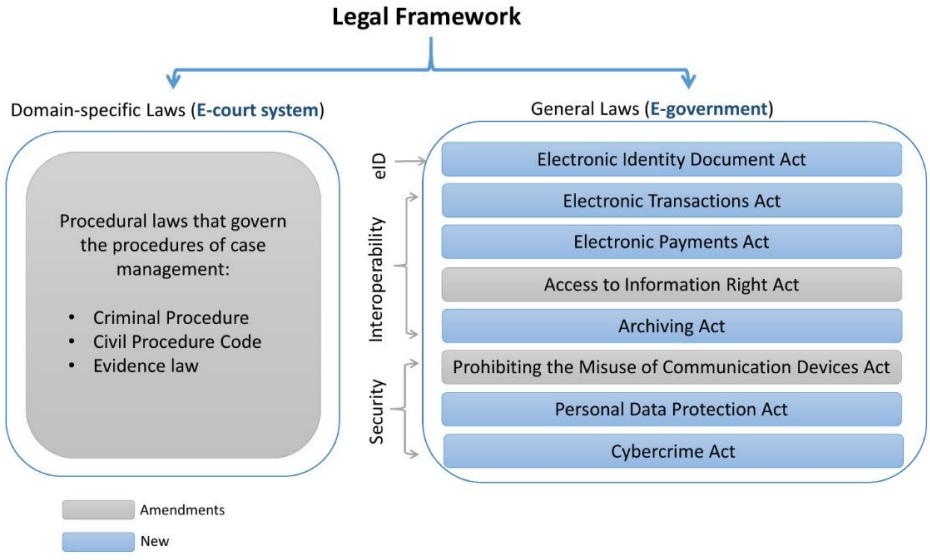

Figure 8. Legal framework proposal for the Kurdistan Region of Iraq

7.3. Practical Application of the Framework

The KRI does not have a constitution, while new laws can be issued, and amendments in the existing laws can be made through the Kurdistan Parliament that was established in 1992 (The Kurdistan Parliament of the Federal Republic of Iraq, n.d.). The legislative mission of the Kurdistan Parliament composes of; issuance of new laws, amendments in the existing applicable laws, and enforcement of laws issued by the Iraqi Parliament of a non-sovereign nature that require legislation from the Kurdistan Parliament for their enforcement in the KRI.

The practical application of the proposed legal framework in this study requires issuing some new laws and amendments in others, as presented earlier in Fig.8. According to the Kurdistan Parliament Election Law, there is no specific mechanism for submitting a new framework project or changes in-laws to the Parliament. It is open to be regulated by the internal system of the Parliament.

The Kurdistan Parliament internal system regulated this process in the following methods:

- **First:** Preparing the draft law and approving it by the Council of Ministers for the Kurdistan Region, then submitting it to Parliament for approval. The laws can be prepared by the relevant ministry and then submitted to the Council of Ministers.
- **Second:** Suggesting or preparing a draft law by several parliamentarians whose number is not less than (10) members, signing it with a memorandum, and submitting it to the Parliament Presidency for approval.
- **Third:** Preparing a draft law by the head of the region and sending it to the Presidency of Parliament for approval.
- **Fourth:** Preparing a draft law from the Judicial Council in the region, provided that it is related to the tasks of the judicial authority and courts, and sending it to Parliament for approval.
- **Fifth:** Preparing a draft law by independent bodies or boards such as (integrity, environment, human rights, elections commission, Kurdistan regions outside the region, and investment)

After the draft law is submitted to the presidency of Parliament, the Presidency Council decides to put in the agenda to start the first reading in one of the sessions. Then, it is referred to the relevant committees of Parliament to prepare a report on the project. Next, the second draft reading takes place with the reports submitted on it in another subsequent session. Later, it is voted on in the same session or a subsequent session, and the approval depends on the majority votes. Finally, the law issued by Parliament is sent to the president of the region for approval, and the president has one of the options:

- Ratification within one month.
- Failure to ratify and return it to Parliament for the reasons that can be specified in the response decision letter.
- Non-ratification and non-response, after one month since its arrival to the presidency house, it is considered approved and ratified.

In cases (1 and 3), the law is sent to the Ministry of Justice for publication in the Official Gazette called (Kurdistan Regional Gazette). It shall be effective from the publication date unless there is a provision in the law to the contrary.

The authors created the following guideline for the practical application of the framework and the changes requested to be made on the relevant ICT laws for both e-court system as domain-specific and e-government as a general, as presented in Fig.9.

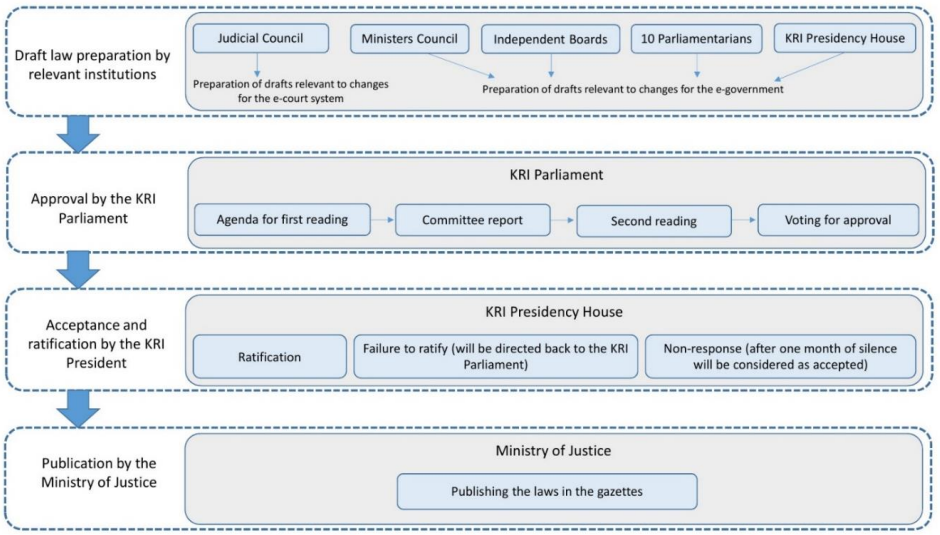

Figure 9. Guideline for the framework application

8. Conclusion

ICT can help governments transform their conventional paper-based working environments into electronic and efficient ones. Hence, a relevant ICT regulatory framework is essential in this transformation process to ensure the validity of electronic transactions and guarantee the proper usage of technological tools. The authors applied a case-based strategy using the Estonian experience and conducted a comparative analysis of both countries' legal regulations. As a background for the proposals, some existing literature, available laws, and other legal instruments related to Estonia and the KRI's digital transformation were analyzed. The results proposed a legal framework for the relevant ICT laws to cover specific domain laws used for an e-court system and general laws relevant to the e-government and the development of the guideline for practical implementation of the framework in the KRI. The research aims at extending the body of knowledge for academics, practitioners, decision-makers, judiciaries, and regulators. In particular, the results will serve the Kurdistan Regional Government (KRG) to prepare digital inclusion concerning legal issues.

Some limitations of this research include the limited availability of updated and public detailed information or literature about initiatives of e-government plans, projects, and reform strategies in the KRI. The lack of available resources and laws in the English language for the KRI case was considered another limitation. Future research could be directed towards making a more in-depth analysis of relevant affected regulations, policies, and other legal documents and actual work on the contents of the mentioned laws in the framework through a team of legal experts to prepare drafts based on the request from the KRG.

References

Agranoff, R., & Radin, B. A. (1991). The Comparative Case Study Approach in Public Administration. *Research in Public Administration*, *1*, 203–231.

Ahmed, R. K., Muhammed, K. H., Pappel, I., & Draheim, D. (2020). Challenges in the Digital Transformation of Courts : A Case Study from the Kurdistan Region of Iraq. *Proceedings of ICEDEG 2020 –- the 7th International Conference on EDemocracy & EGovernment*.

Ahmed, R. K., Muhammed, K. H., Reitsakas, A., Pappel, I., & Draheim, D. (2020). Improving Court Efficiency Through ICT Integration: Identifying Essential Areas of Improvement. *Proceedings of ICT4SD 2019 - the 4th International Conference on ICT for Sustainable Development. Lecture Notes in Networks and Systems*, *93*, 449–461.

Albrecht, V., & Novak, A. S. (2021). Analyzing the Implementation of Electronic Communication Strategies Through Legislation. *13th IFIP WG 8.5 International Conference on Electronic Participation, EPart 2021Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *12849 LNCS*, 198–209.

Almatarneh, A. (2011). Privacy implications for Information and Communications Technology (ICT): The Case of the Jordanian e-government. *Journal of International Commercial Law and Technology*, *6*(3), 151–164.

Andrade, A., Joia, L. A., & Kamlot, D. (2012). E-government in the judiciary system: Assessing the correlation between IT investment and the efficiency of courts of justice in Brazil. *Handbook of Research on E-Government in Emerging Economies: Adoption, E-Participation, and Legal Frameworks*, 158–178.

Astok, H. (2017). *Introduction to e-Government \ e-Government to Support Sustainable Development Goals*. eGA.

Bhattacherjee, A., & Shrivastava, U. (2018). The effects of ICT use and ICT Laws on corruption: A general deterrence theory perspective. *Government Information Quarterly*, *35*(4), 703–712.

Dirk Draheim, Kaarel Koosapoeg, Mihkel Lauk, Ingrid Pappel, Ingmar Pappel, J. T. (2016). The Design of the Estonian Governmental Document Exchange Classification Framework. *Proceedings of EGOVIS'16 - the 5th Conference on Electronic Government and the Information Systems Perspective. LNCS 9831*, 1–15.

Fan, Q. (2018). A Longitudinal Evaluation of E-Government at the Local Level in Greater Western Sydney (GWS) Australia. *International Journal of Public Administration*, *41*(1), 13–21.

Garad, A., & Qamari, I. N. (2021). Determining factors influencing establishing e-service quality in developing countries: A case study of Yemen E-government. *International Journal of Electronic Government Research*, *17*(1), 15–30.

Glyptis, L., Christofi, M., Vrontis, D., Giudice, M. Del, Dimitriou, S., & Michael, P. (2020). E-Government implementation challenges in small countries: The project manager's perspective. *Technological Forecasting and Social Change*, *152*, 119880.

Goede, M. (2019). E-Estonia: The e-government cases of Estonia, Singapore, and Curaçao. *Archives of Business Research*, *7*(2), 216–227.

Government of the Republic of Estonia. (2008a). *Establishment of an e-File System and e-File System Statute*. https://www.riigiteataja.ee/akt/109032018005

Government of the Republic of Estonia. (2008b). *Information Systems Security Measures System*. https://www.riigiteataja.ee/akt/13125331

Government of the Republic of Estonia. (2008c). *State Information System Management*. https://www.riigiteataja.ee/akt/106082019018

Government of the Republic of Estonia. (2016). *Data Layer for Information Systems*. https://www.riigiteataja.ee/akt/106082019017

Henning, F., & NG, G. Y. (2009). The challenge of collaboration - ICT implementation networks in courts in the Netherlands. *Transylvanian Review of Administrative Sciences*, *28 E*, 27–44.

Ingrid Pappel, Ingmar Pappel, Jaak Tepandi, D. D. (2017). Systematic Digital Signing in Estonian e-Government Processes - Influencing Factors, Technologies, Change Management. *Transactions on Large-Scale Data- and Knowledge-Centered Systems*, *36*.

Kalja, A., Reitsakas, A., & Saard, N. (2005). eGovernment in Estonia: Best practices. *Proceeding of the Portland International Conference on Management of Engineering and Technology*, 500–506.

Kalvet, T. (2012). Innovation: A factor explaining e-government success in Estonia. *Electronic Government*, *9*(2), 142–157.

Karoline Paide, Ingrid Pappel, Heiko Vainsalu, D. D. (2018). On the Systematic Exploitation of the Estonian Data Exchange Layer X-Road for Strengthening Public Private Partnerships. *Proceedings of ICEGOV'2018: The 11th International Conference on Theory and Practice of Electronic Governance*.

Khan, A., Krishnan, S., & Arayankalam, J. (2020). The Role of ICT Laws and National Culture in Determining ICT Diffusion and Well-Being: A Cross-Country Examination. *Information Systems Frontiers*, 1–26.
Kim, H. (2019). Globalization and regulatory change: The interplay of laws and technologies in E-commerce in Southeast Asia. *Computer Law and Security Review*, *35*(5), 105315.
Kiškis, M., & Petrauskas, R. (2003). e-Governance: Two Views on Legal Environment. *International Conference on Electronic Government EGOV 2003.Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *2739*, 407–412.
Kitsing, M. (2010). An Evaluation of E-Government in Estonia. *Proceedings of Internet, Politics and Policy 2010: An Impact Assessment Conference at Oxford University*, 20.
Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, *15*(18), 122–136.
Lentner, G. M., & Parycek, P. (2016). Electronic identity (eID) and electronic signature (eSig) for eGovernment services-a comparative legal study. *Transforming Government: People, Process and Policy*, *10*(1), 8–25.
Lips, S., Aas, K., Pappel, I., & Draheim, D. (2019). Designing an Effective Long-Term Identity Management Strategy for a Mature e-State. *Proceedings of EGOVIS'2019 - the 8th International Conference on Electronic Government and the Information Systems Perspective. LNCS 11709*, 221–234.
Moon, M. J. (2002). The Evolution of E-Government among Municipalities: Rhetoric or Reality? *Public Administration Review*, *62*(4), 424–433.
Nyman-Metcalf, K. (2017). e-Governance: A New Reality for Legislative Drafting? *International Journal for Legislative Drafting and Law Reform*, *5*(1).
Nyman-Metcalf, K. (2019). How to build e-governance in a digital society: The case of Estonia. *Revista Catalana de Dret Public*, *58*, 1–12.
Paskaleva-Shapira, K. (2006). Transitioning from e-Government to e-Governance in the Knowledge Society: The Role of the Legal Framework for Enabling the Process in the European Union's Countries. *7th Annual International Conference on Digital Government Research, Dg.o 2006*, 181–190.
Posch, K. C., Posch, R., Tauber, A., Zefferer, T., & Zwattendorfer, B. (2011). Secure and privacy-preserving egovernment-best practice Austria. *Rainbow of Computer Science*, *6570*, 259–269.
Riigikogu. (2000a). *Archives Act*. https://www.riigiteataja.ee/en/eli/504032016002/consolide
Riigikogu. (2000b). *Identity Documents Act*. https://www.riigiteataja.ee/en/eli/504022020003/consolide
Riigikogu. (2001). *Public Information Act*. https://www.riigiteataja.ee/en/eli/529032019012/consolide
Riigikogu. (2002a). *Code of Misdemeanour Procedure*. https://www.riigiteataja.ee/en/eli/515012020005/consolide
Riigikogu. (2002b). *Courts Act*. https://www.riigiteataja.ee/en/eli/519122019009/consolide
Riigikogu. (2004a). *Code of Criminal Procedure*. https://www.riigiteataja.ee/en/eli/507012020008/consolide
Riigikogu. (2004b). *Information Society Services Act*.
Riigikogu. (2005a). *Code of Civil Procedure and Code of Enforcement Procedure Implementation Act*. https://www.riigiteataja.ee/en/eli/511042019002/consolide
Riigikogu. (2005b). *Electronic Communications Act*. https://www.riigiteataja.ee/en/eli/513012020007/consolide
Riigikogu. (2006). *Code of Civil Procedure*. https://www.riigiteataja.ee/en/eli/512122019004/consolide
Riigikogu. (2012). *Code of Administrative Court Procedure*. https://www.riigiteataja.ee/en/eli/512122019007/consolide
Riigikogu. (2016). *Electronic Identification and Trust Services for Electronic Transactions Act*. https://www.riigiteataja.ee/en/eli/511012019010/consolide
Riigikogu. (2017). *Emergency Act*. https://www.riigiteataja.ee/en/eli/511122019004/consolide
Riigikogu. (2018). *Personal Data Protection Act*. https://www.riigiteataja.ee/en/eli/523012019001/consolide
Rikk, R., & Roosna, S. (2016). e-Estonia: e-Governance in Practice. In *Norwegian-Estonian e-Governance initiative*. eGA.
Saarenpää, A. (2003). A legal framework for E-Government. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *2739*, 377–384.
Saputro, R., Pappel, I., Vainsalu, H., Lips, S., & Draheim, D. (2020). Prerequisites for the Adoption of the X-Road Interoperability and Data Exchange Framework : A Comparative Study. *Proceedings of ICEDEG 2020 - Seventh International Conference on EDemocracy & EGovernment*.
Sarabdeen, J., Rodrigues, G., & Balasubramanian, S. (2014). E-Government users' privacy and security concerns and availability of laws in Dubai. *International Review of Law, Computers and Technology*, *28*(3), 261–276.
Sarantis, D. (2017). Modernization of Greek public sector: Results from eGovernment law application and next steps. *Proceedings of the European Conference on E-Government, ECEG, Part F1294*, 179–187.
SELFCITATION. (2021). .

Silva, R. C. (2020). A legal framework for blockchain technology in Brazil. *13th International Conference on Theory and Practice of Electronic Governance, ICEGOV 2020*, 137–142.
Somer, E. (n.d.). *Court Information System*. Retrieved October 1, 2020, from https://www.rik.ee/et/node/489
Srivastava, S. C., & Teo, T. S. H. (2005). Electronic Government as a guided evolution in Singapore: Vision for the world in the 21st century. *Academy of Management 2005 Annual Meeting: A New Vision of Management in the 21st Century, AOM 2005*.
The Kurdistan Parliament of the Federal Republic of Iraq. (n.d.). *Kurdistan Parliament*. Retrieved October 20, 2020, from https://www.parliament.krd/english/
The Supreme Judicial Council of the Republic of Iraq. (2015). *Iraqi legislation Database*. http://iraqld.hjc.iq:8080/identity_search.aspx
United Nations. (2018). *The United Nations e-Government Survey 2018*.
Valentyna Tsap, Ingrid Pappel, D. D. (2017). Key Success Factors in Introducing National e-Identification Systems. *Proceedings of FDSE'2107 - the 4th International Conference on Future Data and Security Engineering, LNCS 10646*.
Wierzbowski, M., Galán-Vioque, R., Casado, E. G., Grzywacz, M., & Sokołowski, M. M. (2021). Challenges and prospects of e-governance in Poland and Spain. In *Electronic Government* (Vol. 17, Issue 1).
Wirtz, B. W., & Daiser, P. (2018). A meta-analysis of empirical e-government research and its future research implications. *International Review of Administrative Sciences*, *84*(1), 144–163.
Yin, R. K. (2011). *Applications of Case Study Research*. SAGE.
Zarei, B., Ghapanchi, A., & Sattary, B. (2008). Toward national e-government development models for developing countries: A nine-stage model. *The International Information & Library Review*, *40*(3), 199–207.

Endnotes

[i] EU Parliament and Council regulation (EU) no 910/2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

[ii] EU Parliament and Council regulation (EU) no 2016/679 on the protection of natural persons with regard to the processing of ersonal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

Appendix 9

[IX]

Rozha K. Ahmed, Aleksander Reitsakas, Khder H. Muhammed, Soran AB. Saeed, Ingrid Pappel, and Dirk Draheim. System model of the Sulaymaniyah Appellate Court e-court system. *SSRN Electronic Journal*, pages 1–107, 2022

System Model of the Sulaymaniyah Appellate Court e-Court System

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Preface

Judicial systems are integrating Information and Communications Technology (ICT) tools into court processes to increase the efficiency and effectiveness of courts and increase citizen trust in justice. The workflow of court processes is digitized through an electronic court (e-court) system. The system serves judicial employees, including judges, clerks, litigants, police officers, and prosecutors with performing their daily operations in a more modern and organized manner, in addition to many other advantages, such as improved security and privacy of court cases, enhanced transparency of processes, and extended availability through distance working environment.

This document describes the implementation of the e-court system in the Kurdistan Region of Iraq (KRI) for the Sulaymaniyah Appellate Court in Sulaymaniyah city. The system was designed and developed by Aktors OÜ in cooperation with multiple subcontractors and supported by the governorate of Sulaymaniyah city.

The document presents an overview of the system, an analysis of the main court types and their working processes, defined user types, roles and permissions, and various system features and functionalities. Furthermore, it provides information about the implementation aspects, such as software and hardware plans. The document also summarizes the processes of training end-users of the courthouse. Finally, it ends by presenting the main achievements and benefits of the system.

The result of this e-court system implementation aims to practically serve the decision-makers in the KRI to conclude the replication plan in other courts from different cities in the Kurdistan area. In addition, it expands the body of knowledge and literature for academic researchers and other practitioners in the justice domain to obtain a better overview of justice digital transformation and how the implementation of the e-court systems improves effectiveness and efficiency in the court's daily internal operations.

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Chapter 1

Introduction

Digitalization provides opportunities to increase the efficiency and effectiveness of service delivery to citizens and improve the internal administration of government processes [18, 19, 24, 39, 74]. Therefore, recent experiences showed a noticeable global transition to e-government, and smart cities focused on the data-centric digital government to build effective and accountable institutions [19, 20, 24].

Judiciaries are part of this flow of digital transformation and considering the integration of Information and Communications Technology (ICT) tools into court processes to improve the process efficiency of courts and deliver better justice services to the public [2, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 51]

In this regard, the working processes of the conventional system are digitized with ICT tools to introduce an electronic court (e-court) system for courts. E-court is the courts' information management system aimed at simplifying the workflow of daily operation, providing a more modern and efficient working environment in the courts. Additionally, putting an end to wasting time for judicial employees, including judges, clerks, litigants from lawyers/barristers, and citizens who need court services. The system digitizes all the main operations of the daily work in the courts with the help of a computer through an easy-to-use and intuitive interface, which allows the court staff to perform their tasks more effectively, and improves the experience of people using the judicial system [3, 7, 11, 44, 50, 65, 71, 72, 74, 78, 82, 83].

This document delves into the implementation of an e-court system in the Kurdistan Region of Iraq (KRI) . It presents an overview of the process redesign, analysis, and implemented functionalities.

1.1 Purpose of the Document

This document has the following mutually overlapping purposes:

- Comprehensive description of the realized e-court system as the final project delivery in April 2021, as a definitive reference for all project stakeholders.
- Description of the realized e-court system as the resulting artifact of the project as a Design Science (DS) [48] effort, as a reference for researchers in the field.
- Reference point for future improvement cycles of the system.
- Reference point for future expansions of the system (in terms of functionalities, supported processed, emerging technologies etc.).
- Deeper information of expert users beyond the information provided by the user manual.
- Reference point for reuse of the project know-how in implementations of similar systems in other courts in the region and the country.
- Reference point for reuse of the project know-how in implementations of similar systems globally.

1.2 Project Background

The Sulaymaniyah Appellate Court is located in Sulaymaniyah city in the north of the Kurdistan Region of Iraq. In Kurdistan, the legal structure of courts is composed of one Supreme Court [1] and four Appellate Courts in the cities (Erbil, Sulaymaniyah, Duhok, and Kirkuk). In addition, every Appellate Court administers several sub-courts from civil and criminal jurisdiction.

The digital transformation of the justice domain was initiated in the KRI in 2014, with the e-court system as the first e-service pilot project planned to be expanded to other cities. The system has been designed and developed by AKTORS OÜ [2] in cooperation with multiple subcontractors and supported by the governorate of Sulaymaniyah city.

For better management of the project, different working groups were established, such as a group of advisory judges from the court-side (Judges Advisory Board) to provide legal advice and the system requirement, a supervisory group from the governorate to administer all the project processes and stages (Supervisory Board), and a technical group from Aktors to analyze the conventional system and develop a new e-court system.

1.3 Problem Formulation

Main problems identified in the conventional paper-based system are as the following:

- Paper registries, conventional systems rely on paper registries for keeping records of court case data. Same data must be repeatedly recorded in several registers for different matters. For example, case data and participants' details must be recorded in the Prime Register for the case registration purpose; then, when the case moves to the next stage, again will be recorded for the fee payment in the Fee Register; later, the same information must be repeated in the Daily Register, the clerks continuously record the same information across all the registers to the final stage of the case and add it in the Register of Decisions. In the handwritten information repetition, there is a possibility of typing errors and inconsistency in the format, in addition to the time needed for re-writing the same data multiple times.

- Manual case registration, the process of case registration in the conventional system, requires in-person attendance in the courthouse. Apart from the cost of travelling to the court, and multiple rooms to visit for the registration process, it adds an additional burden to the courts and clerks to be able to communicate with all attendees and manage queue processes.

- Manual case allocation, distribution of cases in the conventional system is another challenge that is maintained in the manual tables on paper. The process of case allocation should be evenly controlled by a first judge in every court type. In addition, the process is not public, which leaves room for lawyers to select the desired judge.

- Unsecured files, paper case files are stored on metal shelves in every court. The shelves have no level of security and privacy, as whoever accesses the shelf will have access to all files.

- Nontransparent processes, as transparency is a "fundamental value of justice", and it is defined as the visibility of and accessibility to information and procedures [55]. However, the processes in the conventional system are not visible to the public and are managed by a user or group of users, public citizens and case participants do not have the possibility to access the data easily even if they are allowed to due to difficulty in the procedure of getting permissions and finding the right data and document.

- Manual case transfer, the process of the case transfer from one institution to another is very slow in the conventional system. The slowness is due to some factors, such as cases being transferred by human resources and the need for time to travel between buildings; in addition, they can only take a particular amount of cases. Therefore, there is a restriction and delay in the process that only a specific number of cases can be transferred during working hours and days.

[1] The Supreme Court is located in Erbil, which is the capital of the Kurdistan region.

[2] Estonian Company for Development and Integration of Information Systems. https://www.aktors.ee/competence-areas/justice/

- Notification, the notifications are mainly two types, first is the called summons, to notify participants to attend the hearing. Second is the notification about case activity and status. In the conventional system, the hearing will not be held unless the confirmation of the notification/summons delivery is added to the case file. Case data and addressee details are written manually on the summons template. There is a possibility that addresses have been typed wrong. The summoner will take it to the address and comes back to court, then corrects the address and takes it again to the new address. This process will take time, cost, and hearing delay.

  The notification about case activity is managed mostly based on face-to-face communication between judges and clerks, or in case of case participants need to be informed about the status such as a missing document to be added or others, then the person might be contacted through a phone call. This process will take time, cost, and case dispensation delay. All case progress and status details are written manually on the case cover which will increase over time and will be hard to follow.

- Searching, in the conventional system, searching is time-consuming and not efficient in the paper registers. Clerks need to establish their search criteria according to alphabetic order and year of the registry and start a manual search in big paper registries.

- Paper documents, there are several challenges connected to paper documents in the conventional system. First, the cost of paper usage. Second, the handwritten text on the court-generated documents could be hard to read, as each document is written differently, by different clerks or judges in every court.

1.4 Aim and Objectives of the Work

The aim of this work is to create an e-court system and digitize court processes through the utilization of ICT tools to solve the problems and obstacles that exist in the conventional paper-based system and ensure better justice delivery to the citizen. To achieve the aim, the following objectives are set:

- To analyze existing technologies to be integrated into court processes.

- To analyze existing software development approach and identification of the proper methodology to follow.

- To design and develop the system.

- To implement the system in all courts.

1.5 Technology Integration with Court Processes

Relevant studies on the digitization of justice systems showed that judiciaries are integrating ICT tools into court processes in various methods to increase transparency, ensure delivery of better justice and allow the public to access court data and contents [38, 37, 36, 33, 51, 31, 32, 34, 35]. Table. 1.1 summarizes some global experiences toward justice digital transformation in alphabetical order.

Table 1.1: Relevance work from other countries

Region	Implementation
Argentina	Argentina introduced an electronic notification system to ensure faster and safer information publishing of court notifications and enhanced transparency in the process of notification management [56].

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Table 1.1 – continued from previous page

Region	Implementation
Australia	Australian courtrooms introduced e-court systems to enhance the efficiency of case management and provide evidence in a digital format [77].
Austria	Austria introduced an e-filing system to digitize case management workflow and eLaw to allow citizens to access laws online. Furthermore, they implemented Electronic Legal Communication (ELC) system for data exchange and court users [17, 78, 68].
Belgium	Belgium implemented the Phenix system to enhance the efficiency and effectiveness of court processes and developed an integrated e-filing system [17, 78].
Botswana	In Botswana, electronic systems showed noticeable improvements in court process efficiency with electronic registers to provide details about case information, and security enhancements of court files by storing them in the central database, protect information accessibility from any unauthorized user, in backups can be used in occasions of disaster recovery, and updating information is easier and more manageable as the main challenge with paper registers. [61, 60].
Brazil	Brazilian judiciary integrated technology into justice to improve the transparency and efficiency of the judicial processes used Artificial Intelligence (AI) to enhance the judgment process and achieve an even distribution of cases over judges [13]. Furthermore, [14, 53] reported some significant improvements after implementing the e-court system regarding information availability and accessibility to facilitate decision document generation and increase transparency that allows participants to track case status online, as well as improvements in caseloads visualization and organization of courts.
China	Chines courts proposed an"intelligent court system" to allow cases more efficient and faster management process and provide judges to work remotely, resulting in "on-call" and "non-stop" judges [84, 83]. Additionally, the multi-types court e-file classification system is implemented to increase the case management efficiency [27].
The Czech Republic	They introduced the Database of Experts and Interpreters and the Central Database of Bankrupt Entities to allow connection to courts data [17].
Denmark	Danish courts developed IT systems to manage case processing in simple matters. This system allows case registration and hearing management. The system manages the required resource for different work in each phase by comparing the registered code for deciding cases and codes for the sliding scale in every case. The system allows effective tracking of cases at different statuses. The system is considered significant for handling the statistics [2].
England	England and Wales digitized criminal justice with technology-based systems to improve the judiciary by generating more efficient decision documents through the re-use of pre-registered data of case participants in the system [50]. Additionally, they allow online claim submission through Money Claim Online (MCOL) to allow online claim submissions [17].

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Table 1.1 – continued from previous page

Region	Implementation
Estonia	Estonian courts implemented an e-File system that consists of different integrated systems such as the Police Information System, the Court Information System, the Prison Information System, and the Criminal Case Management Register through the Public Prosecutor's Office. The system increased the security of court cases and enhanced efficiency in daily court operations [75].
Finland	Finnish courts started digitization in justice systems in the 1980s and continually developing. There are two systems for civil case management, the TUOMAS case management system and the SANTRA electronic transfer system. Electronic mail or fax can also be used as a medium for case data transfer. Additionally, summonses can also be sent out by Electronic Posting Service (EPS) that does not require a signature. The use of E-filing is common; however, the decision generated still have to exist in hard copy. Later, SAKARI case management system for criminal cases 2000 was introduced. The process involves court users, police, the prosecutor, and the injured parties. Conducting court hearings through videoconferencing was allowed by the legislation in Finland in 2002 [2].
France	They implemented e-Justice to increase document security and remote access to allow judges and prosecutors to access the system after court working hours [79].
Germany	They integrated ICT with court processes to increase efficiency in the processes and worked towards an e-justice system [78, 33].
Ghana	Courts in Ghana eliminated human error and implemented decision support systems to produce a fair judgment [8].
Greek	Greek justice systems implemented the e-court system as an efficient tool to enhance transparency, and allow remote access to court data [18].
Hungary	Hungarian courts digitized registries for claim registration, and automatic generation of case numbers [17].
India	Implementation of e-court systems reduced the time and cost in courts, enhanced security, and increased efficiency in particular by addressing the challenge of vast numbers of case backlogs [66, 74, 57].
Indonesia	Indonesian courts implemented an e-court system in civil courts to make the process of case registration faster with lower costs [47].
Ireland	Ireland implemented a Criminal Justice system and made secure internet available for e-mailing and browsing [17].
Italy	Case management system implemented in the Italian courts increased efficiency in case registration. Also, the availability of electronic registers is improving court processes by providing fast access to information and allowing re-using the data in all the connected registers [3].
Japan	Integrated AI into courts to evaluate various robots and improve court efficiency in the areas of Decision Support System (DSS) and Case-Based Reasoning (CBR) for deciding the appropriate length of the judgment according to the matched previous similar case information.[45, 46]

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Region	Implementation
Kenya	The reform started with establishing Judicial Information Communication Technology Committee in 2008 to manage ICT-relevant matters in the Judiciary. They mapped several activities toward digitizing court processes and creating a case management system. They started with digitizing hard copy files and planning for the next step to move to the entire records management system [54].
Korea	The first electronic case management was launched in the mid 1980's, and then it was updated to allow public access for searching cases through a web-based system in 2010. The electronic case filing showed improvements in courts with faster processing time, better submission and registration of cases and more efficient notifications. Currently, the system is developed with a very modern and fully paper-less integrated e-court system, with all necessary functionalities including e-filling, video conferencing, case management system, audio and video recording of hearings, decision support, calendaring, law database search, payments and archiving [9, 44, 18].
Los Angeles	Integrated technological tools with courts through the implementation of "distributed case management computer-based systems" to ensure faster case processing and assist in processing a large number of cases. [28].
Luxembourg	Introduced intranet connections between courts as an initial phase to allow administering civil procedures [17].
Malaysia	Judicial system in Malaysia considered e-court systems as a significant tool to improve the efficiency of courts by reducing case backlogs, time-saving, increasing transparency, faster searching and retrieving case information, eliminating data repetition and typing mistakes [43, 40, 41, 71, 72, 44].
Netherlands	Dutch justice systems introduced the virtual desktop to "support private law adjudication, register the data of the plaintiffs, defendants and parties involved, the method of conclusion and the completion times" with this solution, and security is enhanced in the virtual desktop due to implementing security-filters on Internet connections to restrict corrupted processes. The system improved administrative processes, and extended accessibility of court staff [73].
New Zealand	The focus was on integrating technology into court processes to support court staff in managing cases in an efficient and effective manner and in the less required time. In this regard, New Zealand explored the usage of the case management system, electronic filing, and e-court systems with video conferencing technology [58].
Nigeria	Nigerian justice system considered ICT integration with courts and implementation of e-court systems to increase transparency and security, faster access to information, make a cost-saving solution, save storage, and ensure faster case disposal [9].
Norway	Norwegian justice system made use of IT systems to increase efficiency in court processes. They focused on the caseload weighting system (Belastningsmodell), which allows better management of the human resource allocation [2].

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Region	Implementation
Pakistan	Pakistan considered the court case management system as a vital tool to increase transparency and improve the efficiency of the overall court case workflow through the e-court systems to ensure accelerating dispensation process, automatic case movements between different institutions, tracking case statuses, remote case monitoring, better statistics [67].
Philippine	Philippine addressed the challenge of case backlog in courts with technology and introduced a new electronic notification method to replace the paper notification system, and implemented a system for predicting decisions to generate an automatic decision context. [80, 27].
Portugal	They introduced online centralized databases to allow data exchange between different judicial institutions, and case participants are allowed to submit information to courts by e-mail [17].
Russia	Russian courts implemented a DSS to optimize the decision generation process and enhance case disposal [59].
Rwanda	Implemented the integrated electronic case management system to allow collaborative case management of civil and criminal matters between all justice institutions. The system seeded the case management process eliminated data duplication, and enhanced transparency[81].
Singapore	Courts in Singapore adopted an advanced e-court system to enhance the efficiency of case processing and implemented Integrated Criminal Justice System (ICJS) with a video conferencing feature to allow citizens to participate in trial sessions remotely. furthermore, they introduced the Automated Traffic Offence Management System (ATOMS) and TICKS 2000 for better case management processes [68, 17].
Slovenia	They introduced several databases for different registries and created a portal for online access to legal information [17].
Spain	Spain courts implemented a case management system with a video conferencing system for hearing sessions; furthermore, they made legal information available online [17].
Sweden	Since 2000, Swedish courts started to introduce new technologies into court processes and used video conferencing as a part of a pilot project in some general courts and considered a significant tool for court hearings to allow participants to join remotely. Courts use the new electronic case management system, Vera. The system relies on the database, and all collected information can be analyzed, and statistical reports can be produced. The system stays under development to integrate more functionalities that can manage electronic summons and establish a connection with the prosecution system [2].
Switzerland	They created internal databases to compile court decisions and cases and used e-mail to communicate with courts [17].

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Table 1.1 – continued from previous page

Region	Implementation
Tanzania	ICT integration started by gradually using computers for typing with limited connectivity between courts. Later, a case management system was introduced in the commercial courts. The plan was to upgrade the current system to a better and standard design. The system was designed with several limitations, including limited searchability, slow data retrieval, no connection between the digital case file and a paper copy, limited audit trail without monitory, no track for user access and case recordings changes, and no backups of court records which ends at risk of loss [54].
Thailand	The design and software prototype of the Civil Court Case Management System is presented by [69, 70]. The system improved security by implementing user groups and privileges. Electronic court systems are considered a significant tool for efficient service delivery to the stakeholders and show faster-searching functionality. Further study by [52] presented the implementation of a so-called "JudgeDoll" system to automatically extract a part of the information and provide the case law as a summary of the complete judgment to ensure accelerating the judgment process.
Uganda	Ugandan Judiciary has established an ICT Policy and Strategic Plan for implementing the digital court recording and digitization of the court workflow, transcription system, and digital records retrieval. They implemented a court case management system with limited functionalities at the first stage [54].
Ukraine	In Ukraine, courts implemented an e-court system to enhance transparency in the processes and to win citizens' trust [76].
The United States	Courts implemented an e-filling system to digitize the court processes. The system has witnessed improvements in security due backups of electronic copies of the court documents are more reliable and secure than paper copies, and faster information sharing due to electronic notification about case acceptance by the court [39].

Table. 1.2 summarizes common types of technology-based solutions used in courts.

Table 1.2: Types of technology integration

Technology	Description	Source
Electronic Filing System (EFS)	The e-filing application allows electronic submission of documents for filing and case registration through an online portal that requires features of document management systems.	[40, 41, 43, 44, 2, 72, 39, 58, 74]
Court Records Management System (CRMS)	An electronic system to manage case file records and other information safe for accurate and fast retrieval.	[60, 72]
Case-Weighting System (CWS)	An electronic system to assess the complexity of different case-types concerning the amount of judicial time and effort required for processing them.	[35, 2]

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Table 1.2 – continued from previous page

Technology	Description	Source
Case Management System (CMS)	An electronic management system developed particularly to improve efficiency in internal administration processes and handling court cases. This system can be accessed by court staff, clerks and judges.	[41, 43, 44, 2, 72, 28, 69, 70, 67, 3, 58, 74]
Community and Advocate Portal System (CAPS)	A portal system created to ease the communication between the courts and the public in notifying changes and case updates for scheduled trials .	[43, 74]
Video Conferencing System (VCS)	This system is used during court trials to assist individuals saving the costs of traveling and help speeding up the case proceedings.	[43, 2, 72, 58, 74, 65]
Case Recording and Transcribing System (CRTS)	This system is used for recording case evidence. It allows participants get copy of recordings for referencing purposes.	[43, 74]
Queue Management System (QMS)	An electronic system that arranges the queue process of attendance such as lawyers and other case parties	[43, 44, 72]
Electronic Notification System (ENS)	Is a system used as a reliable channel for communication between case participants to help faster information sharing on case updates.	[56]
Online Dispute Resolution System (ODR)	Is a system used to resolve disputes, in particular introduced for e-commerce relevant issues.	[44, 65]
Digital Right Managements (DRM)	Is the electronic system developed for protection of legal documents.	[44]
Electronic Court System (e-Court)	Is the court case management system that automates the workflow of courts and uses e-filing for case registration, case and evidence management, video conferencing, and electronic notification system.	[44, 2, 43, 40, 72, 14, 53, 77, 44, 66, 57, 74, 67, 79, 18, 58]
Electronic courtroom	Presented as using a range of technological tools during court trials including, evidence recording, video conferencing, video and audio recordings.	[58]

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1.6 Development Approach

The Model Driven Architecture (MDA) approach ensures better management of the complexity of large systems and supports the production of an executable artifact [63] [3] . In the MDA context, models are considered the core aspect of the software development of the system; hence, the MDA consists of three models. First, Computational Independent Model (CIM) describes the system requirement and business objectives at a very abstract level. Second, the CIM will be transformed into the Platform

[3] https://www.omg.org/mda/

Independent Model (PIM) to define the behaviour of the system in regard to the stored data and algorithms independent of the technological platform and tools. Then, PIM will be transformed into Platform Specific Model (PSM) to detail technological aspects needed for the implementation, and finally, PSM will be transformed into an executable code [12, 63].

Agile software development approach ensures producing high-quality software with different iterative activities with the active participation of the project stakeholders, establishment of active team members, flexible design, reduced documentation, and provision of various training sessions to ensure high-level successful software [4, 5, 6, 10, 15, 16, 26, 49].

During the process, different modelling tools and approaches were used, such as Business Process Modeling Notation (BPMN) to map the business process of daily activities [23, 62], and the Unified Modeling Language (UML) [64] to model properties and behaviour of the system.

The current e-court system was designed and developed with Agile methodology [38]. Figure. 1.1 presents the development cycle with activities and deliverables for every phase.

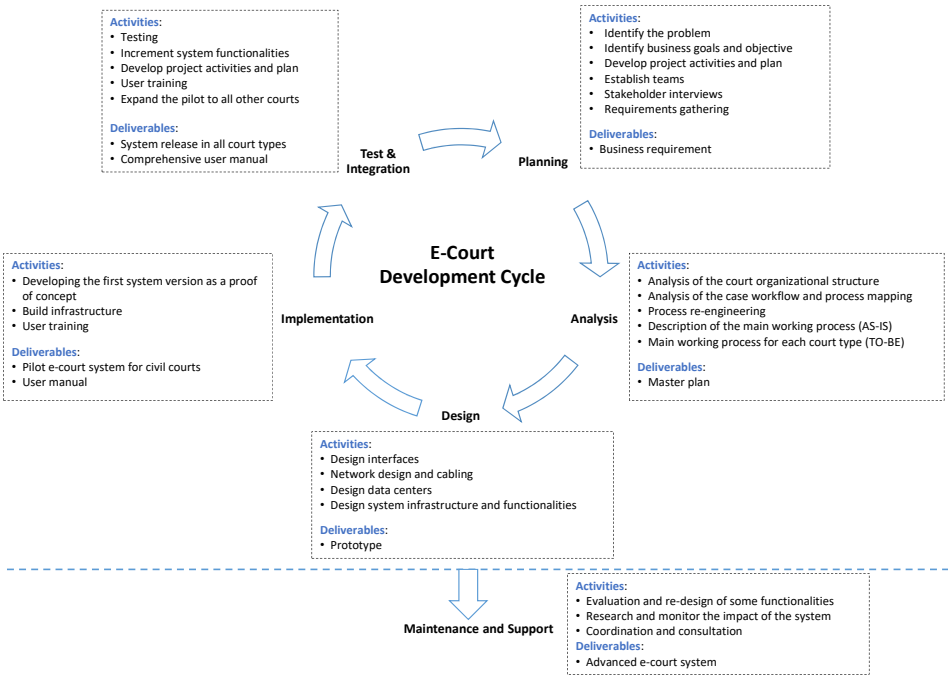

Figure 1.1: Agile development approach

1.7 Outline

In Chapter 2, an overview of the system is presented. The chapter details the court types that exist in the Sulaymaniyah Appellate Court and are currently operating through an e-court system. Next, we conduct an analysis of the main working processes for both civil and criminal cases. Furthermore, we give an overview of system user groups, the role types, and defined permissions. Then, in Chapter 3 we describe the features and functionalities of the current e-court system. In Chapter 4, we elaborate activity diagrams of all processes and user dialogues in each court type. In Chapter 5 we present some examples of the main interfaces of the system. In Chapter 6, an overview of the implementation side is presented with a description of the components of both software and physical infrastructure architecture. In Chapter 7, a list of provided training sessions for end-users is presented along with the details of every training type and targeted audience. In Chapter 8, the system's main benefits are

summarized, which are considered achievements of the implemented e-court system as an executable artifact. Finally, we conclude and discuss directions for future work in Chapter 9.

Chapter 2

System Overview

2.1 Courts in the Sulaymaniyah Appellate Court

The following section details the court types that are under the supervision of the Sulaymaniyah Appellate Court:

Civil Primary Court

The Civil Primary Court is specialized in civil and commercial cases falling within its jurisdiction, such as (selling, buying, renting, civil commitments, commercial contracts, and others). In any Appellate Court, there is a number of Civil Primary Courts depending on the need of the region. In Sulaymaniyah, there are six courts, and one of them is specialized in civil status matters (cases involving the Civil Status Affairs Directorate, issues regarding the name and age of applicant (the local population registry)). Each judge has a personal courtroom.

Personal Status Court

The Personal Status Court is specialized in marriage, divorce, expenses, and family cases in general. In Sulaymaniyah, there are five courts. Each judge has a personal courtroom. A judge is typically a Muslim and presides over these courts that deal with all matters affecting an individual's personal status.

Personal Items Court

The Personal Items Court deals with similar matters as the Personal Status court, but for Christians and other non-Muslims. There is one such judge in Sulaymaniyah with a personal courtroom.

Labour Court

The Labour Court is specialized in disputes arising out of the Labour Act and the workers' Pension and Social Security Act. The court deals with both criminal and civil cases. There is only one Labour Court judge in Sulaymaniyah that has a personal courtroom.

Investigative Court

The Investigative Court is in charge of the investigative proceedings. The team dealing with investigative proceedings consists of one judge, a team of judicial investigators and police officers from police stations under the supervision of the judge to accomplish the primary investigative process in addition to the involvement of the prosecution offices. In each Appellate Court, there are a number of investigative judges. In the Sulaymaniyah Appellate Court there are 12 Investigative Courts divided according to certain geographical regions/territories in Sulaymaniyah and specified types of crimes. Each judge has his own group of clerks and office.

Misdemeanor Court

The Misdemeanor Court is specialized in criminal cases related to infractions or misdemeanors, for which the punishment can be from (24 hours) up to (5 years imprisonment) or fines. This court is also specified for proceeding cases related to bail (sponsorship). In addition, this court also deals with judgments related to a conditional discharge, which is asked for by sentences. There are five such courts in Sulaymaniyah. Each has a courtroom and an office. One of them is specialized in domestic violence cases.

Felony Court

The Felony Court is specialized in cases where their penalties are not less than five years, and its verdicts should be viewed by the court of cassation. In each Appellate Court, there is one or more Felony Court(s). In the Sulaymaniyah Appellate Court, there are three Felony Courts. Each consists of a president and two members. These courts have two properties: First, as ordinary, the court deals with felony cases of crimes that are punishable by death, life imprisonment (50 years), and temporary imprisonment (5 years to 15 years). Second, the Felony Court as a cassation, each court is specified to the cassation on judgments by the Investigative Courts, in the competent court. Also, the decision on referral cases from misdemeanor judges. This court is responsible for cassation proceedings in such cases. It is also specified to review appeals in the decision made by the Misdemeanor Court related to conditional discharge (conditional release).

Juvenile Court

The Juvenile Court exists for offenders between the ages (of 11 to 18 years) at the time of the commission of the offense, for misdemeanor cases that are punishable by more than (3 years), and for felony cases. This court consists of the court president, who is a judge, and two members (one is the social research officer, and the other is a representative from the education department) The Juvenile Court also deals with adoptions – they decide whether to allow the adoption, and afterward, Personal Status Courts issue the certificate of adoption. There is one juvenile judge in Sulaymaniyah with one courtroom and office. The Juvenile Court proceedings are closed to the public. Adoption cases are completely confidential.

Appellate Court

The Appellate Court is the highest degree of litigation in the area of governorates. From an administrative point of view, supervises the courts that are located in the geographically-based appellate jurisdiction of that governorate. From the judicial point of view, it deals with two types of cases, including appeals on the decisions from the Civil Primary Court and appeals as a cassation for both civil and criminal cases, which are mentioned in the law. Three-judge panels preside over each session of court. Each panel is loosely supervised by a president of the Appellate Court or vice president.

2.2 Court Processes

The general working process of case management in all courts after the automation in the e-court system is described in Figure. 2.1.

Figure 2.1: General case management cycle

- Case submission can be made by a prosecutor, court official, judge, or other authenticated e-court system user.

- Court proceeding consists of different stages, which all require the user to insert relevant documents and information.
- Court decision and documents will be archived.
- Court cases can be later searched by the authenticated e-court system user.

After the requirements were gathered and the court structure was defined, some processes were re-engineered to ensure processes optimization [22, 42] prototype, and use cases and activity diagrams of the processes in the system (to be) were presented to the court users and legal advisory board. During the analysis phase, the case management cycle was identified as the following processes in both criminal and civil courts as described in Figure. 2.2 and Figure. 2.3.

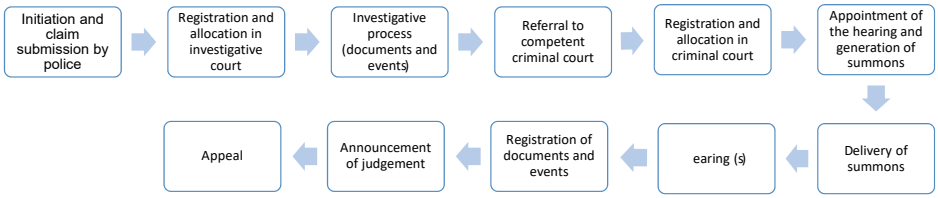

Figure 2.2: Processing criminal cases

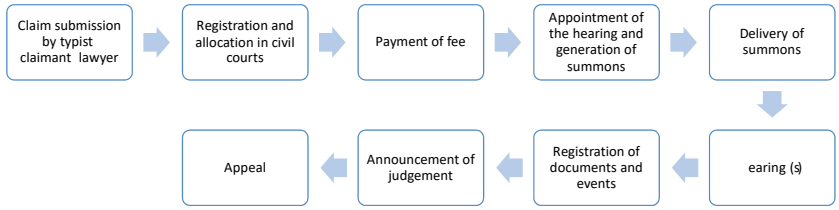

Figure 2.3: Processing civil cases

The system is designed to manage both civil and criminal cases; the case management workflow for both jurisdictions is presented in Figure. 2.4.

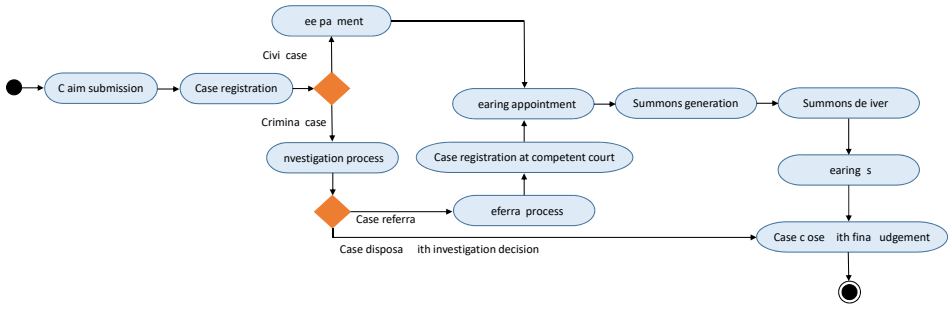

Figure 2.4: Case management process

2.3 User Groups, Roles, and Permissions

The system is designed with four main user groups:

- *Court users* are all users in courts, such as judges, clerks, judicial investigators, and prosecutors.
- *Lawyers* are lawyers/barristers representing case participants.
- *Public users* are claimants, defendants, accused persons, complainants, victims, appellants, opponents, experts, and any other participant type in the cases.
- *Agency employees* are users involved in the process of case administration from public and private sector agencies.

2.3.1 Court User Roles

The group of court users is defined with 27 role types for better management of the cases and insurance of security and privacy. The system gives access to data depending on the given role to each user. It is possible one user gets multiple roles. Table .2.1 presents implemented role types with their description:

Table 2.1: User roles in the e-court system

No.	Role	Description
1	Administrator	Admin user who has access to the sections relevant to system management, such as addition, removal, modification of users, institutions, templates, court documents, case types, and others.
2	All	Has access to overall the system.
3	Appeal clerk	Has permission to submit an appeal.
4	Assistant judge	This is a judge in the panel used for courts that are managed by a panel of judges. This role has the same permissions as a judge has.
5	Auditor	Has permission to access the fee department and is responsible for approving payments.
6	Case transfer clerk	Has permission to transfer cases.
7	Certificate clerk	Has permission to manage certificate proceedings.
8	Chief prosecutor	Is the head of the prosecution institution. Has permission to view and access all processes in the prosecution institution.
9	Daily Register clerk	Has permission to access and view Daily Register and appoint hearings.
10	Fee clerk	Has permission to access and view Fee Register and manage the payments.
11	First judge	Is the first judge of every court type. This role has the same permissions as a judge has.
12	Implementation department clerk	Has permission to access, view, and manage all cases moved to the implementation stage.
13	Judge	Has access to manage all cases and view registers in the specific court.
14	Judicial investigator	Has permission to access, view and manage investigative cases.
15	Juvenile inspector	This role exists in the Juvenile Court. Has permission to access, view and manage juvenile cases.
16	Notification department clerk	Has permission to access, view and manage all summonses, such as generating, printing, and delivering them.
17	Personal inspector	This role exists in the Persona Status Courts and Personal Items Court. Has permission to access, view and manage juvenile cases.
18	PITA	This role is Personal IT Assistant that has been suggested to assist judges who are not capable of using computers. Has the same permission as a judge has.

Continued on next page

Table 2.1 – continued from previous page

No.	Role	Description
19	Police officer	Has permission to access and view the Prime Register in the Investigative Court and submit cases.
20	Prime registry clerk	Has permission to register cases.
21	Prosecution clerk	Has permission to manage tasks relevant to case referrals to prosecutors in the prosecution institution.
22	Prosecution secretary	This role is the deputy head of the chief prosecutor. Has permission to access, view, and manage all tasks in the prosecution institution.
23	Prosecutor	Has permission to access, view, and manage cases in the courts he or she is connected to. Proceed with all the prosecution tasks.
24	Spectator	It is the supervisory role. The role will be given to a judge to supervise activities in the system. Has view permission to all courts, registers, and cases.
25	Statistics department user	Has permission to view the case statistics section and generate statistical reports.
26	Transfer authority judge	This role is given to any specific person that can be selected by the court president. Has permission to approve the judge's movement from one court to another.
27	Typist	Has permission to fill the case data for participants and submit claims to courts.

2.3.2 User Permissions

The system is implemented with 186 permission types for each user, as detailed in Table .2.2.

Table 2.2: User permissions in the e-court system

No.	Permission	No.	Permission	No.	Permission
1	Register a case	2	Modify a case	3	Save case draft
4	Send case to assessment	5	Reject a case	6	Add claimants
7	Add participants	8	Add defendants	9	Add representatives
10	Modify claimants	11	Modify defendants	12	Modify representatives
13	Add documents to proceeding	14	Modify documents on proceeding	15	Generate documents
16	Add notes to documents	17	Add notes to hearing	18	Add notes to proceeding
19	Initiate automatic allocation	20	Manually select a judge	21	Manually re-select a judge
22	Re-initiate automatic allocation	23	Register a fee payment	24	Reject a fee
25	Confirm a fee	26	Modify a fee payment	27	Register outgoing summons
28	Register a hearing	29	View proceeding	30	View list of proceeding documents
31	View proceeding hearings	32	View list of fees on proceeding	33	View proceeding members
34	View list of proceedings	35	View list of fees	36	View list of hearings
37	View judges calendar	38	View list of summonses	39	Grant judicial aid
40	Postpone hearing	41	Cancel hearing	42	Modify case value

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Table 2.2 – continued from previous page

No.	Permission	No.	Permission	No.	Permission
43	Modify a hearing	44	Add notes to fee payment	45	Add documents to hearing
46	Modify documents on hearing	47	View documents on hearing	48	View list of trusts
49	Register a deposit	50	Modify a deposit	51	Add notes to deposit
52	View confidential cases	53	View confidential cases in list of proceedings	54	Modify participants
55	View list of hearings on proceedings	56	Modify state fee	57	View confidential hearings
58	View proceeding document details	59	Register an outing	60	Modify an outing
61	Add documents to outing	62	Add notes to outing	63	Remove document from hearing
64	Remove document from case	65	View documents list	66	View document
67	Download and print receipt	68	Request dossier	69	Send dossier
70	Appeal a proceeding	71	View Register of Legal Distributions list view	72	Modify Register of Legal Distributions entries
73	View Pending Cases	74	Link Proceedings	75	Unify Cases
76	Detach cases	77	Manage users	78	Add Victim
79	Modify Victim	80	Add Complainant	81	Modify Complainant
82	Add accused	83	Modify accused	84	Request an order
85	Linking with confidential cases	86	Add police comments	87	Approve Proceeding Link
88	Remove Proceeding Link	89	Restore unified case	90	View confidential linked case
91	Investigative case categorization	92	Cancel proceeding	93	Manage document templates
94	View fee department statistics	95	Add appellant	96	Add appellee
97	Add applicants	98	Add cassator	99	Add decision
100	Add opinion	101	Add opponent	102	Add other person
103	Add signed certificate to case	104	Appeal a decision	105	Appeal a document
106	Close case	107	Create an event	108	Generate memo
109	Issue a certificate	110	Issue a copy of certificate	111	Issue an application
112	Manage case types	113	Manage caseloads	114	Manage classificators
115	Manage default proceeding members	116	Manage hearings	117	Manage institutions
118	Manage notifications	119	Manage Panels	120	Modify an event
121	Modify appellant	122	Modify appellee	123	Modify applicants
124	Modify cassator	125	Modify opponent	126	Modify other person
127	Refer a case	128	Start a case	129	Start a certificate proceeding
130	View appeal as cassation Prime Register	131	View case statistics	132	View certificate case
133	View list of events	134	View Prime Register of certificates	135	View register of decisions
136	View register of fines	137	View register of referrals	138	Add orders
139	Add police document'	140	Edit police document'	141	Modify orders

Continued on next page

Table 2.2 – continued from previous page

No.	Permission	No.	Permission	No.	Permission
142	Add object	143	Add prosecution document	144	Edit prosecution document
145	Manage prosecutors	146	Modify object	147	Restore case
148	Suspend case	149	Give permissions to view document in public web	150	Mark as dropped out
151	Restore hearing	152	Add reconciliation decision	153	Send document copy
154	Start or finish implementation	155	Add claimant of cassation decision	156	Add defendant of cassation decision
157	Modify claimant of cassation decision	158	Modify defendant of cassation decision	159	Add claimant of grievance
160	Add claimant of retrial	161	Add defendant of grievance	162	Add defendant of retrial
163	Add first party	164	Add objector	165	Add objector absentia decision
166	Add objector for the sake of law	167	Add objector third party	168	Add opponent absentia decision
169	Add opponent for the sake of law	170	Add opponent third party	171	Add second party
172	Modify claimant of grievance	173	Modify claimant of retrial	174	Modify defendant of grievance
175	Modify defendant of retrial	176	Modify first party	177	Modify objector
178	Modify objector absentia decision	179	Modify objector for the sake of law	180	Modify objector third party
181	Modify opponent absentia decision	182	Modify opponent for the sake of law	183	Modify opponent third party
184	Modify second party	185	Select prosecutor	186	View transactions register

Chapter 3

System Functionalities

The preliminary pilot version of the system was delivered to the court in 2018. Since the first release, the system has been continuously improved, and some functionalities have been modified. Furthermore, several architectural system concepts have also been redesigned and constantly re-developed until the final version has been finalized in 2021 and delivered to the court.

Currently, the Sulaymaniyah Appellate Court is operating through an e-court system within the sub-courts presented in Figure. 3.1 as a first pilot project in the KRI, and other Appellate Courts are prepared for the next expansion plan.

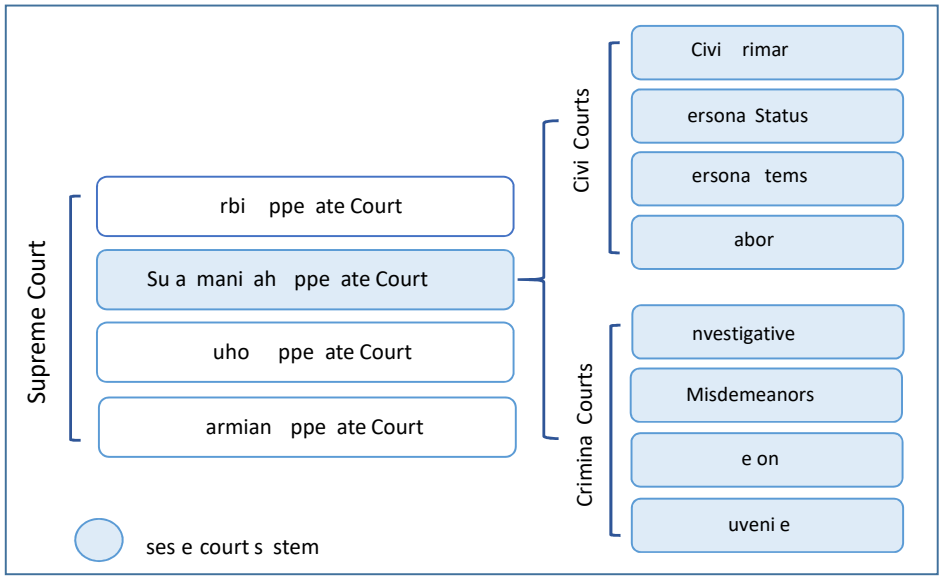

Figure 3.1: Structure of courts in the Kurdistan Region of Iraq

The system provides a wide range of reports that cover the needs of the courts in different terms of judicial reference, giving a simplified way to assess the performance of courts and judges. Hence, giving a clear picture of the work done during a specific period and the amount of stress experienced by the courts results in making appropriate decisions by the administration department for better court organization.

The electronic processes in the e-court system ensure significant benefits and improvements such as *integrity* of information through the implementation of a central database for case records that guarantees the accuracy and consistency of information through all the linked registers. *Security* of

court case data through presenting different layers of authentication, different user categories, and roles per each court with restricted user privileges and permissions according to the specific task. *Confidentiality* of case data is protected through access limitation to only involved and authorized users. *Accessibility* with different channels such as the direct connection from the courthouse, remote connection through a Virtual Private Network (VPN) for authorized users, and public portal for public users from outside the courthouse. *Availability* of the interfaces within three languages, Kurdish, Arabic, and English, extends the usage of the system by different users across different locations. *Flexibility* in searching and indexing court cases and participant information.

The main implemented features and functionalities in the system are summarized in the following points:

3.1 Automatic Case Distribution

Automatic case allocation functionality presents a more transparent process that is seen by all involved users. It ensures fair distribution by considering the complexity of cases (in addition to the number of cases).

3.2 Case Registration

The claim is submitted, and the case is registered electronically in the Prime Register of every court. The system automatically creates connections to other registers [1]. All case participants can access the case simultaneously. This automatic connection results in re-using the data that has already been entered into the system.

3.3 Case Statuses

Implementation of (13) different states[2] of the case simplifies the tracking process of cases by their current status. Moreover, before implementation, old closed paper cases are all added to a separate archiving system.

3.4 Hearing Management

Hearings digitally are more simplified than a paper system. Selecting judges and participants are all managed systematically.

3.5 Court Summons Management

Digital form of court summons and notifications functionality helps keep a better look on undelivered/delivered summonses, which helps plan court hearings.

3.6 Robust Statistics

This functionality provides better possibilities for gathering statistics and the analysis of court statistics regarding the number of incoming and disposed cases. Hence, the backlog will be gathered automatically (instead of manual calculation), and the result will be ready in a matter of seconds.

[1] Prime Register, Daily Register for hearings, Register of Decisions, Register of Referrals, Register of Fines, Register of Trusts, Fee Register, Register of Documents

[2] draft, pending, registered, in next instance; closed, unified, canceled, in supreme court; suspended, abrogated, dropped out, dropped out date passed; in implementation

3.7 Electronic Notification

Electronic notification sends instant notification about every activity performed in the case to all related users. Specific case updates such as case registration, hearings, fees, case participants, and documents are all notified to related case users.

3.8 Remote Access

Through different methods, users can access their case information, get notifications about updates, submit new cases and certificates, and download and upload documents. This functionality builds trust and confidentiality of the public toward the judiciary. Besides the local access inside the courthouse, the system provides:

- Public portal for outside agency users, public users, and lawyers/barristers.
- Virtual Private Network (VPN) to judges, prosecutors, and any other authorized user.

3.9 Onscreen Hearing Monitor

TV screens are installed in the courthouse, next to courtrooms, in order to clarify the schedule of hearings to all the visitors. These screens help better monitoring of the hearings in every court and decrease the waiting time by lawyers/barristers and litigants in a more systematic manner.

3.10 Documents Registration

Documents are all registered digitally. Digital document templates will improve the process of creating documents in several aspects: quality of documents, readability of documents, easier copying, consistent design, and the speed of creating documents.

3.11 User Management

User management section provides a better overview of the roles, views, users, and permissions of every user. The system was implemented for four main user groups and different roles, as detailed in section. 2.3.

3.12 Document Template Management

All system-generated letters, decisions, and certificates are added from the template management section. A Digital document management registry will make creating system-generated document templates easier. The automatically generated templates in the system contribute to faster case processing due to eliminating typing errors, in addition to providing a more organized view in comparison to the manual documents.

3.13 Case-Law

This is the summary of previous court judgments, which will become available online. Presenting the judgment summary is essential functionality for lawyers/barristers and for judges, who will be able to search for summaries of similar cases and refer to them in their ongoing cases.

3.14 Digital and Physical Case File Connection

Bar code for every case is implemented to connect the digital and physical case files. If cases are stored digitally and also parts of them are printed out on paper, there is a need for linking the physical and digital cases to one another. This bar code provides faster case data retrieval.

3.15 Fee Management

Digital fee management simplifies the work of clerks and auditors at the Fee Register. It also helps to acquire better statistics on all paid and unpaid fees. Hence, it enables a better overview of fees (and the dates when they are due).

3.16 Multilingual System

Current system is implemented in three main languages (Kurdish, Arabic, and English). This functionality will aim at decreasing the cost for participants and the court. In the paper system, the language used for reading and writing was Kurdish in most of the courts. Hence, the case participants who were not their primary language was Kurdish; they had to get the official court papers and translate them outside the court to their language, for example, Arabic or English. The current system is equipped with this functionality to generate all court documents in three languages, which saves the cost of translation.

Chapter 4

User Dialogues

This chapter describes the user dialogues of the main processes in the courts and outlines the system (to be) processes:

4.1 Civil Primary Courts

4.1.1 Case Initiation

The document which initiates proceedings is called (a claim) and can be submitted to the court on paper or digitally. The paper claim is submitted to the court by the claimant/lawyer/barrister (in as many copies as there are defendants) and delivered to the desk of the judge. Then, the judge decides whether to order registration of the case (including the payment of the fee) and allocation to a judge or not (orders written on paper attached to the claim). If the judge orders the registration of the case, then the claimant takes the claim to the main office of the court for registration and allocation. Additionally, a digital claim can be submitted through the web portal.

1. The primary clerk enters the view of the Prime Register, and in the top part of the view, data regarding all digitally submitted documents which have not been confirmed yet, is displayed (data has been either entered by the lawyer/barrister or automatically generated):

   - Type/category of the case (entered by the lawyer/barrister).
   - Name of participants (claimant and defendant) and their places of residence (entered by the lawyer/barrister).
   - Name of the judge (automatically allocated).

   If the data is correct, the clerk confirms the registration of the case upon which the case number is generated (based on the type of the court, sequence, and year). If any of the data must be altered, the clerk has the possibility to do that. The file which was submitted by the lawyer/barrister can also be opened from the Prime Register view.

2. The clerk can register all case data described in 1 manually if the claim has been brought to the court on paper:

   - Type/category of the case.
   - Name(s) of participants (claimant and defendant), the number of the ID (if exists), and their places of residence.
   - The clerk can activate automatic allocation of a judge (or choose the judge manually (from a list of judges who qualify to adjudicate the particular type of case).
   - The clerk uploads the scan of the paper claim and attaches it to case data.

3. Data regarding the confidentiality of the case/proceeding may be manually entered as well (e.g., there are no automatic processes that decide the confidentiality of the case).

4. The primary clerk can print out the main data of the case (number, participants, and others.) on a label to be stuck on the file. The system generates the barcode of the case, which is added to the label, and a separate page of barcode labels can be printed out to be added to the file for attachment on case documents (in order to enable quick find-function with scanners).

5. After registration of the case in the Prime Register, the system creates the Electronic File View (a web form), which can be used for entering and viewing case specific data in addition to the register-based views.

6. Entry of data regarding the physical location of the paper file (from the Electronic File View): name of the clerk/judge who has the file can be added, as well as comments regarding the location of the file. If the user of the specific barcode reader is registered in the system, the system is able to change the location of the paper file automatically based on the use of the barcode reader.

7. Entry of data regarding the stage of the case: value can be chosen from a complete list of stages (e.g., payment of fees, the appointment of the hearing, delivery of summons, hearing, and case closed).

8. Throughout the duration of the proceedings, the clerks can add participants to the case (e.g., representatives of parties, third parties, experts, and witnesses). The list of lawyers/barristers who provide state-financed legal aid and experts who have been sworn by the court is entered into the system, and lawyers/barristers and experts can be appointed as participants from this list based on criteria like specialization and number of previous appointments.

9. The system enables deleting and correction of data entered by mistake (including deleting the case/proceeding).

The process of case initiation is presented in Figure. 4.1.

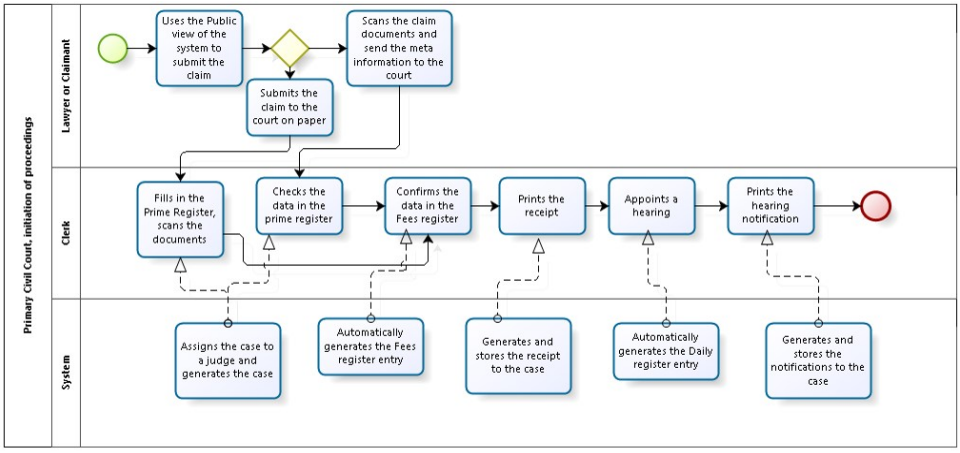

Figure 4.1: Civil Court case initiation

4.1.2 Fee Registration

Fee registration is part of the case initiation process and described in Figure. 4.1. Fees are paid in cash or – in the case of lawyers/barristers – with sticking stamps that have been bought from the Bar Association and verify the payment of a fee in the necessary amount onto the claim.

1. Fees clerk identifies the case/claimant:

   - The cases which have been registered last and for which the fees haven't been paid are displayed in the top part of the Fee Register;

- If necessary, it is possible to search the case according to the case number or the name of the claimant/defendant; the name of the judge.
- Uses the barcode-based quick-find function.

After identifying the cause, the clerk reuses the data already entered regarding the case in the Prime Register (number, date of registration, names of parties, case type) for entering case specific data into the Fee Register.

2. Fees clerk enters the value of the claim and the appropriate amount of the fee (currently 0-75 000 dinars) to be paid to the Fee Register. Alternately, data regarding the reasons for not paying the fee upon submission of the claim can be entered (e.g., judicial aid). In the case of judicial aid, the clerk can enter the date by which the fee is to be paid (this can also be done at the stage of terminating proceedings).

3. After payment, the fees clerk prints the receipt (form automatically filled out with case specific data, including the barcode of the case) to be handed to the claimant. The receipt is added to the documents of the case;

4. Auditor can confirm the payment after the print of the receipt. The clerk and auditor have the same view in the Fee Register, but only the user rights of the auditor enable them to push the button confirm. This enables – if at some point the role of the auditor becomes unnecessary – to appoint a clerk with the same user rights as auditor and do both of the processes (entering of data and confirmation) by the same clerk.

5. Data on the payment of the fee is added to the Electronic File View.

6. The function of payment of fees can be repeated during the course of the proceedings, and other participants, in addition to the initial claimant, can also pay fees and other types of payments (e.g., deposits). In addition, data regarding the fact that a deposit (or any other payment registered in the Fee Register) is paid to a third party (expert) can be registered.

4.1.3 Hearing Appointment

The hearing appointment is part of the case initiation process and described in Figure. 4.1.

1. Appointments clerk identifies the case:

   - The cases which have been registered and for which the fee has been paid, but have no hearing, are displayed in the top part of the Daily Register as unregistered entries;
   - Searches the case according to the case number or the name of the claimant/defendant.
   - Uses the barcode-based quick-find function.

   After identifying the case, the clerk selects the case to reuse the data already entered regarding the case in the Prime Register (number, date of registration, names of parties, names of the judge(s) and clerk(s) participating in the hearing, case type) for entering case specific data to the Daily Register.

2. Appointments clerk enters the date/time of the hearing in the Daily Register:

   - The date/time can be manually entered on any given working day using the calendar view (If necessary, the clerk can appoint hearings in several cases to the same date/time).
   - The system automatically identifies the next available date (and two alternatives) which meets the criteria (according to case type-specific rules and judge-specific rules). The clerk can accept the automatically offered date or enter the date/time manually.
   - The chosen date/time is added to the Daily Register and the file view of the case (under hearings of the case). If the chosen date does not meet the deadlines set in the law, the system displays a warning.

3. The appointments clerk marks the participants of proceedings who are invited to the hearing, court clerks attending the hearing, and enters other relevant data regarding the hearing (e.g., confidentiality).

4. Postponing the hearing: Data entered regarding the reasons for postponing the hearing. E.g., need for an expert, additional document/evidence.

5. steps 1 through 3 can be repeated over and over again during the course of the proceedings (if hearings are postponed or there is a need for additional hearings).

4.1.4 Elaboration of Summonses

1. The clerk initiates the automatic elaboration of summonses for a particular hearing and the relevant participants of proceedings from the Daily Register view or from the Electronic File View of the case.

2. The summonses are template-based documents to which case specific data is entered upon generation (including the picture of the signature of the judge in green color and the barcode). There are different templates based on the type of the proceeding and also the type of the participant. If there are several templates for the particular type of case/participant, the clerk must choose the appropriate template.

3. The summonses are added to the list of the case documents in the Electronic File View.

4. After elaboration, the summons can be printed in as many copies as necessary (usually depending on the number of participants).

5. Automatic entry regarding the summons is made to the Register of Notifications and simultaneously also to the Register of Incoming and Outgoing Documents. (with the automatic generation of data regarding the deadline for notification). From the Register of Notifications, the Notification Department/Summoner will get the information regarding the summonses which need to be delivered (it is possible to search summonses according to the date of elaboration, date of the hearing, number of the case, judge, name of the participant, date of delivery, sent/not-sent/delivered summonses).

The summons is taken on paper to the person who deals with posting/delivery. The process of summons elaboration is presented in Figure. 4.2.

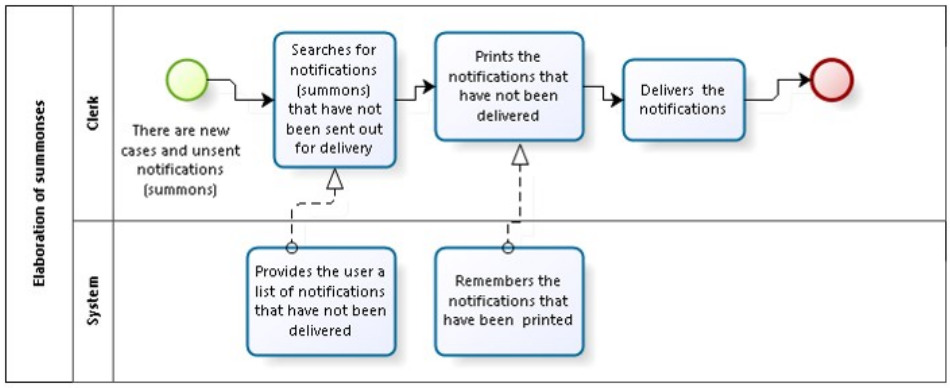

Figure 4.2: Elaboration of summonses

4.1.5 Registration of the Delivery of Summonses or any other Document

The registration and delivery of summonses processes are as in the following steps:

1. Notifications clerk identifies the case
   - Searches the case according to the case number or the name of the claimant/defendant, name of the judge (enters the Electronic File View and locates the entry for the delivered document).
   - Uses the view of the upcoming hearings (based on the Daily Register) or the Register of Notifications (according to type/court) and searches for the hearing/summons from these registries.
   - Uses the barcode-based quick-find function to locate the summons which has been delivered.
2. Notifications clerk enters the data regarding the delivery of the notification/another document to a particular addressee (from the register view, the entered data is stored in the register and the Electronic File View):
   - Result of the delivery attempt (successful/non-successful).
   - Date of the attempt.
   - Any other relevant data.

The process of registration and delivery is described in Figure. 4.3

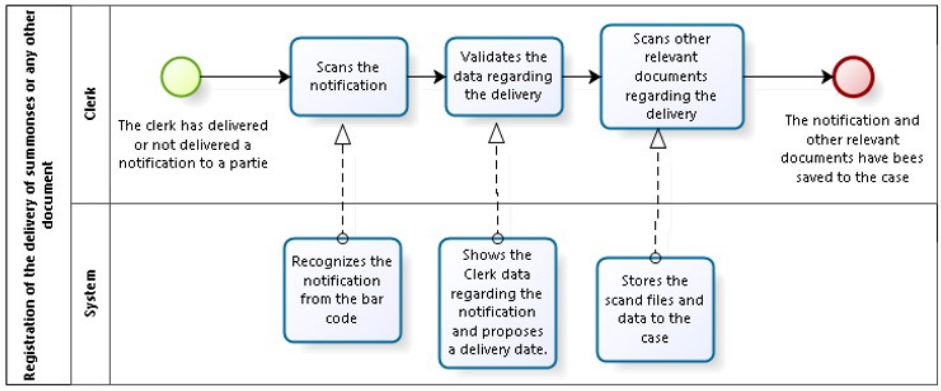

Figure 4.3: Registration of the delivery of summonses or any other document

The processes of registration and delivery of documents (incoming and outgoing) are as in the following steps:

1. Clerk/judge identifies of the case:
   - Searches the case according to the case number or the name of the claimant/defendant, name of the judge, and enters the Electronic File View.
   - Uses any of the views of the registries and clicks on the case number as a link to enter the Electronic File View.
   - Uses the barcode-based quick-find function to access the Electronic File View.

   Or initiates entry to the Register of Incoming and Outgoing Documents (if the document is submitted digitally by an outside party – see use-case after the next – the entry is already there as a document to be registered).

2. Entry of document-specific data (can be initiated from the Electronic File View or from the Register of Incoming and Outgoing Documents):
   - Type and sub-type.
   - Submitter/elaborator.
   - Date (including the date of elaboration, sending date, delivery date).
   - Confidentiality of the document/restrictions regarding the visibility of the document (including the visibility to the participants of proceedings through the web portal.
   - Data regarding the delivery/non-delivery (if relevant)
3. Uploading the file or automatic generation of the file using the pre-entered data regarding the case or the document.
4. If the registration process is initiated from the Electronic File View, the document is automatically registered also in the Document Registry or the Register of Decisions if the document terminates proceedings.

This processes is described in Figure. 4.4.

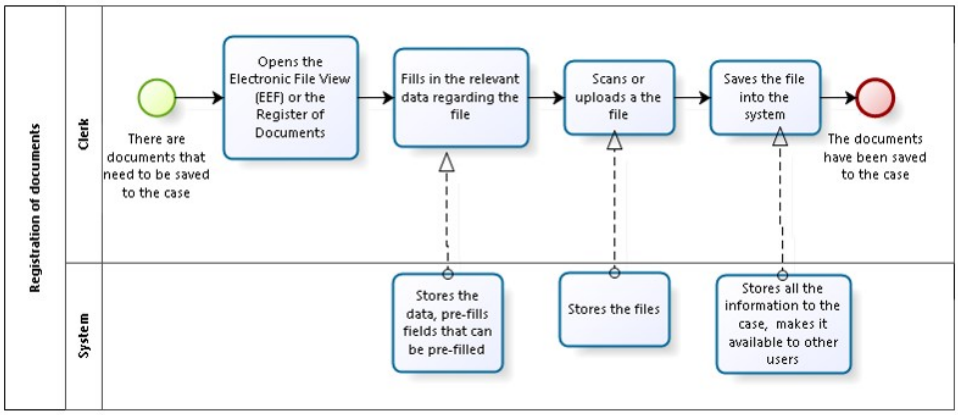

Figure 4.4: Registration of documents (incoming and outgoing)

4.1.6 Submission of Documents by an Outside Party

1. The outside party enters the webpage for submission of documents.
2. The outside party identifies the case to which the document is to be submitted (using number, name of the participants, judge).
3. Entry of document-specific data:
   - Type and sub-type.
   - Submitter/elaborator.
   - Date (including the date of elaboration, sending date, delivery date).
   - Confidentiality of the document/restrictions regarding the visibility of the document (including the visibility to the participants of proceedings through the web portal.
   - Data regarding the delivery/non-delivery (if relevant)
4. Uploading the file(s).
5. Submission of the document. Upon submission, the document does not get a number, and the number is generated upon confirmation by a court clerk.

6. The submitted document is displayed in the view of the Registry of Incoming and Outgoing Documents and the Electronic File View as a document to be registered. After confirmation by a clerk, the document becomes a real case document with a number.

7. Through the outside view web page, the outside party can:

   - Search for cases where the lawyer/barrister is a participant (represents somebody or is himself/herself a claimant or defendant).
   - Submit documents to existing cases and submit documents for the initiation of a new case(if appropriate user rights exist).
   - View documents of the case and data regarding the hearings in the case (if appropriate user rights exist).
   - View notices regarding events and documents.

This processes is described in Figure. 4.5.

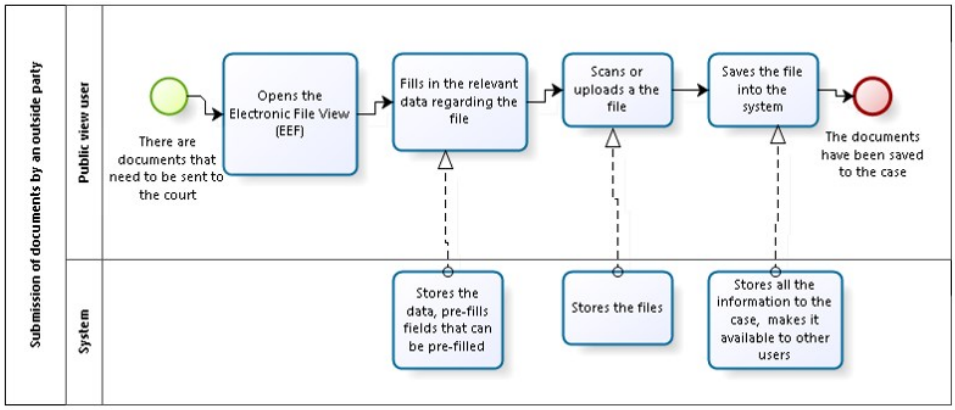

Figure 4.5: Submission of documents by an outside party (a registered lawyers/barristers)

4.1.7 Linking Cases

Linking of cases is used when two or more cases are relevant to each other's proceedings. The cases are linked together so that the judge and clerks can easily locate the other relevant cases and check the stage they are in. Proceedings continue in both of the cases in their own manner.

1. Identification of the case to be linked (is initiated from the Electronic File View of the case to which the case is to be linked):

   - Clerk searches the case according to the case number or the name of the claimant/defendant, name of the judge.
   - Uses the barcode-based quick-find function.

2. Clerk identifies the correct case to be linked, enters data regarding the nature of the association, and confirms the creation of a link.

3. The fact that two cases are linked is visible from the Electronic File View of both cases.

The process of linking case to one another is presented in Figure. 4.6.

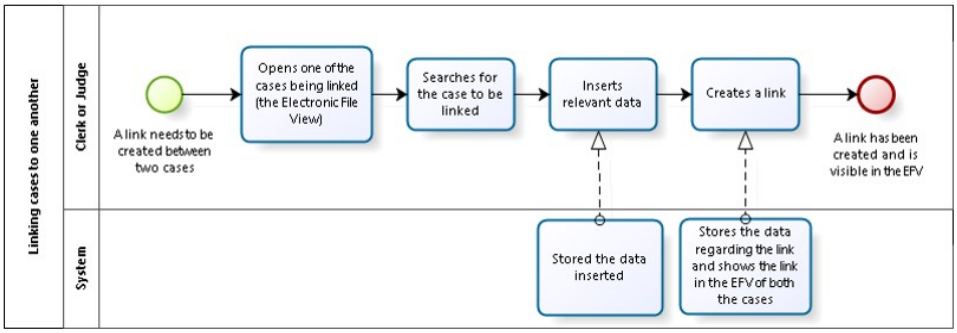

Figure 4.6: Linking cases to one another

4.1.8 Unification of Cases

Unification means that two or more cases are connected in a manner that requires managing them together so that the court chooses one case as the main case where the proceedings of all unified cases are continued.

1. Identification of the case to be unified (unification can be initiated from the Electronic File View of the main case or the case to be unified):
   - Clerk searches the case according to the case number or the name of the claimant/defendant, name of the judge.
   - Uses the barcode-based quick-find function.
2. Clerk identifies which will be the main case after the unification, identifies the participants, the paid fees, and documents that have to be transferred to the main case, and confirms the unification. An order which unifies two cases is uploaded to both of the cases. The proceedings continue in the main case, and the other case will move into the stage of "unified" (similar to terminated/solved). The numbers of the cases do not alter due to the fact of unification; simply, proceedings will continue under the number of the "master case".

The unification process is presented in Figure. 4.7.

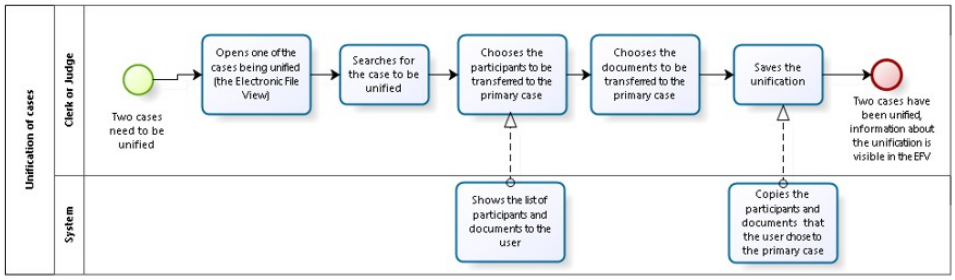

Figure 4.7: Unification of cases

4.1.9 Detachment of Cases

Detachment of a case into two separate cases is carried out in order to manage cases more efficiently (e.g., one of the claims can be dealt with in a faster fashion, etc.).

1. Identification of the case to be detached (detachment can be initiated from the Electronic File View):

- Clerk searches the case according to the case number or the name of the claimant/defendant, name of the judge.
- Uses the barcode-based quick-find function.

2. Clerk identifies the participants and documents which have to be transferred or copied to the detached case and confirms the detachment. An order which detaches cases is uploaded to both of the cases. The detached case will get a new number (the existing case from which the detachment was initiated keeps the number). Proceedings will continue in both of the cases, and a judge is allocated to the detached case (can be the same as the existing judge or a new one).

The detachment process is presented in Figure. 4.8.

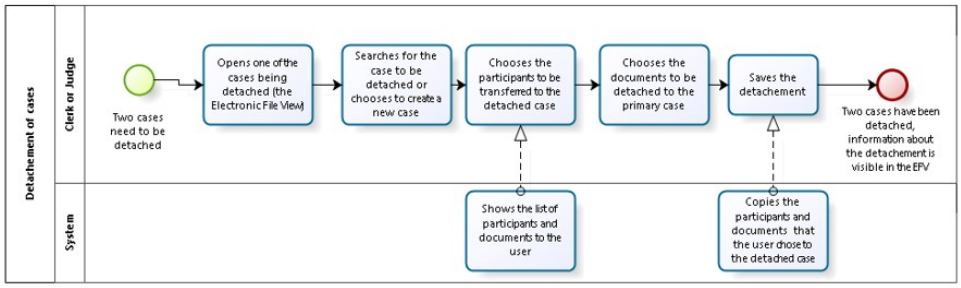

Figure 4.8: Detachment of cases

4.1.10 Termination of Proceedings

1. Clerk/judge identifies the case:

   - Searches the case according to the case number or the name of the claimant/defendant, name of the judge.
   - Uses any of the views of the registries.
   - Uses the barcode-based quick-find function.

   Or initiates entry to the Register of Documents by entering the case number upon which all relevant data is automatically retrieved.

2. Entry of document-specific data (can be initiated from the Electronic File View or from the Register of Documents):

   - Type (certain document types can automatically terminate proceedings).
   - Elaborator (name of the judge).
   - Date.
   - Confidentiality of the document/restrictions regarding the visibility of the document.
   - Data regarding the delivery/non-delivery (if relevant).
   - Data regarding the fact of termination (reasons, outcomes, referral to other courts, and others).
   - Data regarding what happens to the fee paid by the claimant or which was supposed to be paid but the payment of which got suspended due to judicial aid (e.g., does the defendant have to compensate the fees; does the claimant have to pay them by a certain date).
   - The summary of the judgment (for publication to other users of E-Court and to be published on the website of the court).

3. Uploading the file or automatic generation of the file using the pre-entered data regarding the case or the document.

4. If the registration process is initiated from the Electronic File View, the document is automatically registered also in the Document Registry.

5. The stage of the case becomes "case solved" and the announcement of the final judgment. Usually done at the final hearing of the case.

The process of case closing and case proceeding termination is presented in Figure. 4.9.

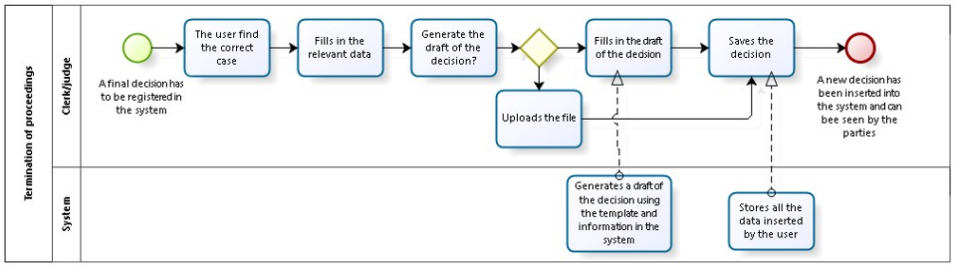

Figure 4.9: Termination of proceedings

4.2 Personal Status Courts and Personal Items Court

In the Personal Status Courts and Personal Items Court, there are two main types of proceedings, claim or case proceeding, that settles disputes between parties, and the process involves hearing. A certificate proceeding is the issuance of a document by a court to certify specific matters such as birth certificates, death certificates, and others. The process does not involve any hearing. Personal Status Court manages cases and certificates for Muslims. Personal Items Court manages both case proceedings and certificate proceedings for other religions. The case proceeding processes are similar to the Civil Primary Court.

4.2.1 Case Initiation

Same process as described in Sub-Section. 4.1.1 and Figure. 4.1.

4.2.2 Fee Registration

Same process as described in Sub-Section. 4.1.2.

4.2.3 Hearing Appointment

Same process as described in Sub-Section. 4.1.3.

4.2.4 Elaboration of Summonses

Same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.2.5 Registration of the Delivery of Summonses or any other Document

Same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.2.6 Submission of Documents by an Outside Party

Same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.2.7 Linking Cases

Same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.2.8 Unification of Cases

Same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.2.9 Detachment of Cases

Same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.2.10 Termination of Proceedings

Same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

4.2.11 Certificate Proceeding Initiation

The certificate proceedings are similar to cases, but the process is without hearing and the participants of proceedings are called in a different manner (e.g. claimant = applicant). The process is presented in Figure. 4.10.

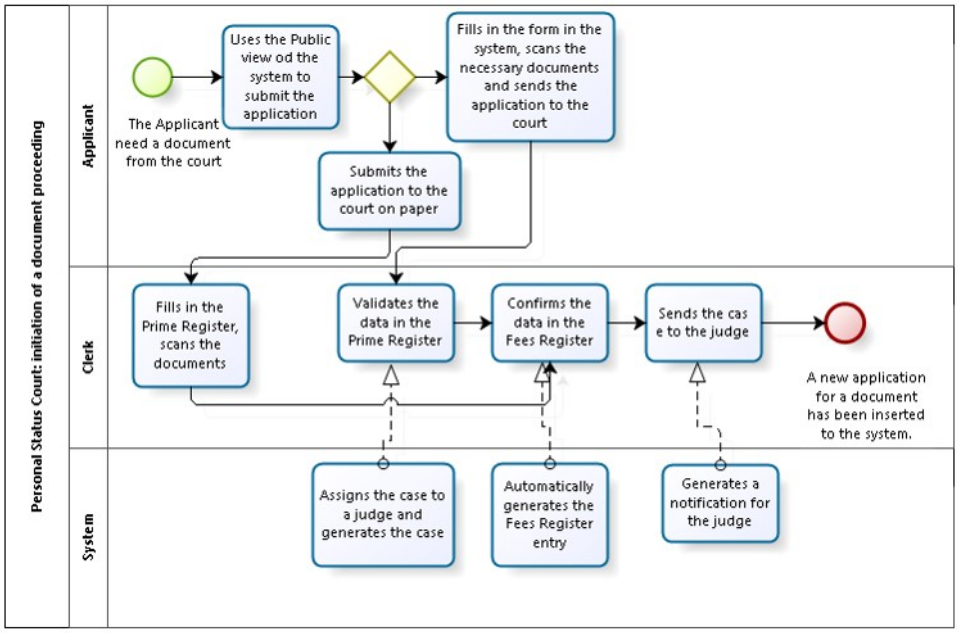

Figure 4.10: Personal Status Court and Personal Items Court certificate application initiation

4.2.12 Certificate Proceeding Termination

The issuance of the certificate document terminates the process as presented in Figure. 4.11.

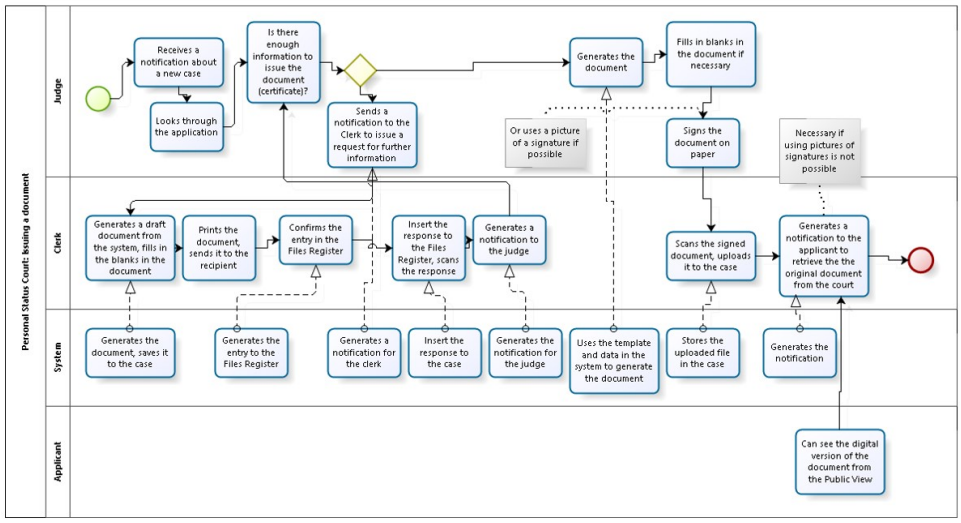

Figure 4.11: Personal Status Court and Personal Items Court registration of the certificate document which terminates proceedings

4.3 Investigative Courts

4.3.1 Case Initiation

Usually, the investigative case is initiated in the police office upon a complaint. The police then submit the case to the court for further instructions. Alternatively, the court can initiate a criminal case as well, and then step 1 is skipped.

1. Submission of the case/complaint to Investigative Court:
   - The police can search for existing cases of the defendant (according to the name of the defendant, type of the case, date of initiation) to find out if an identical case has been already initiated by the court. If an existing case exists, the police submit a document to the existing case.
   - If no identical cases exist, the police enter the police number of the case, the names of participants, the type of the proceedings (based on territorial specialization)) and upload the files regarding the case and submits the case to the court.
2. Registration of the case in the court:
   - The primary clerk registers the case in the Prime Register. If the case is submitted by the police, the primary clerk selects the already existing case data from the view of incoming cases. If the case is initiated in court, all data is entered by the prime clerk.
   - The primary clerk enters/changes the basic data regarding the case to the Prime Register – the name of the participants, their places of residence, their representatives, a summary of the case (if possible, then automatically generated), and reference to the Article which has been breached.
   - The system has already automatically allocated the judge to the case (based on the type of territorial jurisdiction) of the case. If necessary, the clerk can manually allocate the case to a different judge.
   - If the clerk confirms the correctness of the data entered, the system generates the number of the case (based on the type of the court, sequence, and year). Connection with the police number must be maintained.

- Data regarding the confidentiality of the case/proceeding may be entered as well.
- The primary clerk can print out the main data of the case (number, participants, and others) on a label to be stuck on the file. The system generates the barcode of the case, which is added to the label, and a separate page of barcode labels can be printed out to be added to the file for attachment on case documents (in order to enable quick find-function with scanners).
- The system creates the case-file view, which can be used for entering and viewing case specific data in addition to the register-based views.
- Entry of data regarding the physical location of the paper file (from the case-file view): name of the clerk/judge who has the file can be added, as well as comments regarding the location of the file.
- Entry of data regarding the stage of the case: value can be chosen from a complete list of stages (e.g., an arrest warrant for the defendant, a case referred to the competent court, and others).
- Throughout the duration of the proceedings, the clerks can add participants to the case (e.g., representatives of parties, third parties, experts, and witnesses). The list of lawyers/barristers who provide state-financed legal aid and experts who have been sworn by the court is entered into the system, and lawyers/barristers and experts can be appointed as participants from this list based on criteria like specialization and number of previous appointments.
- The system enables deleting and correction of data entered by mistake (including deleting the case/proceeding).

The process of case initiation in in the Investigative Courts is presented in Figure. 4.12

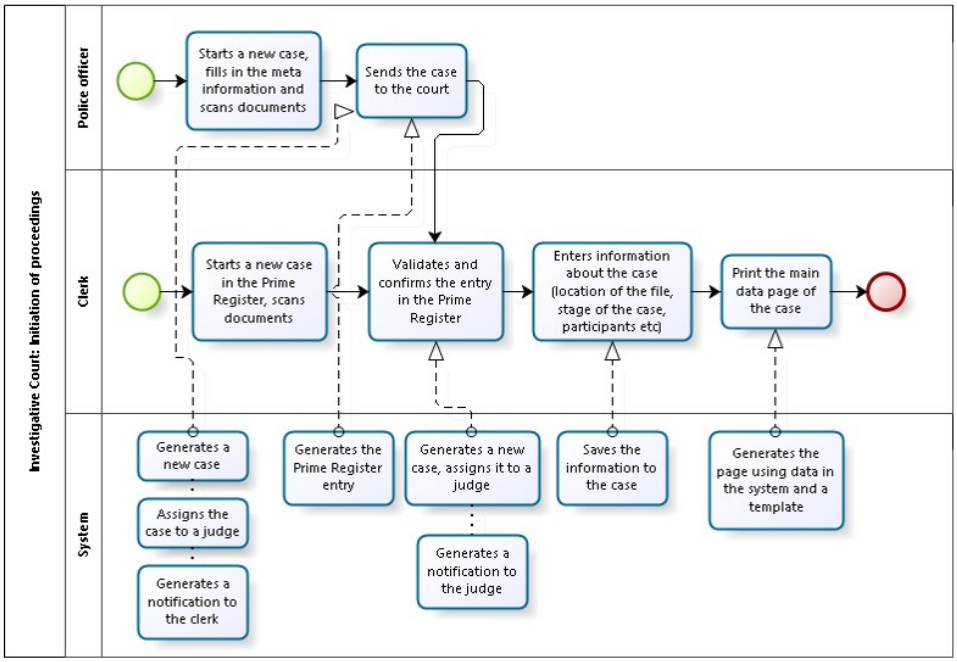

Figure 4.12: Investigative Court case initiation

4.3.2 Registration of Documents

During the investigative proceedings, the police submit documents to the court, and the court gives orders on the basis of these documents or independently. These documents are sent to the police, and

the prosecution can appeal these orders to the criminal court.

The process is similar to the document registration process in the Civil Primary Courts, with the difference that there are no summonses and notification clerks as described in the following steps:

1. Clerk/judge identifies the case:
   - Searches the case according to the case number or the name of the defendant, name of the judge.
   - Uses any of the views of the registries.
   - Uses the barcode-based quick-find function.

   Or initiates entry to the register of documents (if the document is submitted by an outside party – see next use-case – the entry is already there as a document to be registered).
2. Entry of document-specific data (can be initiated from the Electronic File View or from the Register of Documents):
   - Type.
   - Submitter/elaborator.
   - Date.
   - Confidentiality of the document/restrictions regarding the visibility of the document.
   - Data regarding the delivery/non-delivery (if relevant), including data regarding the fact that the document must be visible to the prosecutor/police.
   - Data regarding the content of the order (bail, arrest warrant, and others).
3. Uploading the file or automatic generation of the file using the pre-entered data regarding the case or the document.
4. If the registration process is initiated from the Electronic File View, the document is automatically registered also in the Document Registry.
5. Registration of certain types of documents may be followed by an initiation of a new proceeding in the existing case in the competent criminal court. The new proceeding gets a new number but must be attached to the original case in the Investigative Court.

4.3.3 Submission of Documents by an Outside Party

The outside party in the Investigative Courts usually represents the police and prosecutors. The process is similar to the document submission in the Civil Primary Courts but with the focus on the police and prosecutors as described in the following steps:

1. The outside party enters the outside view web page of E-Court.
2. The outside party identifies the case to which the document is to be submitted (using number, name of the participants, judge).
3. Entry of document-specific data.
4. Uploading the file.
5. Submission of the document.
6. The submitted document is displayed in the view of the Document Registry and the Electronic File View as a document to be registered.
7. In addition, the outside party (the prosecutor) can add comments to an existing document of the case or to the case in general.
8. Certain types of documents may not be submitted to the Investigative Court but to the competent criminal court (appeal as cassation) where a new proceeding is initiated in the existing case. The new proceeding gets a new number but must be attached to the original case in the Investigative Court.

4.3.4 Linking Cases

Same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.3.5 Unification of Cases

Same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.3.6 Detachment of Cases

Same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.3.7 Termination of Proceedings

The process starts with declaring the final judgment decision and is presented in Figure. 4.13.

1. The clerk uploads the final judgment as a document and enters relevant data.
2. If the judgment involves imprisonment, the judgment is finalized in 7 days after the judgment if no one appeals.

Another method is that the Investigative Court refers the case to the competent court (if the crime is a felony or misdemeanor) as the process is presented in Figure. 4.14.

1. The clerk uploads the referral order as a document and enters relevant data. Relevant data includes the data regarding the referral:
   - In non-summary cases refers the case to the competent court (Felony, misdemeanor, Juvenile) via prosecution.
   - In summary cases refers straight to the competent court.
2. The case is appointed a referral number.

As presented in Figure. 4.15, the Investigative Court closes the proceedings due to lack of evidence. In this case, the clerk uploads the final order as a document and enters relevant data. The file is returned to the police, and the case is re-opened if new evidence surfaces.

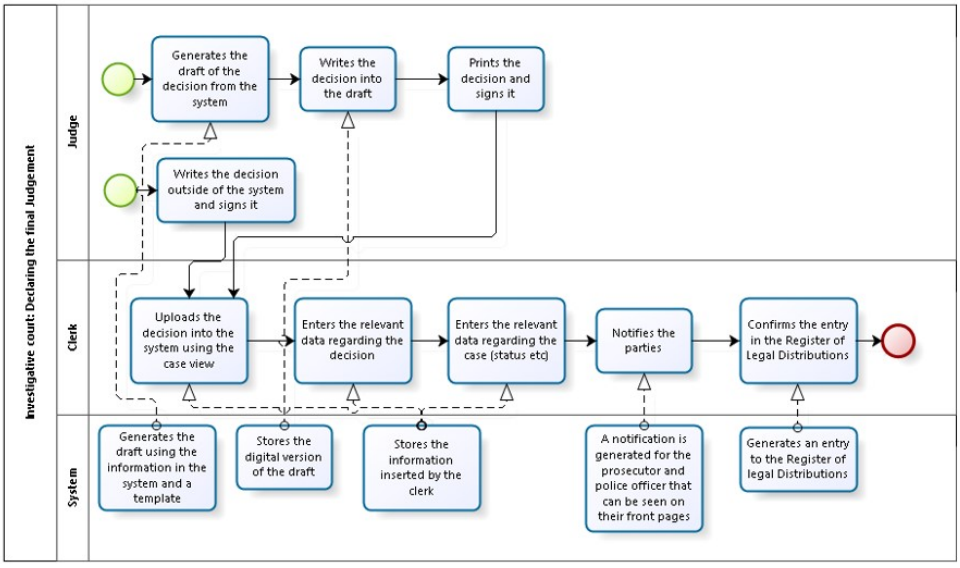

Figure 4.13: Termination of investigative proceedings

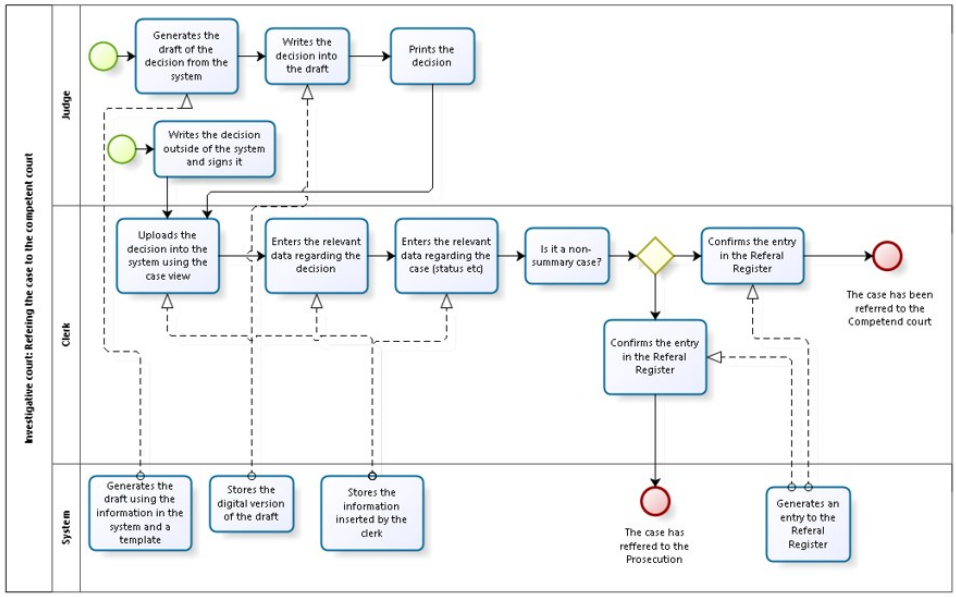

Figure 4.14: The Investigative Court refers the case to the competent court (if the crime is a felony or misdemeanor)

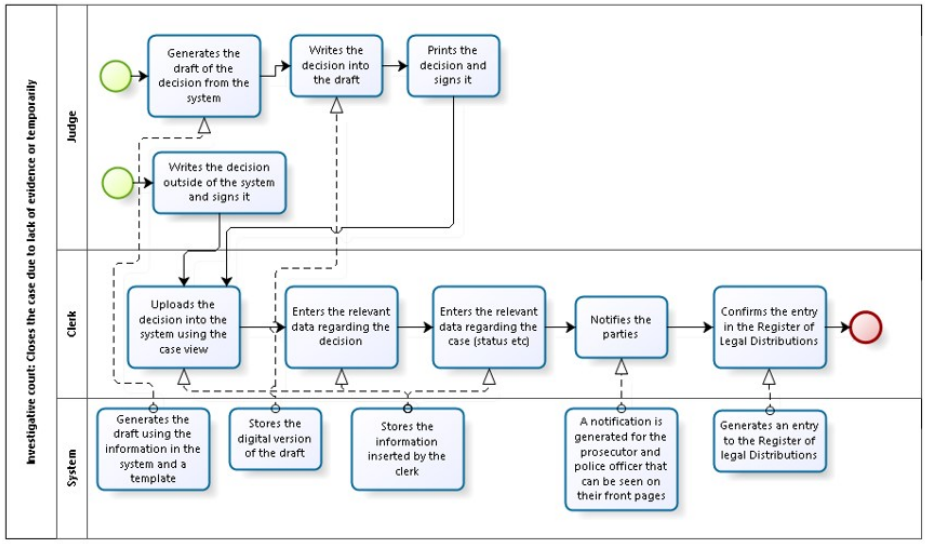

Figure 4.15: The Investigative Court closes the proceedings due to lack of evidence

4.4 Felony Courts

Felony court is one type of criminal courts, and the process of case management in all criminal courts is similar; therefore, in this section, also Juvenile and misdemeanor Courts also stated in some part of

the content.

4.4.1 Case Initiation

The case is referred to the appropriate criminal courts, including (Felony, Juvenile, and Misdemeanor) by the Investigative Court or by the prosecution. Upon referral, the case is allocated to a judge automatically, based on the type of the court and the caseload or workload of judges. Alternatively, when an appeal document is lodged by the prosecutor, a new proceeding can be initiated in an existing case.

1. Upon referral, the case/proceeding is allocated to a judge automatically, based on the type of the court and the caseload or workload of judges. In Criminal Courts, judges sit in a panel of three – automatic allocation is based on the settings and caseload/workload of the head of the panel. The other two judges may be appointed as a fixed panel automatically or manually. In Juvenile Court – the lay judges – are also appointed in a similar manner.

2. The primary clerk registers the case/proceeding in the Prime Register using the data submitted from the Investigative Court or prosecution and by correcting/adding data. The clerk can manually allocate the case to a different judge (from a list of judges who qualify) or initiate the allocation if the judge has not been appointed yet.

3. The system generates the number of cases/proceedings (based on the type of the court, sequence, and year).

4. Data regarding the confidentiality of the case/proceeding may be entered as well.

5. The primary clerk can print out the main data of the case/proceeding (number, participants, and others) on a label to be stuck on the file. The system generates the barcode of the case/proceeding, which is added to the label, and a separate page of barcode labels can be printed out to be added to the file for attachment on case documents (in order to enable quick find-function with scanners).

6. The Electronic File View is created, which can be used for entering and viewing case specific data in addition to the register-based views.

7. Entry of data regarding the physical location of the paper file (from the case-file view): name of the clerk/judge who has the file can be added, as well as comments regarding the location of the file. If the user of the specific barcode reader is registered in the system, the system is able to change the location of the paper file automatically based on the use of the barcode reader.

8. Entry of data regarding the stage of the case: value can be chosen from a complete list of stages (e.g., the appointment of the hearing, delivery of summons, hearing, and case closed).

9. Throughout the duration of the proceedings, the clerks can add participants to the case (e.g., representatives of parties, third parties, experts, and witnesses). The list of lawyers/barristers who provide state-financed legal aid and experts who have been sworn by the court is entered into the system, and lawyers/barristers and experts can be appointed as participants from this list based on criteria like specialization and number of previous appointments.

10. The system enables deleting and correction of data entered by mistake (including deleting the case/proceeding).

The case initiation process in competent criminal courts is presented in Figure. 4.16

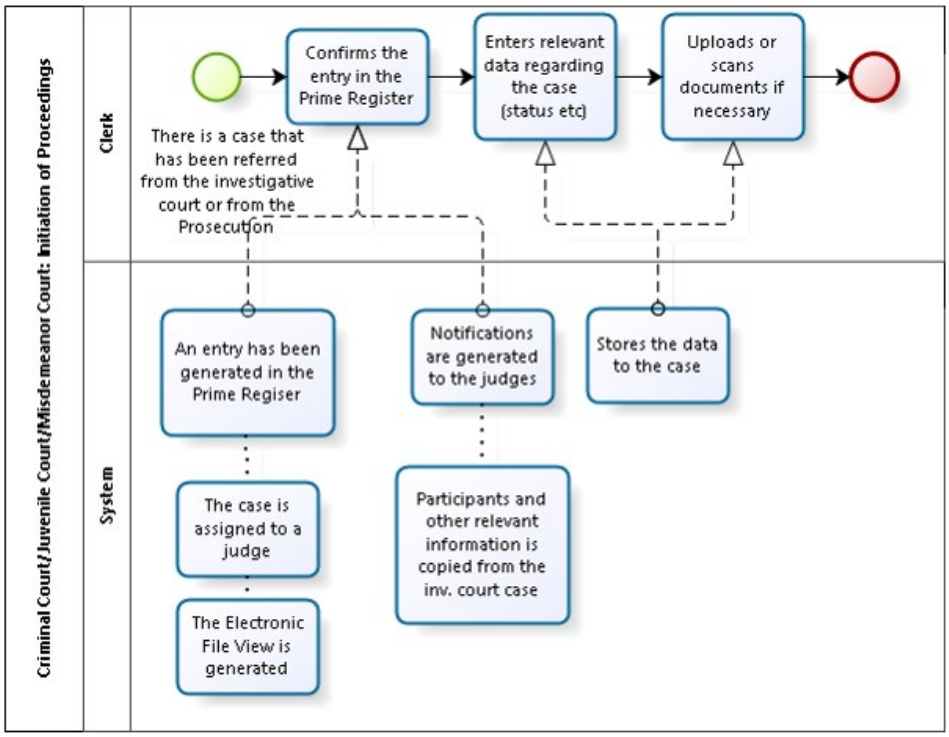

Figure 4.16: Criminal Courts (Felony, Juvenile, and Misdemeanor) case initiation

4.4.2 Hearing Appointment

The hearing appointment process is part of the case initiation process. The process of hearing appointments is similar to the process in the Civil Primary Courts but without fee payments. Therefore, the following steps detail the hearing appointment in Felony Court.

1. Appointments clerk identifies the case:
   - Searches the case according to the case number or the name of the defendant.
   - Uses the view of the last registered cases (according to type/court).
   - Uses the barcode-based quick-find function.

   After identifying the case, the clerk selects the case to reuse the data already entered regarding the case in the Prime Register for entering case specific data into the Daily Register.

2. Appointments clerk enters the date/time of the hearing in the Daily Register:
   - The date/time can be manually entered on any given working day using the calendar view (If necessary, the clerk can appoint hearings in several cases to the same date/time).
   - The system automatically identifies the next available date (and two alternatives) which meets the criteria (according to case type-specific rules and judge-specific rules). The clerk can accept the automatically offered date or enter the date/time manually.

3. The chosen date/time is added to the Daily Register and the file view of the case (under hearings of the case). If the chosen date does not meet the deadlines set in the law, the system displays a warning.

4. The appointments clerk marks the participants of proceedings who are invited to the hearing and enters other relevant data regarding the hearing (e.g., confidentiality).
5. Postponing the hearing: Data entered regarding the reasons for postponing the hearing. E.g., need for an expert, additional document/evidence.

4.4.3 Elaboration of Summonses

Same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.4.4 Registration of the Delivery of Summonses or any other Document

Same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.4.5 Submission of Documents by an Outside Party

Same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.4.6 Linking Cases

Same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.4.7 Unification of Cases

Same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.4.8 Detachment of Cases

Same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.4.9 Termination of Proceedings

Same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

4.5 Juvenile Court

4.5.1 Case Initiation

Same process as described in Sub-Section. 4.4.1 and Figure. 4.16.

4.5.2 Hearing Appointment

Same process as described in Sub-Section. 4.4.2.

4.5.3 Elaboration of Summonses

Same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.5.4 Registration of the Delivery of Summonses or any other Document

Same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.5.5 Submission of Documents by an Outside Party

Same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.5.6 Linking Cases

Same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.5.7 Unification of Cases

Same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.5.8 Detachment of Cases

Same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.5.9 Termination of Proceedings

Same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

4.6 Misdemeanor Courts

4.6.1 Case Initiation

Same process as described in Sub-Section. 4.4.1 and Figure. 4.16.

4.6.2 Hearing Appointment

Same process as described in Sub-Section. 4.4.2.

4.6.3 Elaboration of Summonses

Same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.6.4 Registration of the Delivery of Summonses or any other Document

Same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.6.5 Submission of Documents by an Outside Party

Same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.6.6 Linking Cases

Same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.6.7 Unification of Cases

Same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.6.8 Detachment of Cases

Same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.6.9 Termination of Proceedings

Same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

4.7 Labour Courts

The Labour Court reviews civil and criminal cases. Civil case processes are similar to all processes in the Civil Primary Courts, and for criminal cases, processes are similar to the Felony Courts.

4.7.1 Case Initiation

For civil cases same process as described in Sub-Section. 4.1.1 and Figure. 4.1. For criminal cases, same process as described in Sub-Section. 4.4.1 and Figure. 4.16.

4.7.2 Fee Registration

Fee is paid only for civil cases and same process as described in Sub-Section. 4.1.2.

4.7.3 Hearing Appointment

For civil cases same process as described in Sub-Section. 4.1.3. For criminal cases same process as described in Sub-Section. 4.4.2.

4.7.4 Elaboration of Summonses

For civil and criminal cases same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.7.5 Registration of the Delivery of Summonses or any other Document

For civil and criminal cases same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.7.6 Submission of Documents by an Outside Party

For civil and criminal cases same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.7.7 Linking Cases

For civil and criminal cases same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.7.8 Unification of Cases

For civil and criminal cases same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.7.9 Detachment of Cases

For civil and criminal cases same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.7.10 Termination of Proceedings

For civil and criminal cases same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

4.8 Appellate Court

The processes in the Appellate Court are similar to the processes in Civil Primary Courts (while reviewing civil cases) and the Misdemeanor Courts (while reviewing misdemeanor cases). In addition, in the Appellate Court, new proceedings are initiated in existing cases (appeal proceedings, appeal as cassation proceedings). The number of the Appellate Court proceeding is different from the number of the proceeding in the court of the first instance, but the proceedings must be attached. The additional exception lies in the fact that in all Appellate Court cases, judges sit in a panel of three. The Appellate Court is composed of 2 appeal types (ordinary appeal and appeal as cassation). The ordinary appeal processes are similar to Civil Primary Courts. The appeal as cassation manages both civil and criminal cases. There is no hearing in the appeal as cassation cases.

4.8.1 Case Initiation

For civil cases same process as described in Sub-Section. 4.1.1 and Figure. 4.1. For criminal cases, same process as described in Sub-Section. 4.4.1 and Figure. 4.16.

4.8.2 Fee Registration

Fee is paid only for civil cases and same process as described in Sub-Section. 4.1.2.

4.8.3 Hearing Appointment

For civil cases and only in ordinary appeal same process as described in Sub-Section. 4.1.3. For criminal cases managed by appeal as cassation there is no hearing involved in the process.

4.8.4 Elaboration of Summonses

For civil cases and only in ordinary appeal same process as described in Sub-Section. 4.1.4 and Figure. 4.2.

4.8.5 Registration of the Delivery of Summonses or any other Document

For civil cases and only in ordinary appeal same process as described in Sub-Section. 4.1.5 and Figure. 4.3, and Figure. 4.4.

4.8.6 Submission of Documents by an Outside Party

For civil and criminal cases in both ordinary appeal and appeal as cassation same process as described in Sub-Section. 4.1.6 and Figure. 4.5.

4.8.7 Linking Cases

For civil and criminal cases in both ordinary appeal and appeal as cassation same process as described in Sub-Section. 4.1.7 and Figure. 4.6.

4.8.8 Unification of Cases

For civil and criminal cases in both ordinary appeal and appeal as cassation same process as described in Sub-Section. 4.1.8 and Figure. 4.7.

4.8.9 Detachment of Cases

For civil and criminal cases in both ordinary appeal and appeal as cassation same process as described in Sub-Section. 4.1.9 and Figure. 4.8.

4.8.10 Termination of Proceedings

For civil and criminal cases in both ordinary appeal and appeal as cassation same process as described in Sub-Section. 4.1.10 and Figure. 4.9.

Chapter 5

User Interfaces

The system aims at providing all functionalities that are needed for managing daily operations in all courts. The user interaction with the system mainly relies on form-based applications through submit/response-style interaction paradigm [26, 21, 25]. The system provides a wide range of different interfaces that were built for every task. This section provides some examples of the interfaces in the system. *The presented interfaces in this section are captured from the test environment with unreal data.*

5.1 Login Page

- The main Login page is used to allow users to access the system.
- Users can reach this page through the public portal from the outside court house and from the court network inside the courthouse.

The view of the login page is presented in Figure. 5.1.

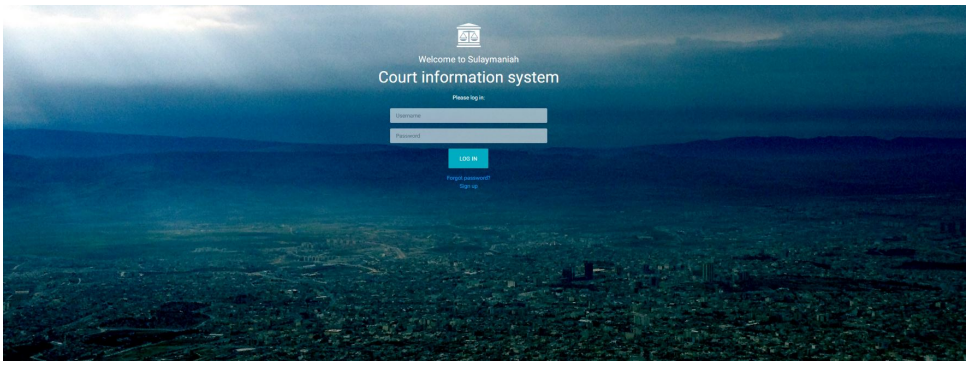

Figure 5.1: Login

5.2 E-Court Dashboard

- The main user dashboard provides a view of all sections and registers.
- The buttons appear to users according to the institution they belong to and roles they have.
- The more roles user has, the more buttons appear in the dashboard.
- In the dashboard of every user, there is a calendar to present events relevant to that user.

- In the dashboard of every user, there is a notification list section to present notifications about activities and case updates relevant to that user.

The view of the main dashboard is presented in Figure. 5.2.

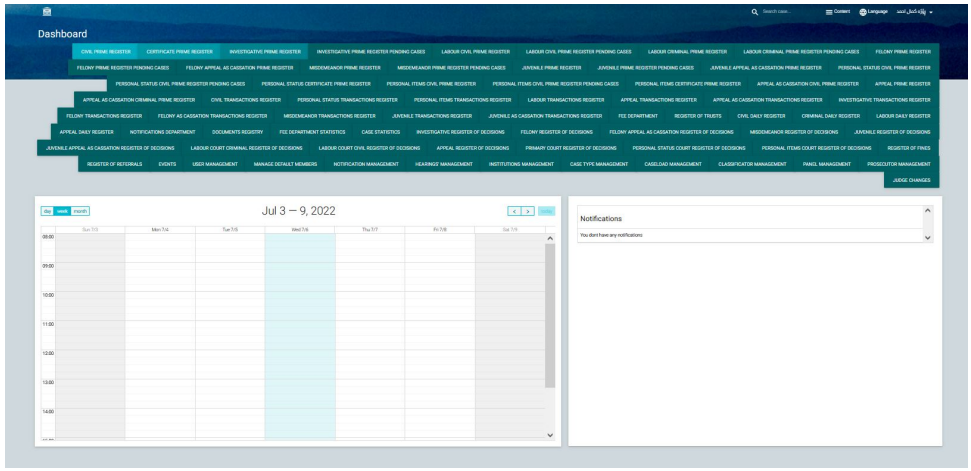

Figure 5.2: Dashboard

5.3 Prime Register

- Every court has its Prime Register.

- The Prime Register provides an overview of all cases in the court.

- The Prime Register presents essential information about the case, including case status, date of the case enter into the system, case number, case type, case sub-type, case participants, judge name, last hearing in the case, and anther relevant data according to the court type.

The view of the Prime Register in Civil Primary Courts is presented in Figure. 5.3, and the Prime Register of Investigative Courts is presented in Figure. 5.4.

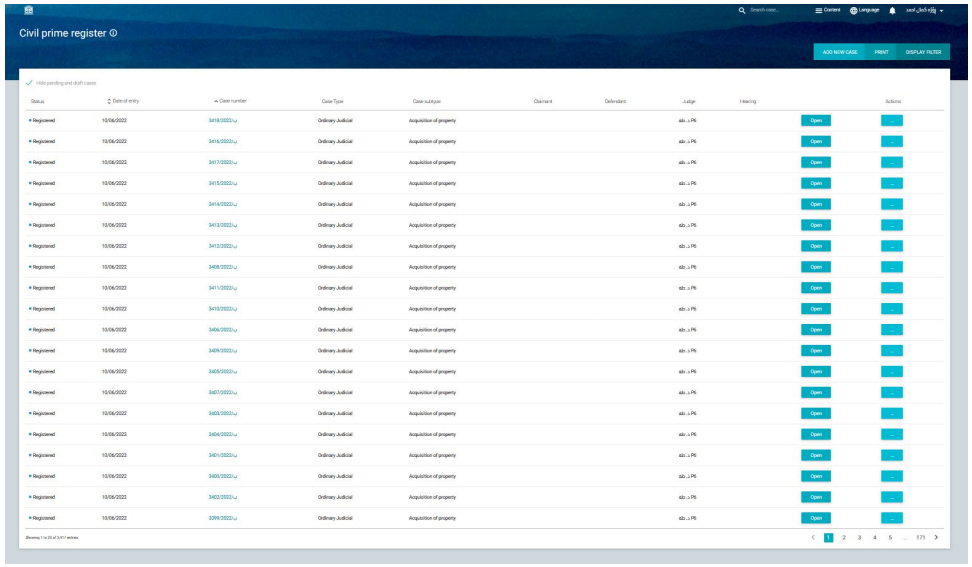

Figure 5.3: Prime Register for Civil Primary Courts

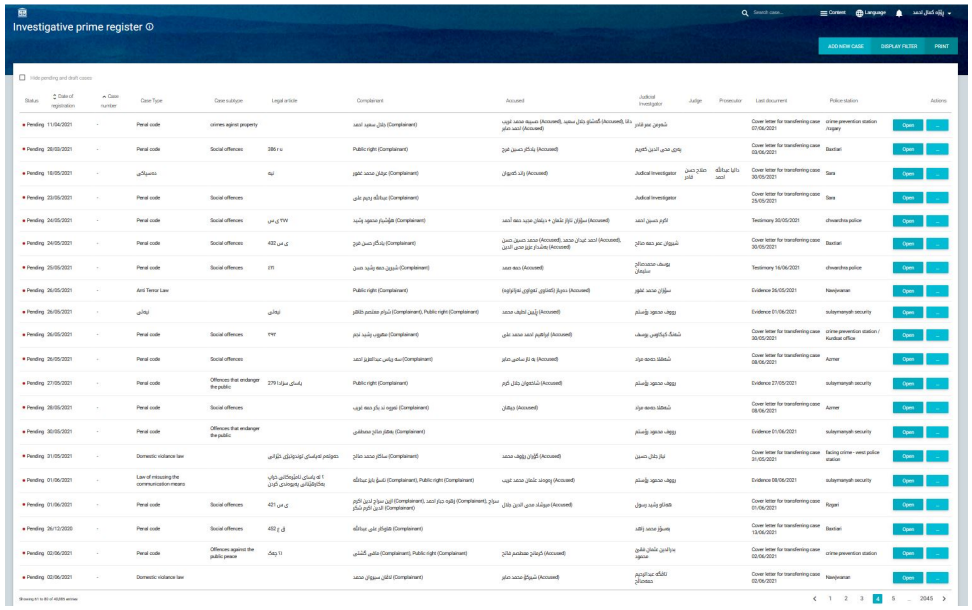

Figure 5.4: Prime Register for Investigative Courts

5.4 Add New Case

The view for entering case information and submitting of the claim and other supporting documents.

- All user types have the right to submit a claim and initiate a new case in the system.

- After the new case data is entered, a user has the following options:
  - Save, to save all entered information and come back to the case for completion and registering it at a later time. The case appears in the status of *Draft* in the Prime Register.
  - Send to judge, to send the case information to the court. The case appears in the status of *Pending* in the Prime Register.
  - Register, to register the case. At this point, the case gets a number and will be ready for processing. The case appears in the status of *Registered* in the Prime Register.
  - Delete case, to delete the case. The case appears in the status of *Deleted* in the Prime Register.
- After the case is registered, the other processes will accordingly start.
- Every case will progress through different statutes defined in the system according to the case type.
- The system is implemented with 13 statuses as stated in note 2.

The view of adding a new case is presented in Figure. 5.5.

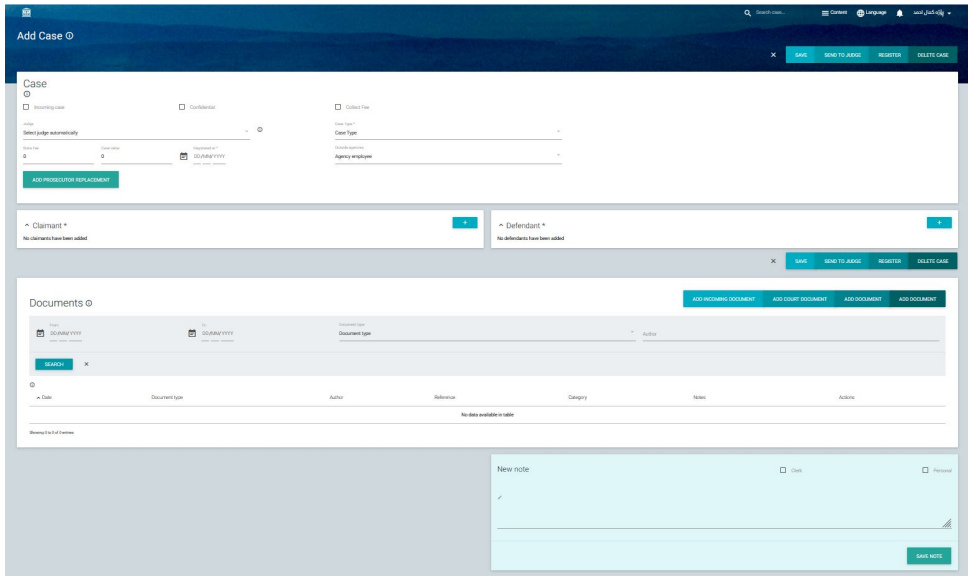

Figure 5.5: Add new case

5.5 Add Case Participants

There are different types of participants according to the court types, but the process of adding participants is the same for all participant types. The required information is presented in the following interface as presented in Figure. 5.6.

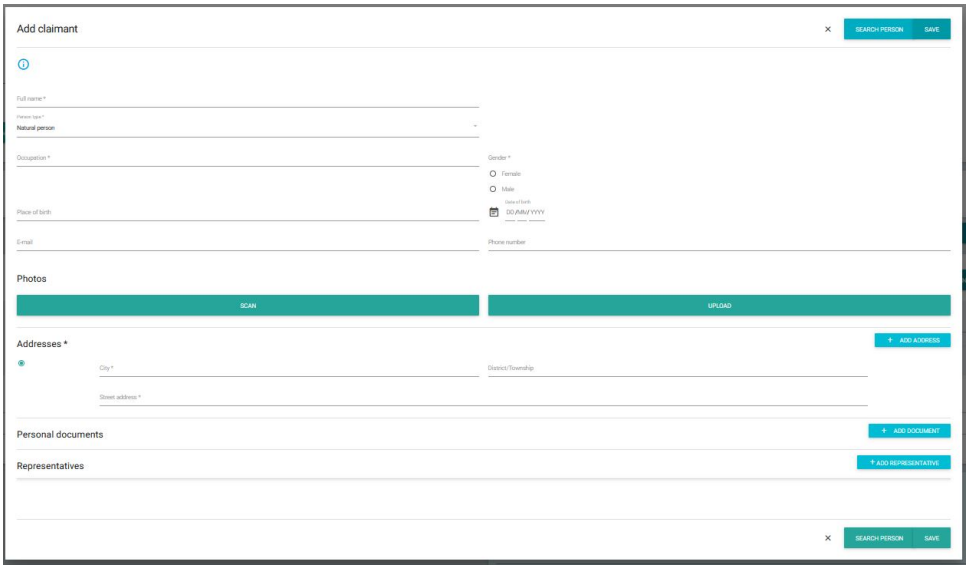

Figure 5.6: Add new case participant

5.6 Register of Decisions

This register provides an overview of all the decisions. The register is made for a judge to have easy access to old decisions when needed. In addition, it presents an organized view for clerks to keep records of all decisions. The view of the Register of Decisions is presented in Figure. 5.7.

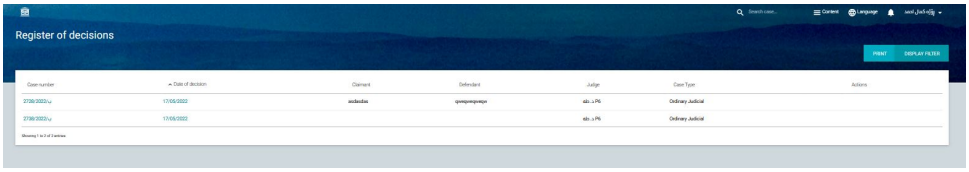

Figure 5.7: Register of decisions

5.7 Fee Register

The Fee Register provides an overview of paid and unpaid fees to the fee department clerks. The view of the Fee Register is presented in Figure. 5.8.

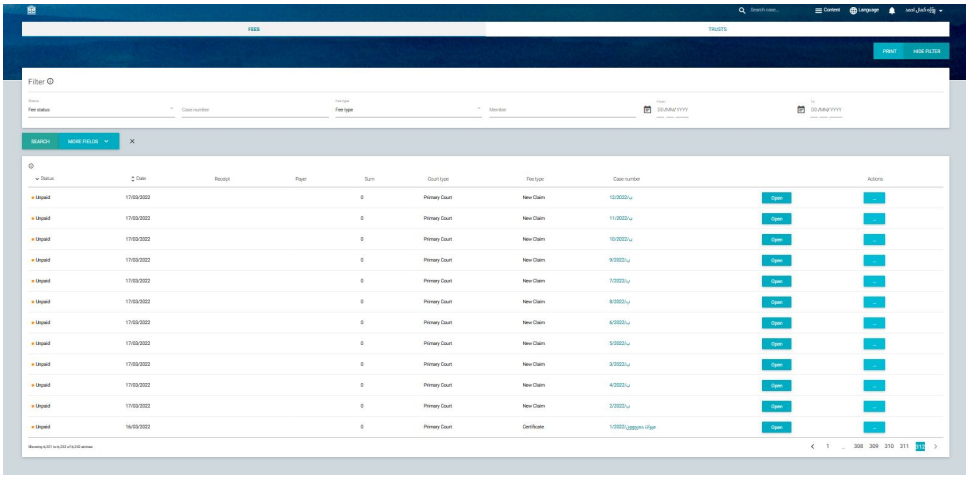

Figure 5.8: Fee Register

5.8 Daily Register

This is a register where the daily clerk can see an overview of all the hearings, their statuses, and the time it starts and ends. As shown in the daily interface, there is a search section. Every register is provided with search functionality to facilitate users' faster retrieval of data. The view of a Daily Register is presented in Figure. 5.9.

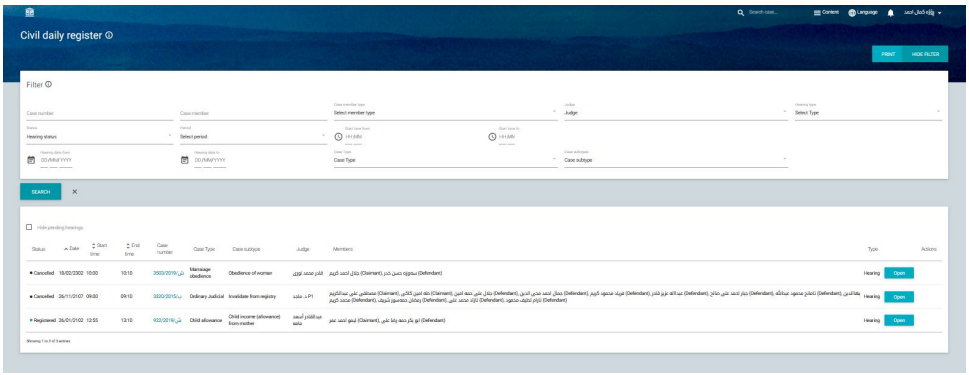

Figure 5.9: Daily Register

5.9 Hearing

Through this view daily clerk can open the hearing detail view, register a new hearing, and modify hearing details. During the hearing sessions, the daily clerk opens the Daily Register, finds the right hearing, and opens the hearing detail view to proceed with the hearing session and preparation of the hearing memo. The view of hearing details is presented in Figure. 5.10.

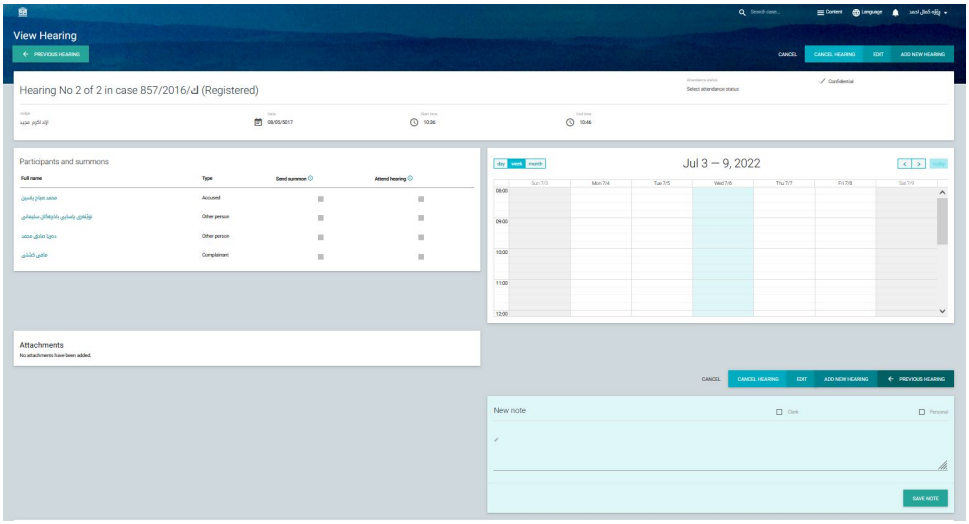

Figure 5.10: Hearing view

5.10 User Management

The user management section provides an overview of all users, and their status, if active or inactive. It presents all the user account detail data. From this interface admin user can manage all user accounts, such as adding new, modifying details, deactivating, and moving users from one institution to another. This section is accessible by admin users only. The view of the user management section is presented in Figure. 5.11.

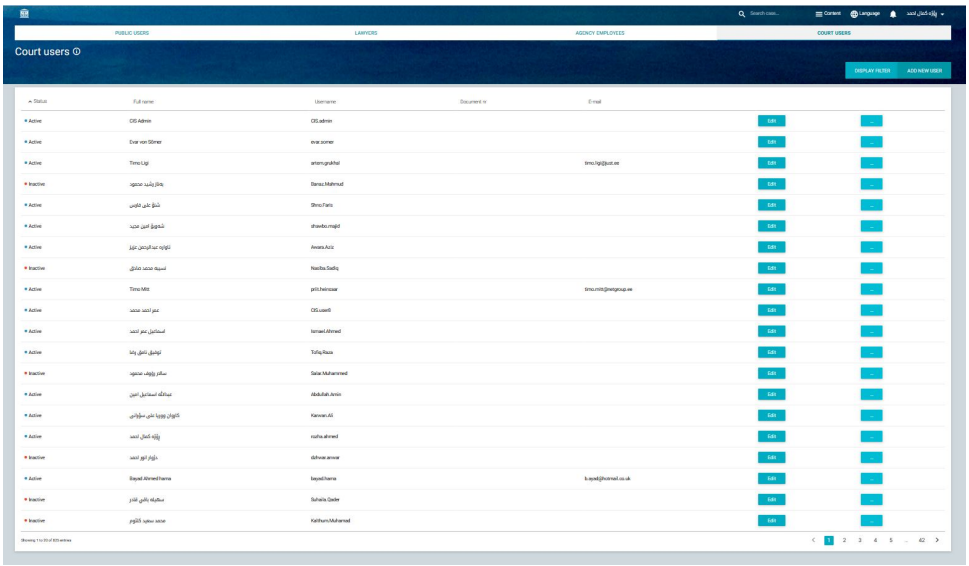

Figure 5.11: User management

5.11 Classificator Management

The Clasificator management section allows access to and management of different aspects such as adding, modifying, removing, case types, participant type, document type, case sub-type, religion type, and many more. This section is accessible by admin users only. The view of the classificator management section is presented in Figure. 5.12.

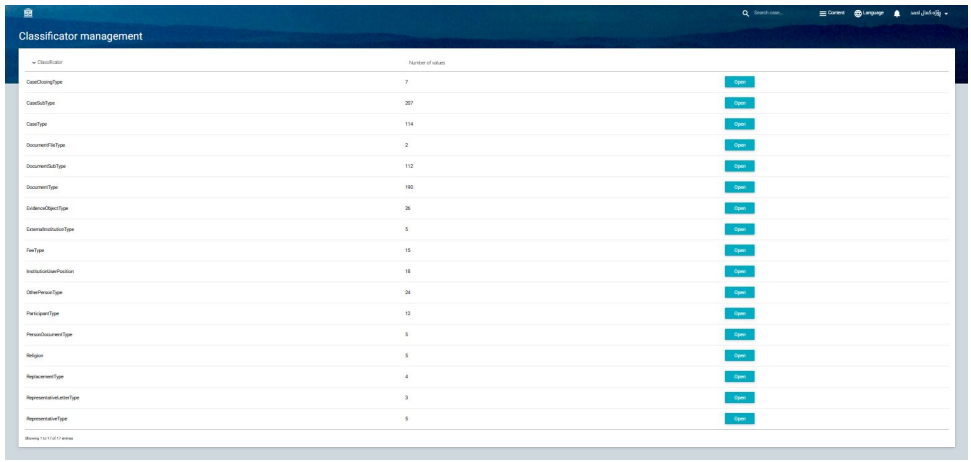

Figure 5.12: Different aspects management

5.12 Document Management

This section allows the management of document templates in all courts. Every court has a wide range of templates that can be managed from the document template section. This section is accessible by admin users only. The view of the template management section is presented in Figure. 5.13.

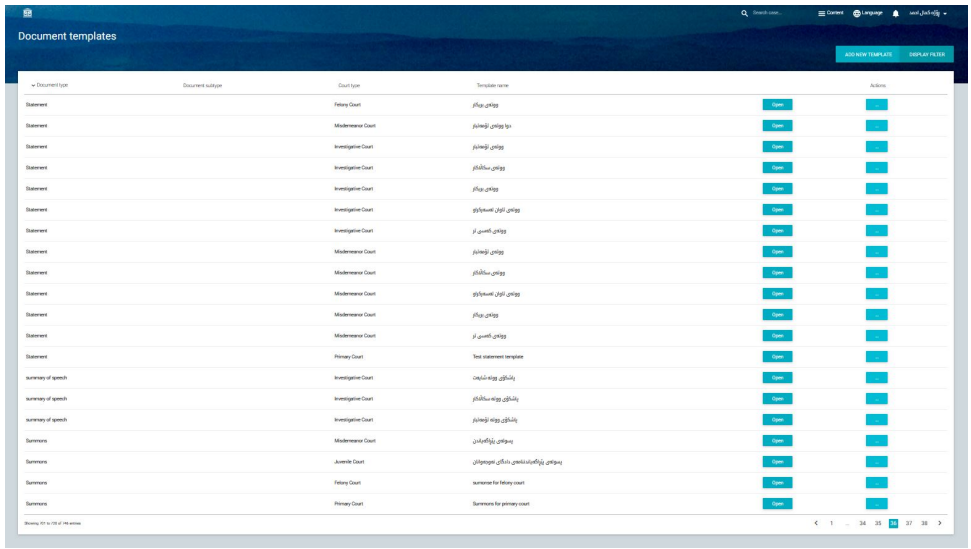

Figure 5.13: Document templates management

5.13 Notification Management

The system is able to send a notification to the users with different activity types on the case. The notification list is manageable in terms of to whom notification should be sent, when to be sent, and on what activity should be sent. This section is accessible by admin users only. The view of the notification management section is presented in Figure. 5.14.

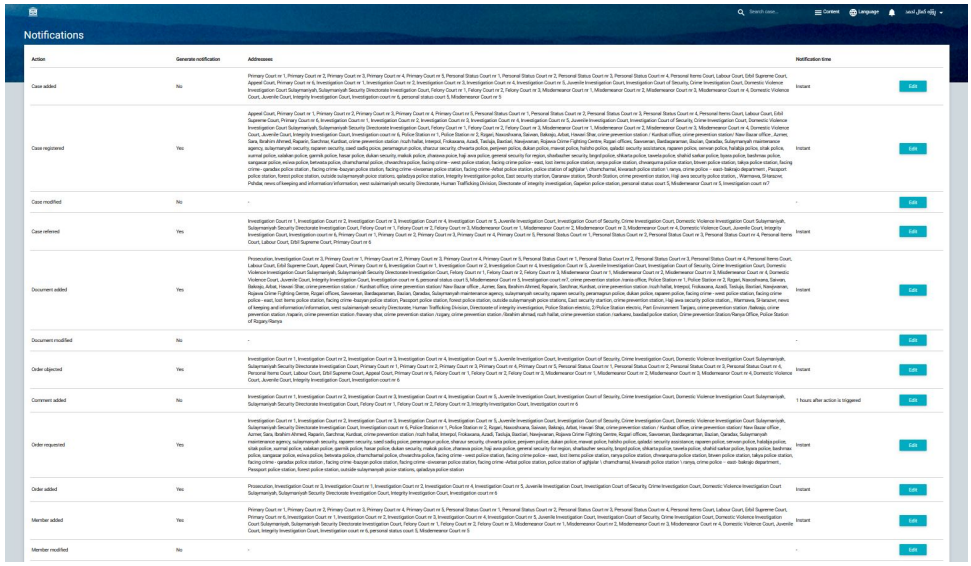

Figure 5.14: Notifications

5.14 Summons Department

This register is accessible for summons department users. The summons is one kind of notification; therefore, the name of this section is also named as notification department. This register allows users to manage summons documents, generate them, and print them for delivery. The view of the summons register is presented in Figure. 5.15.

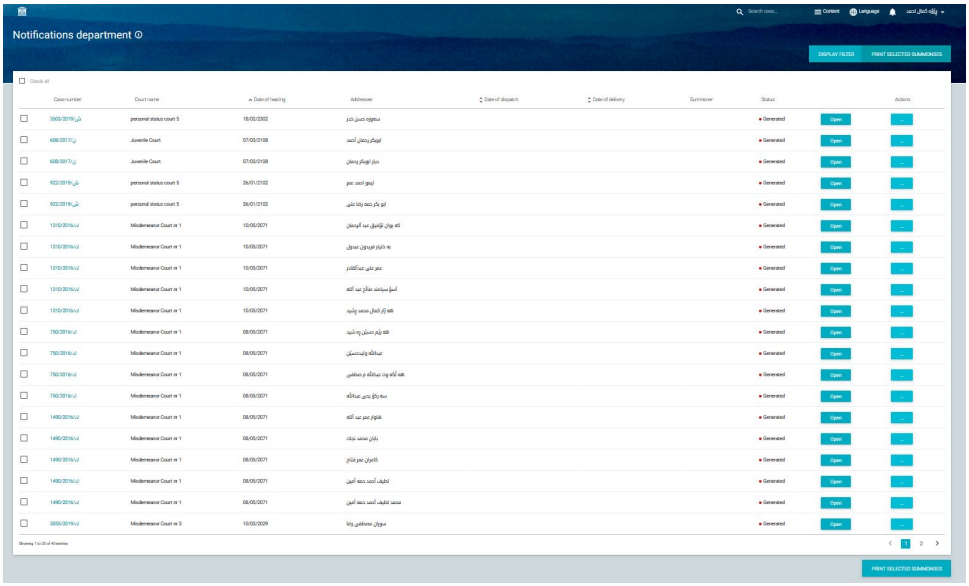

Figure 5.15: Summons department

Chapter 6

System Implementation

6.1 Main Software Infrastructure Components

The e-court system in this section is referred to as a Court Information system (CIS) and the main building blocks of the subsystems and components that together make up software infrastructure include:

Table 6.1: Main building blocks of the software

No.	Component	Description
1	CIS.Services	Comprises the main business logic processes – the creation of cases, documents, hearings, and other elements required to support the processes in the Sulaymaniyah e-court system. This component is also responsible for implementing user access verification logic which permits access to unauthorized content such as court documents, confidential cases, and others.
2	CIS.Core	Contains core supporting logic for logging, caching code constants, and others. This component also contains all the domain objects that support the e-court system's business processes.
3	CIS.DAL	Data Access Layer is responsible for storing and retrieving data from the back-end storage system – the database. It also contains various complex queries used throughout the registers on the CIS website.
4	CIS.Interfaces	It is the backbone and allows communication between all the other components in the system by exposing logical contracts for software component interaction.
5	CIS.Web	It is the main CIS website. This project contains all the front-end user interfaces and design. This component directs its communication to the back-end component – CIS. Services. CIS.Web retrieves its data from CIS.DAL and presents it to the user using common web technologies – Hypertext Markup Language (HTML) , Cascading Style Sheet (CSS) , and Javascript. CIS.Web is also responsible for being the first point of entry for user data input.
6	CIS.DocumentConverter	Handles conversion of Microsoft Office Word document conversion to a printable Portable Document Format (PDF) .
7	CIS.Common	Contains common logic which sees usage among other components in the system.

Continued on next page

Table 6.1 – continued from previous page

No.	Component	Description
8	CIS.Web.WebDAV	Provides support for editing word documents in the Microsoft Office Word application. It also handles user authentication and authorization based on the user's relation to the document.
9	CIS.Web.WinLogin	Allows entering the CIS website without any additional username or password entry. When a user is already logged into his or her workstation, those credentials are then forwarded to the CIS system for user authentication and authorization purposes, and the user is then redirected to his or her dashboard view.
10	Packages	Contains various external supporting components, including the following but are not limited to: (Front-end Javascript frameworks and components to provide a more interactive user experience), (Logging – to store info about application behavior for later error tracking.), (Database communication – storing application data permanently in a database.), (Real-time communication – to provide instant feedback on incoming notifications.), and others.
11	CIS.Tests	It is used to write small and concise tests which verify the system's proper behavior. This component is only interacted with during the development process and is not visible to the end-user.
12	External	Contains various external supporting components for communicating with Office software – mainly used to convert Word documents into printable PDF files.

6.2 Physical Infrastructure

In addition to the software design and infrastructure, the physical infrastructure of the project includes building two main data centers and connections between different institutions for efficient and secure data exchange during collaborative activities. The connection between police stations and the courthouse is securely protected through firewalls, as presented in Figure. 6.1.

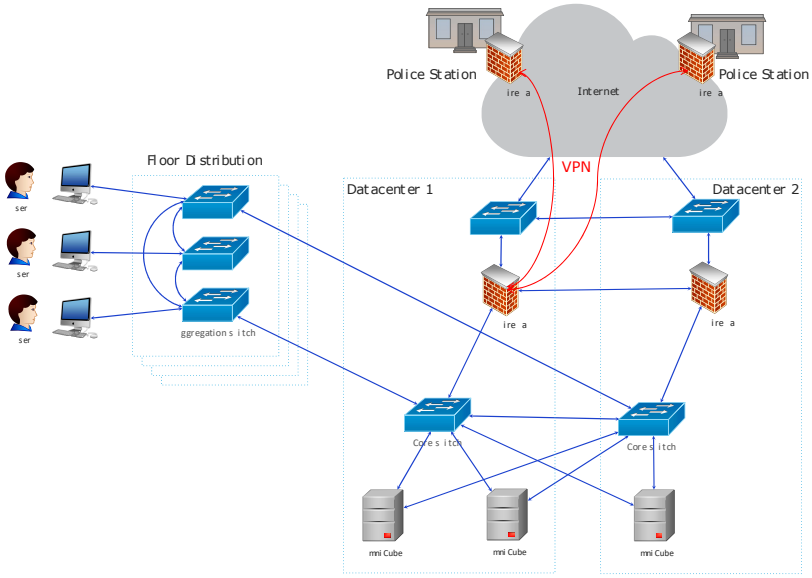

Figure 6.1: Physical Infrastructure Plan

Chapter 7

User Training

During the implementation phase of the project, various types of training sessions have been provided by Aktors to support court users, as detailed in Table 7.1:

Table 7.1: Training

No.	Training	Description	Target Group
1	Basic Computer Skills	This training is to provide basic computer skills to court users who are not able to use computers. This training is aimed at providing lectures on the usage of Microsoft Windows and Microsoft office tools.	Judges, Prosecutors.
2	E-Court System Usage	This training is to provide all end-users with the skills needed to operate the e-court system and be able to use the system on a daily bases, such as case registration, hearings registration, document insertion, and all other functions.	All end-users of the system
3	E-Court Administrations	This training is to provide skills needed to manage the administrative tasks in the e-court system by users who have the role of admin in the system, to manage tasks such as user management, judge change, case type management, caseload management, institution management, and all other tasks.	IT staff
4	E-Court System Support	This training is to provide IT staff users, with skills needed to support and maintain the system for the future. The lectures presented several topics relevant to the system structure, codes, infrastructure, and all other related topics.	IT staff
5	Training of Trainers (ToT)	This training is to provide general in-depth information about the system and all components to users to train others in the future.	IT staff and selected clerks by court president

Chapter 8

Main Achievements

The implemented system is composed of integrated subsystems to provide smooth and efficient communication and secure data exchange between several parties. Information is entered once, and processes are automated to allow users to perform their main functions and collaborate efficiently. In addition to the courthouse users, the prosecution office and police stations use the system for collaborative activities. At the same time, citizens, lawyers/barristers, and outside agencies can also access it through a public portal, as presented in Figure. 8.1.

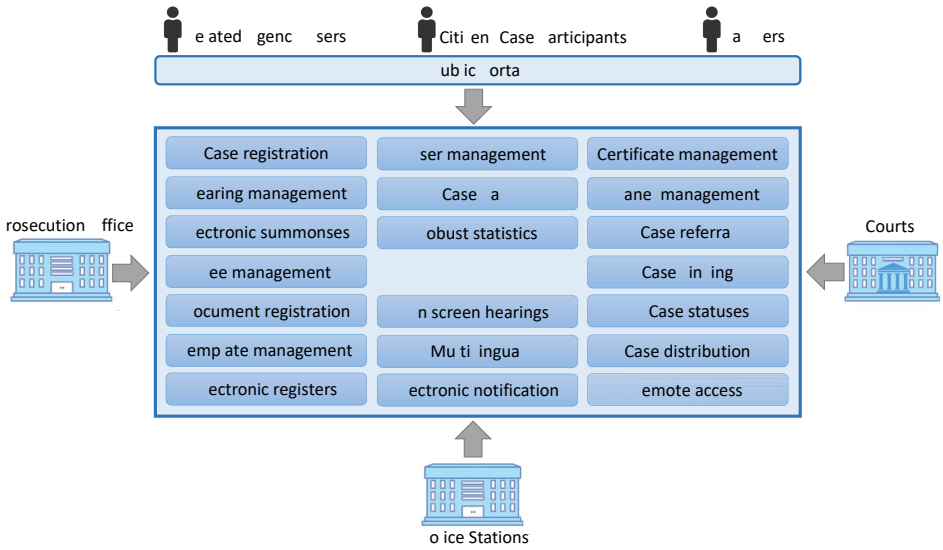

Figure 8.1: Sulaymaniyah Appellate Court System

The implementation of the e-court system aims to improve the court processes in terms of the following:

- **Transparency**, the system achieves more transparent processes through the availability and accessibility of data to end-users and the public.
- **Security**, the system ensures better security of court case files and information through digital means where data are secured in central databases, and accessibility of data can be controlled through user roles and permissions. Additionally, disaster recovery opportunity is another benefit of the e-court system over the paper-based system.
- **Remote work**, extends the user availability, in particular, judges to work from a distance after court working hours.

- **Automatic case allocation** ensures a more robust and fair distribution of cases among judges, in addition to the transparent allocation process that is visible to all participants.
- **Optimization**, the system ensures optimized processes with respect to:
  - Electronic case registration allows all information and documents to be submitted through an online portal. This opportunity saves the user's time to travel to court and gives a better overview of the case detail view.
  - Different electronic registers in every court provide a more organized view of cases and ensure fewer human errors in rewriting data multiple times, as once data is entered, the information is shared in all relevant registers. Additionally, they guarantee more flexible retrieval and search of case data through different searching parameters, which is not possible in paper registers.
  - Automatic generation of documents and availability of different templates guarantees faster documentation processes and a unified view of court documents in all courts.
  - Better overview of ongoing proceedings, including an overview of active cases for each judge, notifications of deadlines, identifying cases that have to be dealt with (based on duration, category/urgency), documents do not get lost, and more comprehensive statistics.
  - Faster case transfer between institutions and efficient data exchange platform for collaborative activities.
- **Better service** to the public as date and time of hearings displayed on TV screens, availability of web-portal for digital submission of documents, and case tracking.

Chapter 9

Conclusion

This study has presented the experience of designing and implementing an e-court system to increase efficiency and effectiveness in the court case management processes. The e-court system has been designed and developed by Aktors and implemented in the Sulaymaniyah Appellate Court in the KRI.

The findings of this project aim to practically serve the decision-makers in the KRI to expand the solution in other courts from different cities and other practitioners who are on the way to implementing the e-court system. Furthermore, the study aims to theoretically expand the body of knowledge and literature for academic researchers in the justice domain to provide a better overview of justice digital transformation and how the implementation of the e-court systems improves effectiveness and efficiency in the court's daily internal operations.

Future research direction could be towards more in-depth analysis to evaluate the system theoretically to understand the system impact on the process efficiency and effectiveness, additionally, identifying challenges to be addressed before expanding the system to further courts.

Chapter A

Court Processes before Court Digitization (as of 2014)

A.1 Description of the Main Business Processes

A.1.1 Civil Primary Courts

Claim

A claimant can submit a claim himself/herself, or the lawyer can submit it for the claimant in as many copies as there are defendants. In addition, if the claimant cannot write the claim himself/herself, then the typist offers a service besides the courthouse of writing the claim for the claimant (for a fee).

Initiation of Proceedings

The claim is submitted on paper to the first judge (Court President). The judge performs the initial check of the claim and, if all formal requirements have been met, orders:

- To register the case.
- To collect the fee (unless the claimant has been granted judicial aid).
- To appoint a hearing.
- Allocates the case to a judge.

Registration

The claimant then takes the claim to the prime clerk of the court. The clerk registers the case (including the claim) in the Prime Register according to the type of the case. Upon registration, the case is also allocated to a judge. The registered case is given a file (a paper cover for the documents); the number of the case, the type of the case, names of the participants, and the dates/times of the hearings are written on the cover of the file.

Payment of Fees

The claimant proceeds to pay the fee for the claim. The amount to be paid depends on the value of the claim and the type of the case and is registered in the Fee Register by a clerk. A receipt is given to the claimant upon payment, and a copy of it is attached to the file of the case. Both are stamped by an auditor to confirm the payment. If the claimant has been granted judicial aid, he/she may be temporarily exempted from paying the fee, but if his/her economic status improves during the proceedings or if he/she loses the case, the fee can still be collected from the claimant. In addition to accepting fees for civil claims, the Fees Department/ Accountant department keeps the Register of Trusts and accepts all other payments made during proceedings (e.g., deposits and payments made to compensate for the involvement of experts).

Appointment of the Hearing Date

The date of the hearing session shall be determined after the prime clerk has collected the judicial fees and registered the pleading. The hearing should take place within 20 days of registering a normal civil case (3 days in summary proceedings and in orders on petitions), but this deadline is not always followed. Usually, the clerk checks the calendar (Register of Appointments Daily Register) and appoints the date, which is written on the cover of the file and entered in the Daily Register. In addition, a notification/summons is written by hand (in as many copies as there are participants of the proceeding), and one copy is given to the claimant who confirms receipt with a signature. The notification has to be signed by the judge (the claimant personally takes it to the judge for signing) in order to be deliverable to the defendant. The file of the case stays with the office clerk. Only the summons and the copy of the claim are forwarded to the Department of notifications for delivery to the defendant. This office keeps the register of notifications, the register of notices, the register of documents, and the register of files. There is a unified register of notifications for all civil courts of the first instance.

Delivering of Notifications/Summons

The summoner from the Department of Notifications deals with delivering the summons (against signature) to the other participants of the proceeding/hearing. The summons/notification has to be delivered at least 3 days prior to the hearing. If the summons/notification is not delivered (e.g., impossible to find the defendant), the hearing is postponed. If the Chief of the District confirms that the defendant has lived at the address given by the claimant but has left by now and no existing address is known, the notification is published in two daily newspapers (the fee for the publication has to be paid by the claimant). If the Chief of the District is not aware of such a person as the defendant living at the address given by the claimant, the claimant must provide a new address or the case is dropped.

Hearing

The memo/notes of the hearing are handwritten (in at least some of the courtrooms computers exist to enable typing, and some judges would like the memo to be typed already) by a clerk. A note of all documents submitted during the hearing is made in the memo, and the documents are registered in the appropriate registries after the hearing. A note of the next hearing is made in the memo, and the memo is signed by all invited participants (this is sufficient for informing, no additional notification is necessary) and the judge. The memo is added to the case file. If the defendant has not been notified yet, the court decides which measures to take to reach the defendant. If the defendant is duly notified and does not show up, the defendant has 10 days to notify the court of the reasons for a no-show. After that, the court can solve the case with a judgment in the absence. The debtor can object to the judgment in the absence during 10 days after the announcement of the judgment. If the claimant does not show, the case is dismissed. If both parties do not show up, the court decides what to do. If the case is ready for final judgment, the court can deliver it at the end of the hearing. If not, then the court appoints a date when the judgment is delivered (maximum 15 days after the final hearing). If necessary (e.g., to collect documents or other evidence), the hearing can be postponed – in fact, it means that a new hearing will be appointed, and normally it should not take place more than 20 days after the initial hearing.

The Rest of the Proceedings

During the ongoing civil proceedings, documents are added to the case – both incoming and documents elaborated by the court. Additional hearings can be appointed and carried out. The proceedings can also be suspended. Experts can be appointed from the court's register of sworn experts or lawyers/barristers appointed as representatives as judicial aid (according to the rules of Law of Legal Practice). According to article 54 of the Civil Action Law, the case can be abandoned if the parties agree to reconsider their dispute or if they fail to attend up before the court despite that the plaintiff or both parties were duly notified. If the case remains abandoned for (30) days and neither the plaintiff nor the defendant pursues the proceedings, then the court shall decide to nullify the pleading. If the case after it was abandoned for reconsideration and before the elapse of the (30) days was renewed, then it shall be resumed from the point at which it has stopped. Cases can be consolidated if it

becomes evident to the court that the case is connected to another that was previously filed, then it may decide to consolidate the two cases. The number of case which was initiated first will remain to be the number of consolidated case.

Announcing the Judgment and Appeal

The last hearing in the case is for delivering the judgment. Before the final hearing, the judge hand-writes the judgment, then delivers the resolution (the main part of the judgment) orally at the hearing and after the hearing, it is typed in by a clerk whose sole responsibility it is and saved on the computer. The contents of the written judgment are described the Civil Action Law. Cases with a value of claim up to 75 000 Iraqi Dinars can be appealed only as cassation proceedings to the Appellate Court in Sulaymaniyah. Cases with a value from 75 001-150 000 Iraqi Dinars can be appealed as cassation to the Supreme Court in Erbil. Cases with a value from 150 001 Iraqi Dinars can be appealed as ordinary appeals in the Appellate Court and as cassation proceedings to the Supreme Court in Erbil. The appeal can be submitted to the Civil Primary Court who made the judgment (with the fee for the appeal also paid to the Civil Primary Court) or to the Appellate Court directly. In addition, to appeal proceedings in civil matters, it is possible to challenge judgments by way of retrial. Such challenge shall be based on one of the following grounds, and can be submitted even if the challenged judgment has become final: a) If the other litigant has committed a cheat, that has affected the judgment. b) If after the judgment, there has been a written confession that the documents upon which the judgment was based are forged, or if such documents were adjudicated as such (forged). c) If the judgment was based upon perjury.

If after the judgment the interested litigant has obtained productive documents, the lodging of which to the court was precluded by the other litigant. Cases get a new number in retrial proceedings.

The process of civil case management in Civil Primary Court is presented in Figure. A.1.

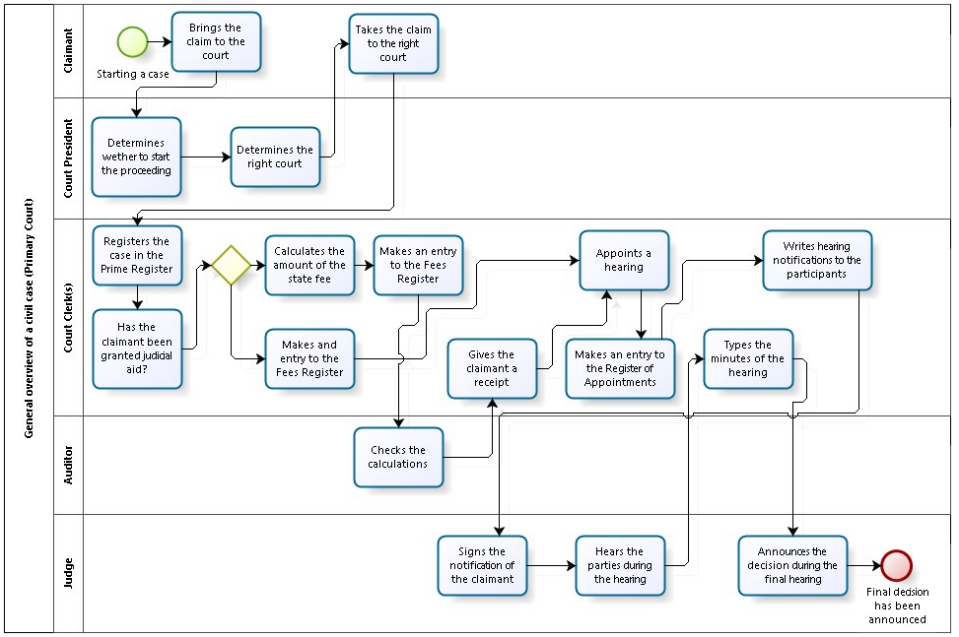

Figure A.1: Civil Court manual case management processes

A.1.2 Personal Status Courts and Personal Items Court

There are two kinds of proceedings:

1. Issuing certificates. Main certificates include inheritance, death certificates, birth certificates, marriage certificates, deed of interdiction, and others.

2. Dealing with disputes (court cases). Main court cases include divorces, dowry cases, custody and alimony, adoptions, and others.

Description of Proceedings

The proceeding in dealing with disputes is similar to that of ordinary civil cases in the Civil Primary Courts. A case is submitted, allocated to a judge (there is some specialization between judges), a hearing is appointed, held, and a judgment is given. The proceeding in issuing certificates is a written proceeding. The application is filled and submitted to the judge, at the end of which a certificate is issued. Appeal on the decisions of the Personal Status Courts can be submitted to the Court of Cassation in Erbil within 10 days of announcing the judgment. Certain judgments of the religious courts have to be sent to the Court of Cassation for ratification even if there is no appeal.

A.1.3 Labour Court

The Labour Court deals with criminal and civil cases which arise from a working relationship (e.g., accidents on construction sites as criminal matters and disputes regarding the payment of salaries as civil matters). In civil proceedings, the process is the same as in the Primary Civil Courts, and in criminal proceedings, the process is the same as in the competent criminal courts, with the exception that there is no investigative proceeding before the criminal proceeding – the Labour Inspectorate initiates the case directly to the Labour Court. The clerk of the Labour Inspectorate assist the judge in the proceedings. In civil cases, it is possible to submit an appeal to the Appellate Court. In criminal cases, it is possible to appeal to the Court of Cassation in Erbil. The process in the Labour Court is presented in Figure. A.2.

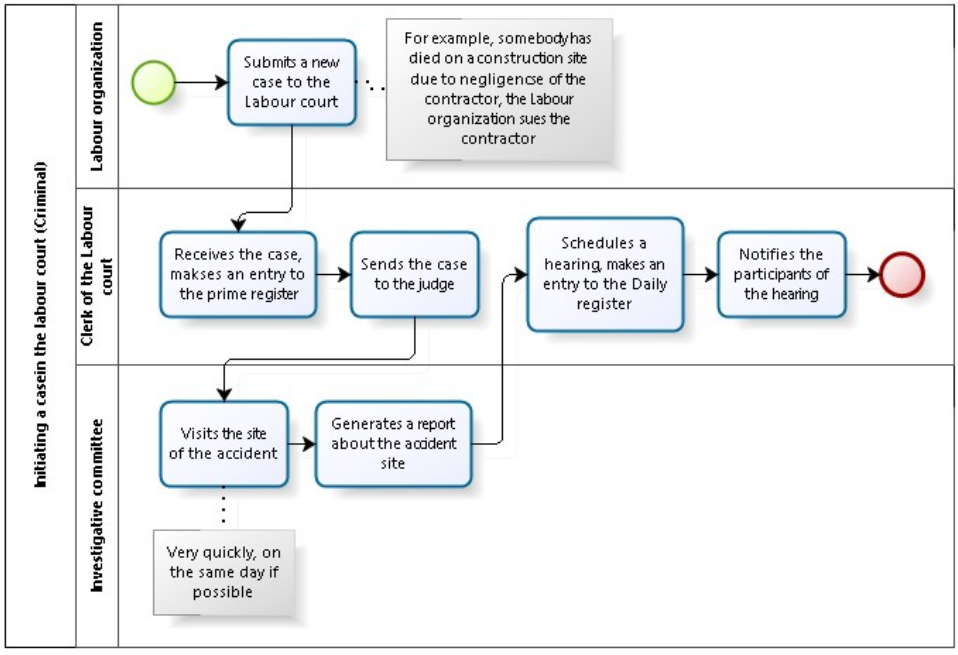

Figure A.2: Labour Court manual case management processes

A.1.4 Investigative Courts

Initiation of the Criminal Proceeding

According to the Criminal Procedure Code, criminal proceedings are initiated by means of an oral or written complaint submitted to an investigative judge, a judicial investigator, a policeman in charge of a police station, or an injured party, or any person taking his place in law, or any person who knows that the crime has taken place. In addition, any one of those listed can notify the Public Prosecution unless the law says otherwise.

Most cases are initiated by the police, upon which the case is given the police number. The police register the complaint and refer it to the investigative court for orders. Even though the investigative judge is in charge of the proceedings, the case file is kept at the police during the investigative proceedings (unless referred to court for orders). If a complaint or allegation against a suspect is lodged with two or more of the competent authorities investigating the offense, the papers on the case must be passed to the authority with which the complaint or allegation was lodged first. The general overview of processes in the Investigative Court is presented in Figure. A.4.

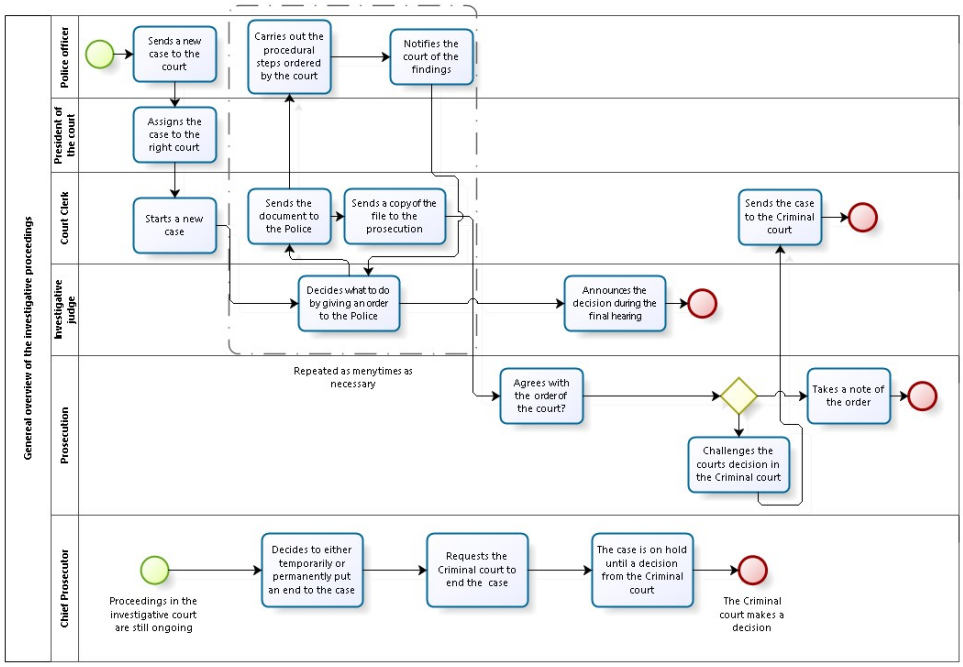

Figure A.3: Investigative Court general overview of manual case management process

Submission of the File to the Investigative Court

The case is referred to the investigative judge who is dealing with the particular subject matter (specialization based on the type of the case, e.g., juvenile, domestic violence, and others) or who is in charge of the particular police district (territorial specialization).

If the investigative judge to whom the papers on the case are referred considers that he is not competent to investigate the offense (e.g., wrong subject matter or territory), he must submit the matter to the Court of Cassation, stating the grounds upon which the Court should issue a decree appointing an investigative judge with the requisite competence as a matter of urgency. He himself must continue with the investigation until such time as the Court of Cassation decides the matter. In addition, it is permissible for the case to be moved from the jurisdiction of one investigative judge to the jurisdiction of another investigative judge by order of the Minister of Justice or by a decision by

the Court of Cassation or the Felony Court with its area if the security situation requires it or if the transfer would help to establish the truth.

The case submission processes in the Investigative Court is presented in Figure. A.4.

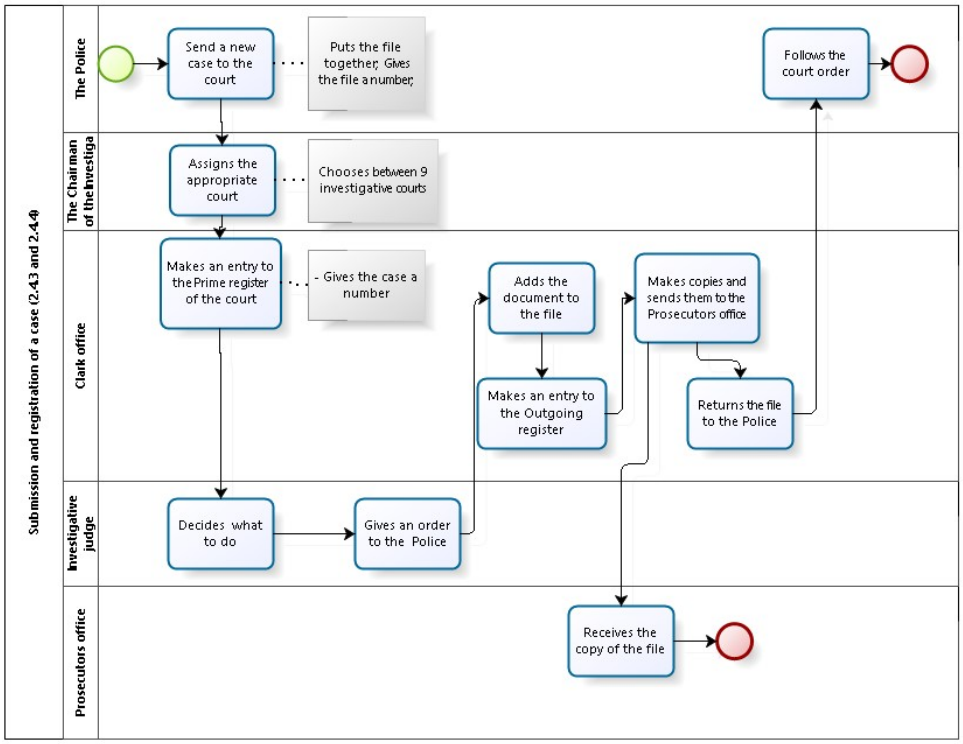

Figure A.4: Investigative Court manual case submission process

Registration of the Case

The clerk in the Registration Office registers the case – the case gets an Investigative Court number in the Prime Register.

Investigative Proceedings

Documents are added to the file, witnesses are heard, testimonies are written, and others. The file moves between the police and the court, and documents also have to be sent to the prosecution's office. This is not always done in a timely fashion. The prosecutor's office would gain a lot with an online search possibility to identify documents made in relevant investigative proceedings. The prosecutor can object the court orders in the competent criminal court during 30 days after the order was made (appeal as cassation, e.g., in the Juvenile Court or Felony Court). The decision of the competent court can be appealed to the Court of Cassation in Erbil. During the investigative proceedings, the prosecutor can also send comments to the court or police regarding specific case documents or the investigative case in general.

In certain cases – when the criminal court is the appropriate court for dealing with the issue, documents may also be referred to a criminal court during the investigative proceedings. During the investigative proceedings – in addition to the registration of incoming and outgoing documents (e.g., court orders) – witnesses can be heard and other kinds of evidence gathered. Data regarding these events is compiled in the case file.

The End of Investigative Proceedings

At the end of the investigative stage, the investigative judge has some options. First, if the crime is an infraction – declares the final judgment in the case. If the judgment involves imprisonment, the judgment is finalized 7 days after the judgment if no one appeals. The case gets an additional number according to the sequence number of the final judgment. Second, if the crime is a felony or misdemeanor, refers it to a competent court. In non-summary cases through prosecution (The case will get a prosecutor's number as well) who can object to the referral – these will be looked through at the court of cassation similar to the other orders made in the investigative proceedings. In summary cases straight to the competent court. Referred cases get a new number upon referral – the referral number. In non-summary cases, the prosecution makes its own copy of the file during the referral stage. Third, closes the proceedings due to lack of evidence (possibly also a new number is assigned to the case). Fourth, closes the proceedings temporarily due to lack of evidence. The end of investigative processes in the Investigative Court is presented in Figure. A.5.

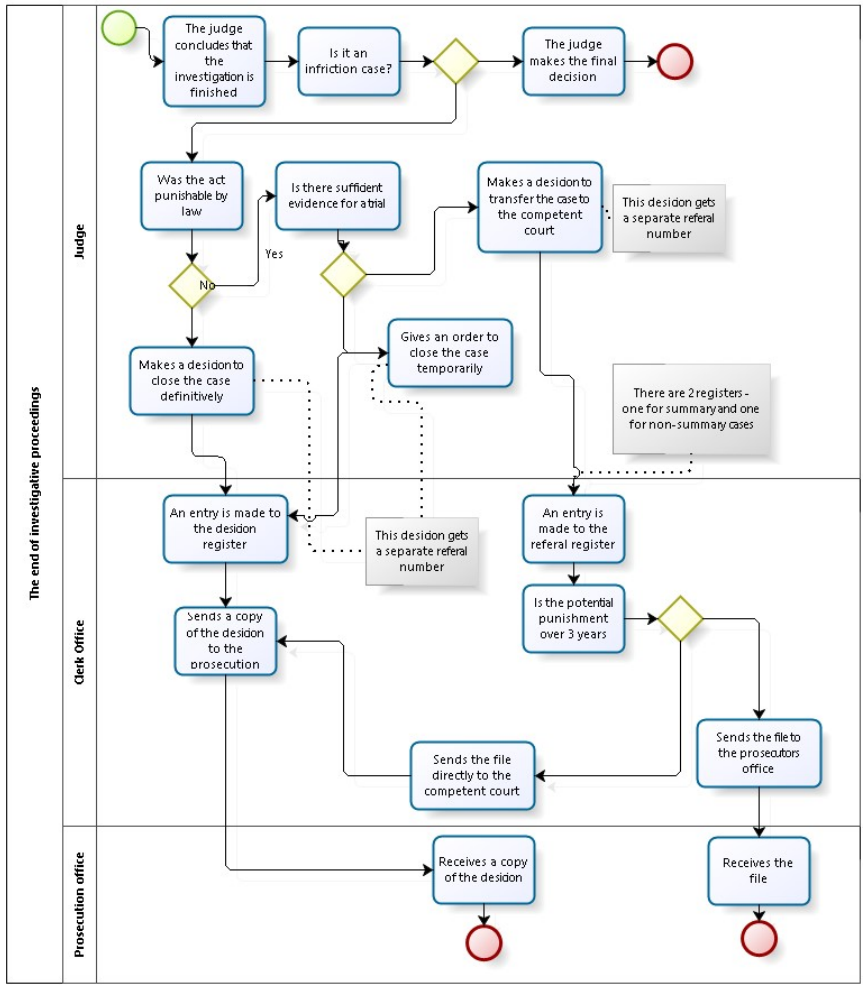

Figure A.5: Investigative Court process of terminating investigative proceedings

A.1.5 Competent Courts: Felony, Misdemeanor, Juvenile

Case Initiation

The first judge of the court orders registration and appoints a judge to every case (taking into account the specialisation of judges based on the type of the case (Juvenile, Misdemeanor, Felony).

Case Registration

The case is registered in the prime registry by the clerks – the date of registration, the names of the accused and the victim (person who submitted the complaint), the Article of the Law which has been breached, the title of the case, and the name of the judge is written down. The case gets a new number upon registration and is allocated to the appointment registry of the appropriate court (depending on the type of the case). Upon registration, the case is also allocated to a judge. The registered case is given a file (a paper cover for the documents), the number of the case, names of the participants, and the dates/times of the hearings are written on the cover of the file. Main types of the criminal case:

- Misdemeanor - an offence punishable by penal servitude or simple detention for a period of between 3 months and 5 years or a fine.
- Felony - an offence punishable by death, life imprisonment, 5 to 15 years imprisonment.
- Juvenile – felonies committed by persons who were younger than 18 during the commitment of the crime.

In addition to processing criminal cases, the Court of Misdemeanors also reviews requests for a conditional discharge. These cases are dealt with in written proceedings, and they are appointed a new number upon registration. Usually, the social officer (probation officer) and the prison officer participate in the proceedings. The prosecutor can also give his opinion on the possibility of conditional discharge. The decisions in cases of conditional discharge can be appealed to a competent criminal court and, subsequently, to the Court of Cassation in Erbil.

Appointment of the Hearing Date

The process of the hearing appointment is similar to the process in the Civil Primary Court as described in A.1.1. The summons to attend the hearing contains the name of the person to be notified and includes his role in the case, the names of the accused and victim, the court, case number, type of offense, the legal paragraph applicable, and the time when they must appear in court.

Delivery of the Notification/Summons

Judicial police (part of the police force but serves the court) delivers summonses (including summonses to experts and witnesses) and get the signatures of the recipients upon delivery. The person summoned notes the contents of the summons and signs the original document with his signature or fingerprint. The other copy is handed to him, and an indication is made on the original document that notification has been carried out, which includes a statement of the time and date of notification. The fact of delivery is registered in the Register of Notifications. The written summons must be delivered at least one day before the trial in the case of an infraction, three days before for a misdemeanor, and 8 days before for a felony.

Hearing

The prosecution and the accused (with a legal representative) participate. Sometimes also experts and witnesses. Everything that takes place in the court is written up in a report. The judge signs all its pages. The report must include the date of each hearing, whether it was public or closed, the names of the judge or judges who considered the case, the clerk, the representative of the Public Prosecution, the names of the accused, and other members of accused's team, the names of the witnesses, a report on the papers which were read out, the requests made, the procedures concluded, a summary of rulings, and everything else that occurred during the trial. If the hearing is postponed, then new notifications/summonses are sent out (unless the summoned person attended the hearing, whereby

he/she is notified at the hearing against a signature). If a summoned party does not attend, it is possible to issue an arrest warrant.

Proceedings

If, either before or after a judicial investigation (or after a trial, in connection with a case transferred in a non-summary form), the Misdemeanor Court having examined the papers believes that the ruling in the penal case is outside its jurisdiction and within the jurisdiction of the Felony Court, then it shall rule that the accused person be transferred to the Felony Court. If the Felony Court finds that the ruling in the case is within the jurisdiction of the Misdemeanor Court, it may either rule on the case or return it to the Misdemeanor Court. If the Felony Court finds that the ruling in the case referred to it by the investigative judge is within the jurisdiction of the Misdemeanor Court, it may decide on it or transfer the accused person to the Misdemeanor Court. The ruling on a criminal case can be suspended pending the result of the ruling in another criminal case. The cases can be consolidated (if there are two separate cases regarding the same crime) or divided (if one of the accused persons is being searched by the police) based on the needs of the particular proceedings.

Announcing the Judgment

After the final hearing, the court usually has 15 minutes recess before declaring the judgment. After it has formulated the ruling, the hearing is resumed publicly. The ruling is read out to the accused, or its contents are made clear to him. If the verdict is guilty, then the court must issue another ruling at the same hearing with the penalty and explain them both. The judgment is then handwritten in full by the judges and then typed in by the clerk (not % 100 of the judgments are typed in). If the court finds, from examination of the case papers, that the infraction is not liable to a sentence of detention, a request for compensation or return of property has not been submitted, and the action of the accused is proven, it may issue a penal order for a fine or another penalty without trial. The accused may contest the penal order by a petition submitted to the court within 7 days of the date of notification, and the court will appoint a date for trial and notify the accused in accordance with basic principles. It is also possible to give the judgment in absentia if the accused/defendant fails to attend the hearing. The person judged in absentia is notified of the judgment issued on him, and if thirty days pass from the date of notification of the judgment in the case of an infraction, three months from the date of notification of the judgment in the case of misdemeanor and six months in the case of a felony without his presenting himself to the court which issued the judgment or to any police station and without his objecting to it within the period mentioned, the verdict of guilty and the principal and subsidiary penalties will have the status of a judgment in the presence of the parties. Appeals on the judgments of the Misdemeanor Court can be submitted to the Appellate Court and subsequently to the Court of Cassation in Erbil. Appeal on the judgments of the Felony Court or the Juvenile Court is submitted to the Court of Cassation in Erbil. The appeal can be submitted to the criminal court which issued the judgment, to any other criminal court, or directly to the Court of Cassation, within a period of 30 days, starting from the day after the judgment was issued, if in the presence of the parties, or from the date it was regarded as having the status of being issued in the presence of the parties if it was in absentia. If the cassation proceedings are returned to the competent criminal court, the proceedings are resumed under the number of the initial proceedings (the case does not get a new number). The process of the case initiation in the competent courts is presented in Figure. A.6, and the cassation proceedings in the Felony Court and Juvenile Court is presented in Figure. A.7

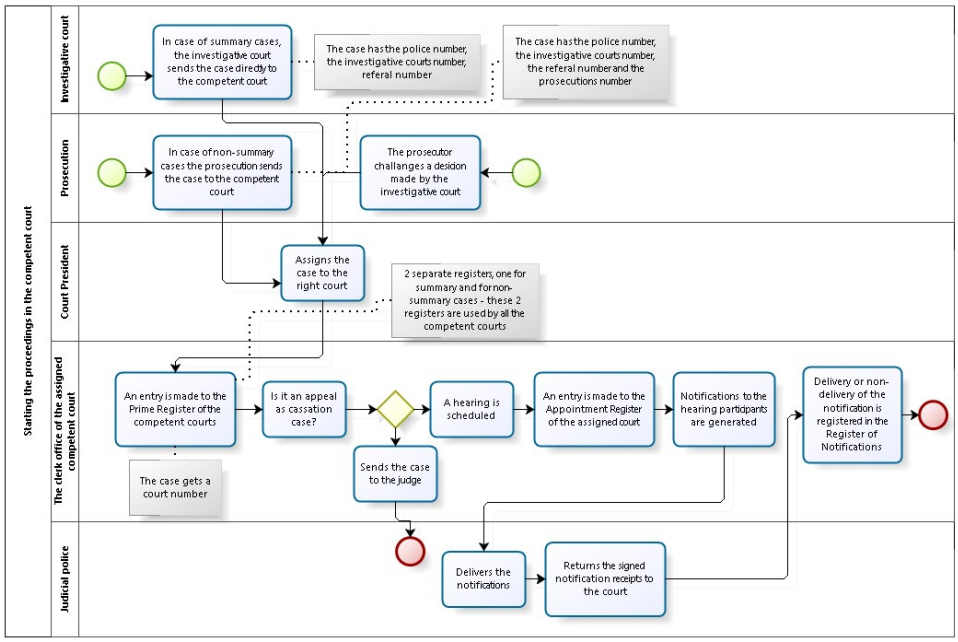

Figure A.6: Competent Courts process of case initiation

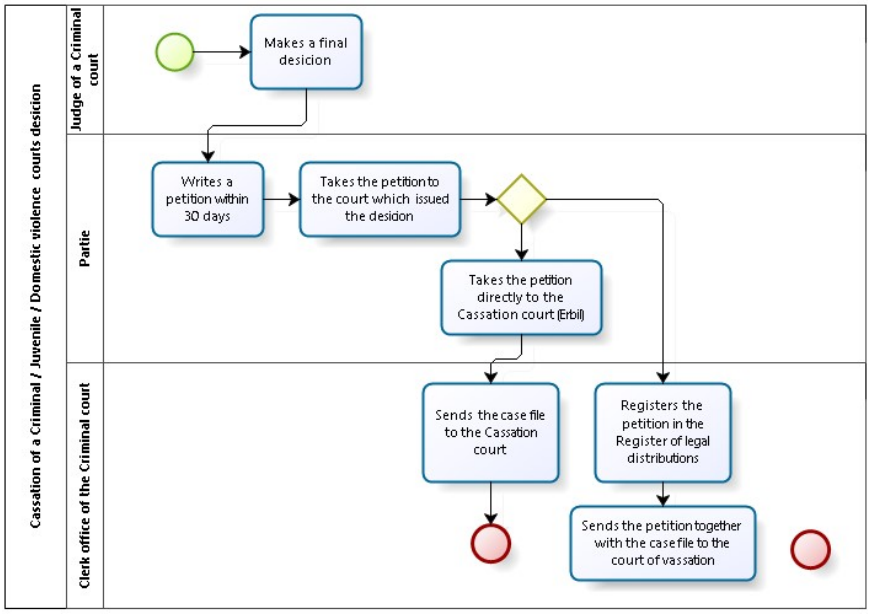

Figure A.7: Felony Court and Juvenile Court cassation proceedings

A.1.6 Appellate Court

There are two main types of civil proceedings in the Appellate Court:

- Ordinary appeal proceedings (Cases with a value of claim from 150 001 Dinars).
- Appeals as cassations (Cases with a value of claim up to 75 000 Dinars).

In ordinary civil appeal proceedings, the procedure is similar to the proceedings in the Civil Primary Court. In appeal as cassation proceedings, the proceedings are written, with no hearing. There are two separate registries for each type of proceedings, and both types of cases get a new number in the Appellate Court. The appeal in civil cases can be submitted through the court of first instance or directly to the Appellate Court during 15 days after the judgment was announced. If the appeal is submitted to the court of the first instance, the fee is also collected at the Civil Primary Court, and the case is submitted to the Appellate Court. If the Appeal is lodged directly at the Appellate Court, then the fee is also collected there. The Court President checks the appeal (e.g., is the appeal submitted in time) and, if all is correct, gives orders to ask for the file to be sent from the relevant court of the first instance. If the fee is paid in the court of the first instance, the file is sent to the Appellate Court (and the fact of delivery is registered in the Register of Legal Distributions).

In appeal proceedings, cases get a new number. A panel of three judges reviews cases in appeal as cassation proceedings and also in ordinary appeal proceedings. All judges have to sign the handwritten judgment, and the head of the panel signs the typed judgment. In appeal as cassation proceedings, all judges comment on the appeal separately (with the head of the panel adding his comments as the last judge). The comments are confidential.

Results of the appeal proceedings:

- If the judgment of the first instance was in line with the rules and legal principles, then the court shall confirm the same and dismiss the objections and reasons of appeal, and state in detail the ground of such dismissal.
- If the court found errors and discrepancies, whether in form or in substance, in the appealed judgment, then it shall complete and rectify the same in a proper manner.
- If, after rectifying and completing the errors and deficiencies in the judgment, the court found that the result of the same was not affected and that it is in line with the law, then the court shall confirm such judgment.
- If, after rectifying and completing the errors and deficiencies in the judgment, the court found that the result of the same was not affected and that it is in line with the law, then the court shall confirm such judgment.
- However, if the amendments to the judgment have affected the result or if the judgment was inconsistent with the law, then the court shall rescind the same in whole or in part and issue a new judgment without the need for returning the judgment to the court of the first instance.

The Appellate Court also reviews appeals lodged on the judgment of the Misdemeanor Courts. In addition to appeal proceedings in civil and misdemeanor matters, it is possible to object judgments by way of retrial. Such challenge shall be based on one of the following grounds, and can be submitted even if the objected judgment has become final:

- If the other litigant has committed a cheat that has affected the judgment.
- If after the judgment, there has been a written confession that the documents upon which the judgment was based are forged, or if such document were adjudicated as such (forged).
- If the judgment was based upon perjury.
- If after the judgment, the interested litigant has obtained productive documents, the lodging of which to the court was precluded by the other litigant.

Cases get a new number in retrial proceedings.

The submission of the appeal to the appeal as cassation from the Civil Primary Court is presented in Figure. A.8. The submission of the appeal to the ordinary appeal from the Civil Primary Court is presented in Figure. A.9. The submission of the appeal to the appeal as cassation directly from the Appellate Court is presented in Figure. A.10. The submission of the appeal to the ordinary appeal directly from the Appellate Court is presented in Figure. A.11 Appeal proceeding in the Appellate Court is presented in Figure. A.12.

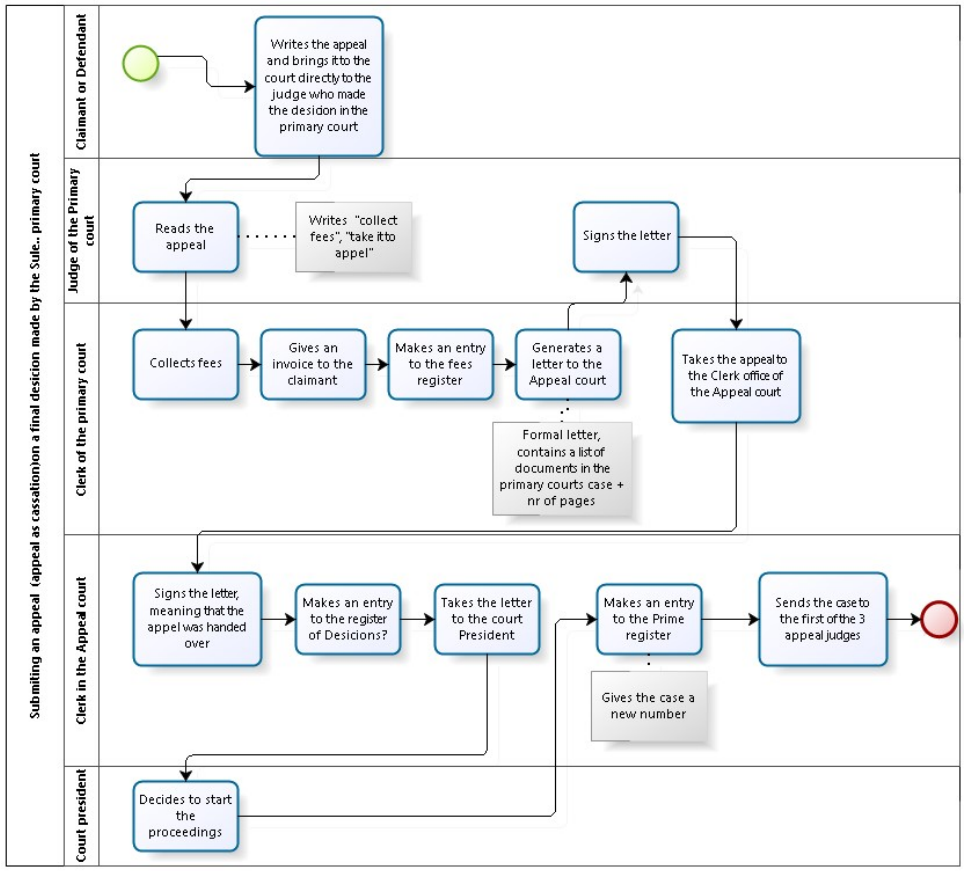

Figure A.8: Submission of appeal to appeal as cassation form Civil Primary Court

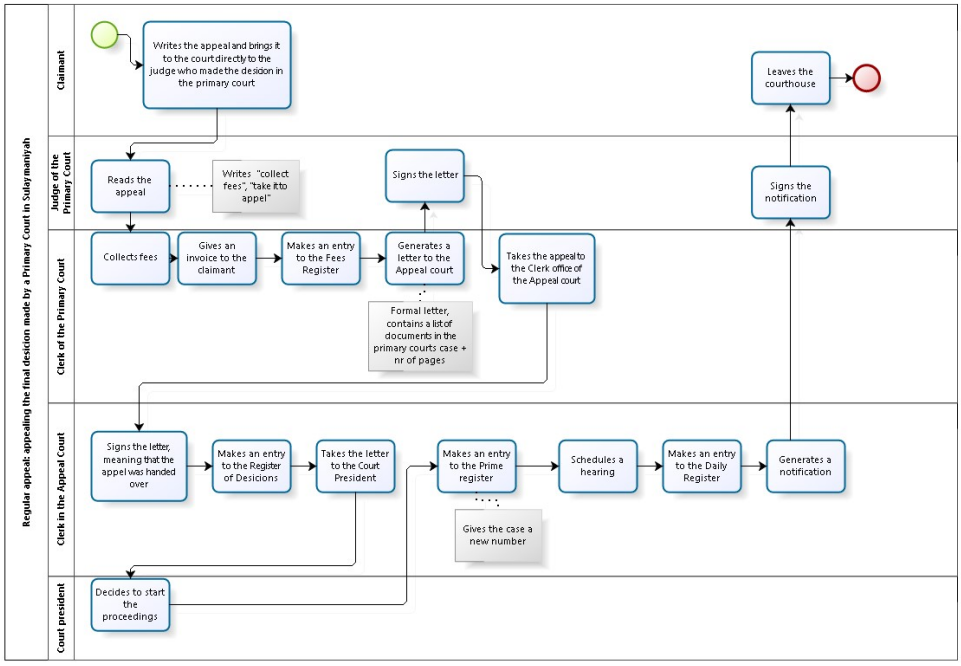

Figure A.9: Submission of appeal to ordinary appeal form Civil Primary Court

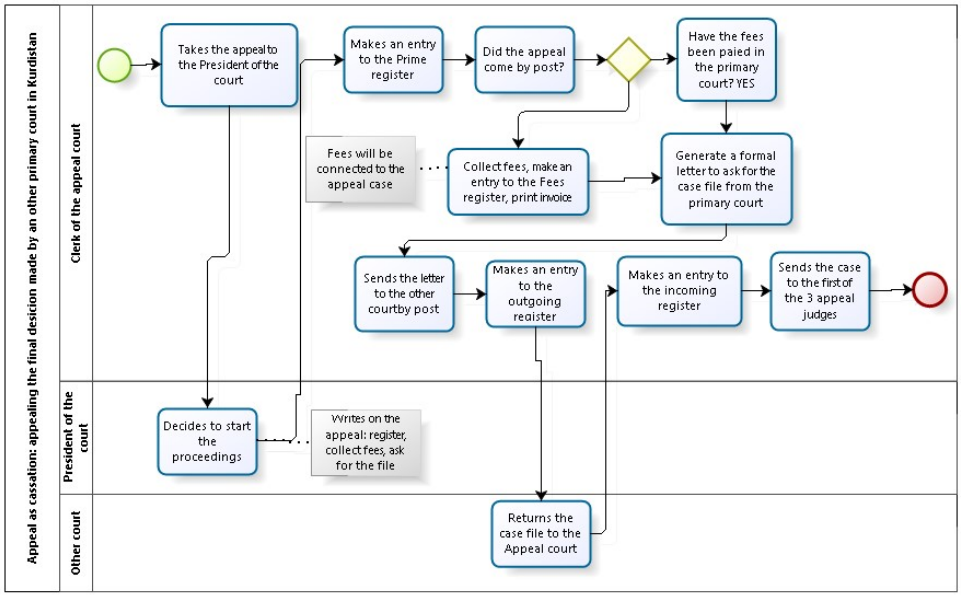

Figure A.10: Submission of appeal to appeal as cassation directly to the Appellate Court

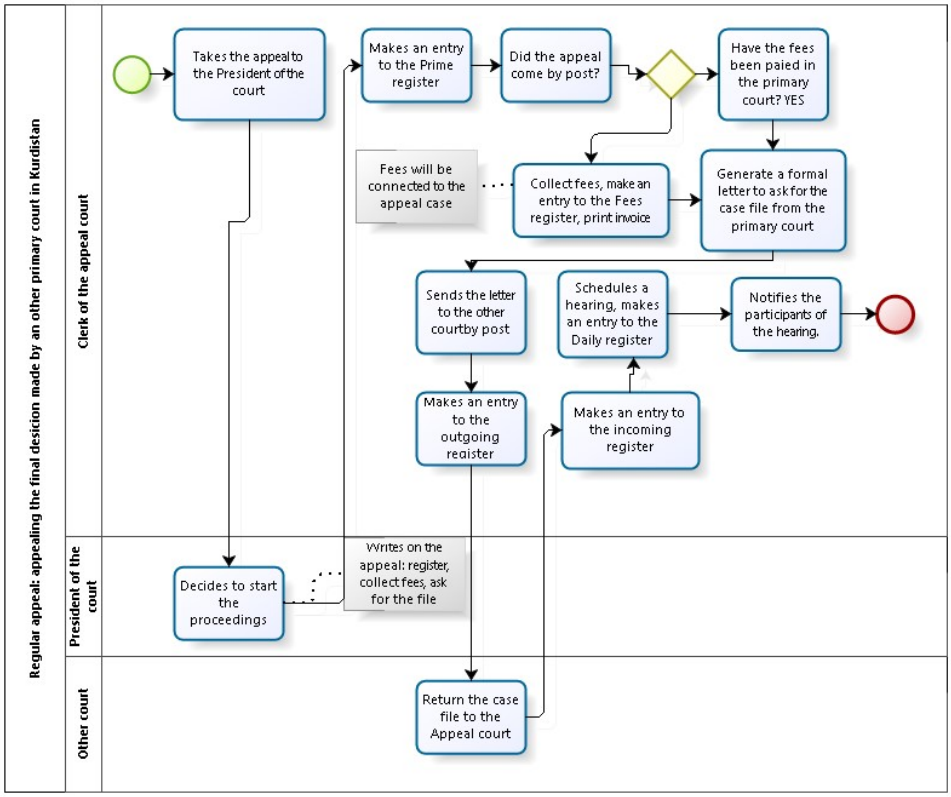

Figure A.11: Submission of appeal to ordinary appeal directly to the Appellate Court

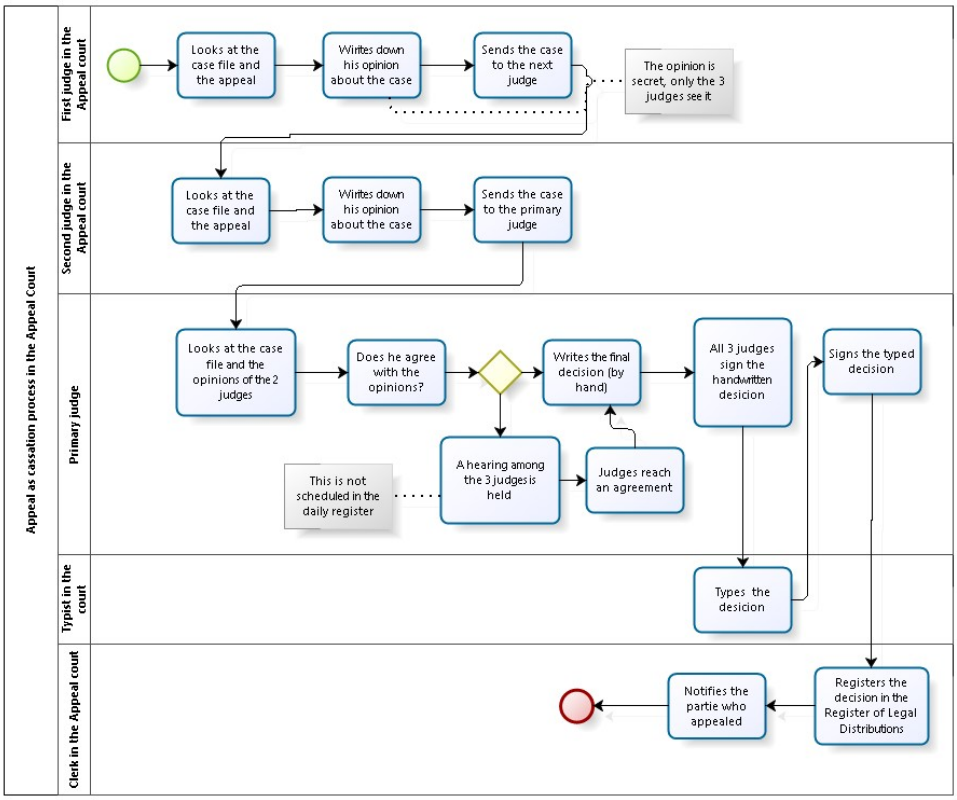

Figure A.12: Appellate Court case processing

A.2 User Groups and Roles in the Conventional System

Table .A.1 presents users and their role types in the conventional system:

Table A.1: User groups and roles in the conventional system

No.	User	Description of role and main function
1	Court President	Decisions on case registration and allocation to judges + acts as an ordinary judge.
2	Judge	Leads the proceedings, writes judgments and orders.
3	Clerk at the Prime Register (Primary Clerk)	Registers the case, enters the basic data about the case.
4	Clerk at the Daily Register (Daily Clerk)	Appoints the hearing date, keeps the calendar of a judge; writes the court summons.
5	Clerk at the Fee Register (Fees Clerk)	Calculates the right amount of fees to be paid; registers the payment.
6	Auditor	Confirms the payment of fees.
7	Clerk at the notification department (Notifications Clerk)	Keeps the registry of notifications.

Continued on next page

Table A.1 – continued from previous page

No.	Role	Description
8	Clerk attending the hearings (Hearings Clerk)	Writes the memo/transcript of the hearing.
9	Clerk typing the judgments (Typist)	Types in the handwritten judgment.
10	Prosecution office	Submits documents to the court; searches for court orders and judgments.
11	Police	Submits documents to the court; searches for court orders and judgments.

Chapter B

Acronyms

AI	Artificial Intelligence
ATOMS	Automatic Traffic Offence Management System
BPMN	Business Process Modeling Notation
CAPS	Community and Advocate Portal System
CBR	Case-Based Reasoning
CIM	Computational Independent Model
CIS	Court Information system
CMS	Case Management System
CRMS	Court Records Management System
CRTS	Case Recording and Transcribing System
CSS	Cascading Style Sheet
CWS	Case-Weighting System
DAL	Data Access Layer
DRM	Digital Right Managements
DS	Design Science
DSS	Decision Support System
EFS	Electronic Filing System
ELC	Electronic Legal Communication
ENS	Electronic Notification System
EPS	Electronic Posting Service
HTML	Hypertext Markup Language
ICJS	Integrated Criminal Justice System
ICT	Information and Communications Technology
IT	Information Technology
KRI	Kurdistan Region of Iraq
MCOL	Money Claim Online
MDA	Model Driven Architecture
ODR	Online Dispute Resolution System
PDF	Portable Document Format

PIM	Platform Independent Model
PITA	Personal IT Assistant
PSM	Platform Specific Model
QMS	Queue Management System
UML	Unified Modeling Language
VCS	Video Conferencing System
VPN	Virtual Private Network

Chapter C

Glossary

Case law	Law based on decisions that have been made by judges in the past.
Jurisdiction	The authority of a court or official organization to make decisions and judgments [1].
Litigant	A person who is fighting a legal case [1].
Offender	A person who is guilty of a crime [1].
Offence	An illegal act; a crime [1].
Portal	A website or page on the internet that allows people, especially a group of people who are interested in a particular subject, to get useful information and to find other websites [1].
Summons	To officially order someone to appear in a court of law [1].
VPN	Virtual Private Network: a system for employees in different places to use its organization's private network over the internet [1].
Workflow	The way that a particular type of work is organized, or the order of the stages in a particular work process [1].

Chapter D

Authors

Rozha Ahmed received a Bachelor's degree in Statistics and Computers in 2006 from the Sulaimani University of Iraq. In 2011, she finished her master's degree in Computing Science from Newcastle University in the United Kingdom with distinction and was awarded for the best MSc project in the school of computing science. Rozha became an industrial Ph.D. student in 2018 at Tallinn University of Technology in Estonia and a software engineer at Aktors Company. The Ph.D. topic focuses on the implementation of e-court systems, and she has worked on the project of e-court system implementation in the Kurdistan Region of Iraq. One of the notable Rozha's contribution in this project is the development of legal framework to support the operation of e-court system as domain- specific and general e-government implementation in the Kurdistan Region. She has worked on several other projects as a consultant and solution architect in different projects on the digital transformation of governments by the Estonian eGovernance Academy. Her research interest focuses on digital transformation, e-justice systems, design and implementation of information systems.

Aleksander Reitsakas received a Ph.D. in mathematics from Leningrad State University in 1986 and currently is a Chairman of the Board of Aktors. He participated in X-Road creation and was the project manager of a consortium implementing X-Road. Aleksander Reitsakas is a co-lead of the GovStack project Working Group on Information Mediator Building Block. The founding partners that started the collaboration in 2020 are ITU, Estonia, GIZ, and the Digital Impact Alliance.

Soran AB. Saeed received his M.SC in Distributed Computer Systems from Greenwich University, London-UK in 1999, and received his Ph.D. in Artificial Intelligent from the Research center at Greenwich University, London-UK in 2006. Soran has a wide range of academic publications, including 50 conference proceedings, and he is a chief editorial board of the Kurdistan Journal of Applied Research (KJAR) journal. In addition, he is a member of the scientific committee in several international conferences and international projects with IREX (current project Entrepreneurship), BC, UNESCO, and others. Currently, he is a professor and holds the position of Vice President for Scientific Affairs at Sulaymaniyah Polytechnic University. Dr. Saeed's teaching and research interests broadly span the areas of Artificial Intelligent and Distributed Computer Systems, System Analysis, Software engineering, Business intelligence, and robotics, and has been lecturing in different universities, including the School of Math and Computer Science at Greenwich University Science and lecturing visitor at Westminster University Harrow Campus in the UK. Soran was a head of the supervisory board in the e-court system project in the Sulaymaniyah Appellate Court.

Khder Hassan Muhammed received his Bachelor's degree in law from the University of Bagdad in the School of Law. He is a member of the Judicial Council of the Kurdistan Region of Iraq and has worked as a lawyer and as a judge for several years. Khder worked as a vice president judge in the Sulaymaniyah Appellate Court and headed the Judges Supervisory Board of Sulaymaniyah e-Court system project. He is also a founding member of the Union of Judges of the Kurdistan Region and a member of the Administrative Committee. He supervised the project of documenting the crimes of genocide in Kurdistan / Sulaymaniyah Governorate, implemented by the Institute of Dialogue (Temple University, Pennsylvania, United States of America). Currently, Khder is a judge in the Supreme Court

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[1] https://egov.ee/nextgen-group/

Bibliography

[1] [last accessed: 12 july 2022] https://dictionary.cambridge.org/

[2] Smolej, Mirka and Johnsen, Jon T.: European commission for the efficiency of justice (CEPEJ), time management of justice systems: a northern europe study. Tech. rep., Council of Europe (2007), https://rm.coe.int/european-commission-for-the-efficiency-of-justice-cepej-time-managemen/16807882bb

[3] Agrifoglio, R., Metallo, C., Lepore, L.: Success Factors for Using Case Management System in Italian Courts. Information Systems Management **33**(1), 42–54 (2016)

[4] Ambler, S.W.: Lessons in agility from internet-based development. IEEE Software **19**(2), 66–73 (2002)

[5] Ambler, S.W.: Agile model driven development is good enough. IEEE Software **20**(5), 71–72 (2003)

[6] Ambler, S.W.: Agile software development at scale, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), vol. 5082 LNCS (2008)

[7] Andrade, A., Joia, L.A.: Organizational structure and ICT strategies in the Brazilian Judiciary System. Government Information Quarterly **29**(SUPPL. 1), S32–S42 (2012)

[8] Asamoah, L.P., Amaglo, E.W., Kester, Q.: Using bayesian networks in analysing judgement. In: Proceedings - 2019 International Conference on Computing, Computational Modelling and Applications, ICCMA 2019. pp. 110–114 (2019)

[9] Asonibare, A.S., Akaje, H.T.: E-path to effective justice delivery : The Nigerian courts in perspective. Second Covenant University Conference on E-Governance in Nigeria (CUCEN 2015) (08062158623), 1–15 (2015)

[10] Bass, J.M.: Artefacts and agile method tailoring in large-scale offshore software development programmes. Information and Software Technology **75**, 1–16 (2016)

[11] Bellamy, C., Taylor, J.: New information and communications technologies and institutional change: The case of the UK criminal justice system. International Journal of Public Sector Management **9**(4), 51–69 (1996)

[12] Brambilla, M., Cabot, J., Wimmer, M.: Model-Driven Software Engineering in Practice, vol. 1. Springer (2012)

[13] Bueno, T.C.D., Bortolon, A., Hoeschl, H.C., Mattos, E.S., Santos, C.S., Theiss, I.: Using RBC to classify judicial petitions on e-Court. In: Proceedings of the 9th international conference on Artificial intelligence and law - ICAIL '03. pp. 83–84. ACM (2003)

[14] Chada, D.M., Silva, F.A.: Visualizing Brazilian justice : The Supreme Court 2.0 project. In: Proc. of ICAIL'15 – the 15th Intl. Conf. on Artificial Intelligence and Law. pp. 176–180. ACM (2015)

[15] Chow, T., Cao, D.B.: A survey study of critical success factors in agile software projects. Journal of Systems and Software **81**(6), 961–971 (2008), agile Product Line Engineering

[16] Cohen, D., Lindvall, M., Costa, P.: An introduction to agile methods. Advances in Computers, vol. 62, pp. 1–66. Elsevier (2004)

[17] Contini, F., Fabri, M.: Judicial electronic data interchange in Europe: applications, policies and trends. Research Institute on Judicial Systems (IRSIG) National Research Council (CNR) Via. Editrice Lo Scarabeo (2003)

[18] Deligiannis, A.P., Anagnostopoulos, D.: Towards open justice: Ict acceptance in the greek justice system: The case of the integrated court management system for penal and civil procedures (OSDDY/PP). In: Proc. of CeDEM'2017 – the 2nd Conference for E-Democracy and Open Government. pp. 82–91. IEEE (2017)

[19] Department of Economic and Social Affairs: E-Government Survey 2018 – Gearing E-Government to Support Transformation Towards Sustainable and Resilient Societies. United Nations (2018)

[20] Department of Economic and Social Affairs: E-Government Survey 2020 – Digital Government in the Decade of Action for Sustainable Development. United Nations (2020)

[21] Dirk Draheim, G.W.: Form-Oriented Analysis – A New Methodology to Model Form-Based Applications. Springer (2005)

[22] Draheim, D.: Business Process Technology – A Unified View on Business Processes, Workflows and Enterprise Applications. Springer (2010)

[23] Draheim, D.: Smart business process management. In: Fischer, L. (ed.) 2011 BPM and Workflow Handbook, Digital Edition, pp. 207–223. Workflow Management Coalition (2012)

[24] Draheim, D., Krimmer, R., Tammet, T.: On state-level architecture of digital government ecosystems: from ICT-driven to data-centric. Transactions on Large-Scale Data- and Knowledge-Centered Systems **48**, 165–195 (2021)

[25] Draheim, D., Weber, G.: Modeling submit/response style systems with form charts and dialogue constraints. In: Proceedings of HCISWWA 2003 - Workshop on Human Computer Interface for Semantic Web and Web Applications. Lecture Notes in Computer Science, vol. 2889, pp. 267–278. Springer (2003)

[26] Draheim, D., Weber, G.: Modeling form-based interfaces with bipartite state machines. Journal Interacting with Computers **17**(2), 207–228 (2005)

[27] Duan, W., Li, L.: Multi-types Court E-File Classification System. In: 2018 IEEE Conference on Multimedia Information Processing and Retrieval (MIPR). pp. 210–211. No. 1, IEEE (2018)

[28] Elliott, M.S., King, J.L.: A Common Information Space in Criminal Courts: Computer-Supported Cooperative Work (CSCW) Case Management Systems. Proceedings of the 38th Annual Hawaii International Conference on System Sciences **00**(C), 272a–272a (2005)

[29] European Commission for the Efficiency of Justice (CEPEJ): European commission for the efficiency of justice (cepej), european judicial systems, edition 2008 (data 2006): Efficiency and quality of justice. Tech. rep., Council of Europe (2008), https://rm.coe.int/16807477ba

[30] European Commission for the Efficiency of Justice (CEPEJ): European commission for the efficiency of justice (cepej), european judicial systems, edition 2010 (data 2008): Efficiency and quality of justice. Tech. rep., Council of Europe (2010), https://rm.coe.int/16807476c5

[31] European Commission for the Efficiency of Justice (CEPEJ): European judicial systems efficiency and quality of justice, high quality justice for all member states. Tech. Rep. 22, Council of Europe (2015), https://rm.coe.int/high-quality-justice-for-all-member-states-of-the-council-of-europe-ce/168078822a

[32] European Commission for the Efficiency of Justice (CEPEJ): European judicial systems efficiency and quality of justice, an overview. Tech. Rep. 23, Council of Europe (2016), https://rm.coe.int/european-judicial-systems-efficiency-and-quality-of-justice-cepej-stud/1680788228

[33] European Commission for the Efficiency of Justice (CEPEJ): European judicial systems efficiency and quality of justice, thematic report: Use of information technology in european courts. Tech. Rep. 24, Council of Europe (2016), https://rm.coe.int/european-judicial-systems-efficiency-and-quality-of-justice-cepej-stud/1680788229

[34] European Commission for the Efficiency of Justice (CEPEJ): European judicial systems efficiency and quality of justice. Tech. Rep. 26, Council of Europe (2018), https://rm.coe.int/rapport-avec-couv-18-09-2018-en/16808def9c

[35] European Commission for the Efficiency of Justice (CEPEJ): Case weighting in judicial systems. Tech. Rep. 28, Council of Europe (2020), https://rm.coe.int/study-28-case-weighting-report-en/16809ede97

[36] European Commission for the Efficiency of Justice (CEPEJ): European judicial systems CEPEJ evaluation report, 2020 evaluation cycle (2018 data). Tech. rep., Council of Europe (2020), https://rm.coe.int/evaluation-report-part-1-english/16809fc058

[37] European Commission for the Efficiency of Justice (CEPEJ): 2022 – 2025 cepej action plan:"digitalisation for a better justice". Tech. Rep. 12, Council of Europe (2021), https://rm.coe.int/cepej-2021-12-en-cepej-action-plan-2022-2025-digitalisation-justice/1680a4cf2c

[38] European Commission for the Efficiency of Justice (CEPEJ): Guidelines on electronic court filing (e-filing) and digitalisation of courts document. Tech. Rep. 15, Council of Europe (2021), https://rm.coe.int/cepej-2021-15-en-e-filing-guidelines-digitalisation-courts/1680a4cf87

[39] Gorham, U.: State courts, e-filing, and diffusion of innovation: A proposed framework of analysis. In: Proc. of dg.o'12 – the 13th Annual Intl. Conf. on Digital Government Research. pp. 232–239. ACM (2012)

[40] Hamin, Z., Othman, M.B., Mohamad, A.M.: Benefits and achievements of ICT adoption by the High Courts of Malaysia. In: 2012 IEEE Symposium on Humanities, Science and Engineering Research. vol. 2, pp. 1233–1238. IEEE (2012)

[41] Hamin, Z., Othman, M.B., Mohamad, A.M.: ICT adoption by the Malaysian high courts: Exploring the security risks involved. In: International Conference on Innovation Management and Technology Research. pp. 285–289. IEEE (2012)

[42] Hammer, M., Champy, J.: Reengineering the Corporation: A Manifesto for Business Revolution. Harper Collins (1993)

[43] Hassan, K.H., Mokhtar, M.F.: The E-Court System In Malaysia. In: 2nd International Conference on Education and Management Technology. vol. 13, pp. 240–244 (2011)

[44] Hassan, K.H., Yusoff, S.S.A., Mokhtar, M.F., Khalid, K.A.T.: The use of technology in the transformation of business dispute resolution. European Journal of Law and Economics **42**(2), 369–381 (2016)

[45] Hayashi, Y., Wakabayashi, K.: Can AI become Reliable Source to Support Human Decision Making in a Court Scene? In: The 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing. pp. 195–198 (2017)

[46] Hayashi, Y., Wakabayashi, K., Shimojyo, S., Kida, Y.: Using Decision Support Systems for Juries in Court: Comparing the Use of Real and CG Robots. In: ACM/IEEE International Conference on Human-Robot Interaction. vol. 2019-March, pp. 556–557. IEEE (2019)

[47] Helmi, H.R.: The existence of electronic courts (e-court) in realizing simple, fast and low-cost justice. International Journal of Innovation, Creativity and Change **8**(9), 270–278 (2019)

[48] Hevner, A.R., March, S.T., Park, J., Ram, S.: Design science in information systems research. MIS Quarterly: Management Information Systems **28**(1), 75–105 (2004). https://doi.org/10.2307/25148625

[49] Highsmith, J., Cockburn, A.: Agile software development: the business of innovation. Computer **34**(9), 120–127 (2001)

[50] Iannacci, F.: Digitising criminal justice in England and Wales: Revisiting information-growth dynamics. Transforming Government: People, Process and Policy **3**(1), 50–64 (2009)

[51] Jean, Jean-Paul and Gurbanov, Ramin: Judicial systems of the eastern european countries, analysis of data by the european commission for the efficiency of justice (cepej). Tech. Rep. 21, Council of Europe (2015), https://rm.coe.int/cepej-studies-n21-council-of-europe-publishing-judicial-systems-of-the/1680788248

[52] Kowsrihawat, K., Vateekul, P.: An information extraction framework for legal documents: A case study of Thai Supreme Court verdicts. In: 12th International Joint Conference on Computer Science and Software Engineering (JCSSE). pp. 275–280. IEEE (2015)

[53] Kurtz, L.P., Santos, P.M., Rover, A.J.: Access to information on websites of Brazilian superior courts of justice. In: Proc. of dgo'18 – the 19th Annual Intl. Conf. on Digital Government Research Governance in the Data Age. pp. 1–5. ACM (2018)

[54] Lowry, J.: Correlations between ICT and records policy integration and court case management system functionality: East African case studies. Records Management Journal **23**(1), 51–60 (2013)

[55] Lupo, G.: Assessing e-justice smartness: A new framework for e-justice evaluation through public values. In: Bolivar, R. (ed.) Setting Foundations for the Creation of Public Value in Smart Cities, Public Administration and Information Technology, vol. 35, pp. 77–113. Springer (2019)

[56] Luzuriaga, J.M., Cechich, A.: Electronic notification of court documents: A case study. In: Proc. ICEGOV'11 – the 5th Intl. Conf. on Theory and Practice of Electronic Governance. pp. 45–50. ACM (2011)

[57] Mandal, A., Ghosh, K., Pal, A., Ghosh, S.: Automatic Catchphrase Identification from Legal Court Case Documents. In: Proceedings of the 2017 ACM on Conference on Information and Knowledge Management - CIKM '17. pp. 2187–2190. ACM (2017)

[58] McKechnie, D.: The use of the internet by courts and the judiciary: Findings from a study trip and supplementary research. International Journal of Law and Information Technology **11**(2), 109–148 (2003)

[59] Metsker, O., Trofimov, E., Grechishcheva, S.: Natural language processing of russian court decisions for digital indicators mapping for oversight process control efficiency: Disobeying a police officer case. In: Electronic Governance and Open Society: Challenges in Eurasia. pp. 295–307. Springer (2020)

[60] Mosweu, T.L., Kenosi, L.: Implementation of the Court RecordsManagement System in the delivery of justice at the Gaborone Magisterial District, Botswana. Records Management Journal **28**(3), 234–251 (2018)

[61] Motsaathebe, L., Mnjama, N.: The management of High Court records in Botswana. Records Management Journal **19**(3), 173–189 (2009)

[62] Object Management Group: Business process model and notation. Tech. Rep. https://www.omg.org/spec/BPMN/2.0.2/PDF, OMG (January 2014)

[63] Object Management Group: Model driven architecture (MDA) – MDA guide rev. 2.0. Tech. Rep. ormsc/2014-06-01, OMG (June 2014)

[64] Object Management Group: Unified modeling language. Tech. Rep. https://www.omg.org/spec/UML/2.5.1/PDF, OMG (December 2017)

[65] Oseni, U.A., Omoola, S.O.: Prospects of an online dispute resolution framework for Islamic Banks in Malaysia An empirical legal analysis Umar. Journal of Financial Regulation and Compliance **25**(1), 39–55 (2017)

[66] Prakash, R., Mohanty, T., Gupta, R., Jain, V.: ICT in Indian Court Challenges & Solution. International Journal of Internet Computing (1), 2231–6965 (2011)

[67] Rahman, A., Nawaz, H., Naeem, O., Zaffar, F., Naseer, F., Zaffar, A.: Finding needle in the case-stack: Effective remote monitoring of courts. Proc. of HICCS'2014 – the 47th Hawaii International Conference on System Sciences pp. 1906–1915 (2014)

[68] Rosa, J., Teixeira, C., Sousa Pinto, J.: Risk factors in e-justice information systems. Government Information Quarterly **30**(3), 241–256 (2013)

[69] Rungruangpattana, P., Achalakul, T.: The design framework of the civil court case management system in Thailand. In: TENCON 2007 - IEEE Region 10 Conference. pp. 1–4. IEEE (2007)

[70] Rungruangpattana, P., Achalakul, T.: The software prototype of civil court case management in Thailand. In: Advanced Software Engineering and Its Applications. pp. 221–225. IEEE (2008)

[71] Saman, W.S.W.M., Haider, A.: E-Court: Information and Communication Technologies for Civil Court Management. In: Proceedings of PICMET '13: Technology Management for Emerging Technologies. vol. 13, pp. 2296–2304. IEEE (2013)

[72] Saman, W.S.W.M., Haider, A.: E-Shariah in Malaysia: Technology adoption within justice system. Transforming Government: People, Process and Policy **7**(2), 256–276 (2013)

[73] Schmidt, A.: IT and the judiciary in the Netherlands - A state of affairs. Computer Law and Security Report **23**(5), 453–460 (2007)

[74] Singh, M., Sahu, G.P., Dwivedi, Y.K., Rana, N.P.: Success factors for e-court implementation at Allahabad High-Court. In: Proc. of PACIS'2018 – the 22th Pacific Asia Conference on Information Systems. AIS (2018)

[75] Somer, E.: Court Information System. Tech. rep., Centre of Registers and Information Systems (RIK), https://www.rik.ee/et/node/489

[76] Stetsenko, S., Pylypenko, S., Zghama, A., Sydorova, E., Shkliar, S.: E-Justice: European standards and the state of implementation in Ukraine. Journal of Legal, Ethical and Regulatory Issues **22**(5), 1–6 (2019)

[77] Tipping, R., Farrell, G., Farrell, V., Woodward, C.J.: From collection to courtroom: Perceptions and realities of how the data flows. In: Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures the Future of Design - OzCHI '14. pp. 107–110. ACM (2014)

[78] Velicogna, M.: Justice systems and ict: What can be learned from europe? Utrecht Law Review **3**(1), 129–147 (2007)

[79] Velicogna, M., Errera, A.: e-Justice in France : the e-Barreau experience. Utrecht Law Review **7**(7), 163–187 (2011)

[80] Virtucio, M.B.L., Aborot, J.A., Abonita, J.K.C., Avinante, R.S., Copino, R.J.B., Neverida, M.P., Osiana, V.O., Peramo, E.C., Syjuco, J.G., Tan, G.B.A.: Predicting Decisions of the Philippine Supreme Court Using Natural Language Processing and Machine Learning. In: IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC). vol. 2, pp. 130–135. IEEE (2018)

[81] Watson, A.C., Rukundakuvaga, R., Matevosyan, K.: Integrated justice: An information systems approach to justice sector case management and information sharing. International Journal for Court Administration **8**(3), 1–9 (2017)

[82] Wiggins, E.C.: The courtroom of the future is here: Introduction to emerging technologies in the legal system. Law and Policy **28**(2), 182–191 (2006)

[83] Xu, A.L.: Chinese judicial justice on the cloud: a future call or a Pandora's box? An analysis of the 'intelligent court system' of China. Information and Communications Technology Law **26**(1), 59–71 (2017)

[84] Xu, Y., Li, Y., Wang, L., Shi, J., Shen, J.: A service-oriented collaborative development platform for digital courts. In: Proceedings - ICEBE 2007: IEEE International Conference on e-Business Engineering - Workshops: SOAIC 2007; SOSE 2007; SOKM 2007. pp. 641–648 (2007)

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Curriculum Vitae

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3. Education

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2011-2012	Newcastle University, Faculty of Science, Agriculture and Engineering, United Kingdom, MSc in Computing Science
2002-2006	University of Sulaimani, College of Commerce, Kurdistan Region of Iraq, BSc in Statistics and Computers

4. Language Competence

Kurdish	native
English	fluent
Arabic	fluent

5. Professional Employment

Since 2023	Aktors OÜ, Senior Software Engineer, Role: Lead System Analyst in the Sulaymaniyah e-Court project.
2014-2022	Aktors OÜ, Software Engineer, Role: Lead System Analyst in the Sulaymaniyah e-Court project (Court Information System project of the Appellate Court in the Sulaymaniyah district, the Kurdistan Region of Iraq).
2017-2018	Sulaimani Polytechnic University, Computer Science Institute, Head of (University Ranking) Committee.
2013-2018	Sulaimani Polytechnic University, Computer Science Institute, Network Department, Assistant Lecturer.
2012-2013	Sulaimani Polytechnic University, Technical Institute of Sulaymaniyah, Statistics and Informatics Department, Assistant Lecturer.
2012-2013	Sulaimani University, College of Commerce, Public Management Department, Visiting Lecturer.
2009-2010	Sulaimani Polytechnic University, Technical Institute of Sulaymaniyah, Statistics and Informatics Department, Programmer Assistant
2007-2009	Millennium Institute for Languages and Computers, Teacher.
2006-2009	Dijlah and Furat Bank, IT Department, Programmer and Analyzer Assistant.

6. Honours and Awards

2012, Received award for the best project in MSc Computing Science, Newcastle University, School of Computing Science, United Kingdom.

7. Defended Theses

- 2012, “Selective Sanitization of Web Browsing History", supervisor Dr. Budi Arief, School of Computing Science, Newcastle University.

8. Fields of Research[8]

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9. Scientific Work

1. Rozha K. Ahmed, Aleksander Reitsakas, Khder H. Muhammed, Soran AB. Saeed, Ingrid Pappel, and Dirk Draheim. System model of the Sulaymaniyah Appellate Court e-court system. *SSRN Electronic Journal*, pages 1–107, 2022

2. Rozha K. Ahmed, Khder H. Muhammed, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation. *SSRN Electronic Journal*, pages 1–20, 2022

3. Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, and Dirk Draheim. e-court system evaluation through the user ’ s perspective : Applying the end-user computing satisfaction (EUCS) model. In *Proceedings of DGO’ 2022 - 23rd Annual International Conference on Digital Government Research*, pages 293–299. ACM, 2022

4. Rozha K. Ahmed, Omer Ahmed, Ingrid Pappel, Aleksander Reitsakas, and Dirk Draheim. The role of digital transformation in fostering transparency : An e-court system case study. In *Proceedings of I3E’2022 - the 21st IFIP Conference on e-Business, e-Services, and e-Society*, volume 13454 of *Lecture Notes in Computer Science*, pages 219–230. Springer, 2022

5. M. Shahin, F. Eskandari, R. K. Ahmed, and D. Draheim. Implementation of e-birth registration systems : Potential and challenges (the case study of Iran). In *Proceedings of ICT4SD: ICT Analysis and Applications*, volume 1. Springer, 2021

6. J. T. Adeleye, R. K. Ahmed, K. Nyman-Metcalf, and D. Draheim. E-court transition process : Identifying critical factors and recommendations for developing countries. In *Proceedings of the 8th International Conference on Electronic Governance and Open Society: Challenges in Eurasia 2021 (EGOSE 2021)*, pages 305–317. Springer, 2022

7. Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Impact of e-court systems implementation: a case study. *Transforming Government: People, Process and Policy*, 15(1), 2021

[8] Estonian Research Information System (ETIS) fields of research

8. S. Lips, R. K. Ahmed, K. Zulfigarzada, R. Krimmer, and D. Draheim. Digital sovereignty and participation in an autocratic state: Designing an e-petition system for developing countries. In *Proceeding of the 22nd Annual International Conference on Digital Government Research*, pages 123–131. ACM, 2021

9. Rozha K. Ahmed, Khder H. Muhammed, Awat O. Qadir, Soran I. Arif, Silvia Lips, Katrin Nyman-Metcalf, Ingrid Pappel, and Dirk Draheim. A legal framework for digital transformation: A proposal based on a comparative case study. In *Proceedings of EGOVIS'2021 - International Conference on Electronic Government and the Information Systems Perspective. Lecture Notes in Computer Science*, volume 12926, pages 115–128. Springer, 2021

10. Rozha K. Ahmed, Khder H. Muhammed, Aleksander Reitsakas, Ingrid Pappel, and Dirk Draheim. Improving court efficiency through ICT integration: Identifying essential areas of improvement. In *Proceedings of ICT4SD'2019 - the 4th International Conference on ICT for Sustainable Development. ICT Analysis and Applications. Lecture Notes in Networks and Systems*, volume 93, pages 449–461. Springer, 2020

11. Rozha K. Ahmed, Khder H. Muhammed, Ingrid Pappel, and Dirk Draheim. Challenges in the digital transformation of courts : A case study from the Kurdistan Region of Iraq. In *Proceedings of ICEDEG' 2020 - the 7th International Conference on eDemocracy & eGovernment*, pages 74–79. IEEE, 2020

12. Rozha K. Ahmed, Silvia Lips, and Dirk Draheim. eSignature in eCourt systems. In *Proceedings WorldS4'2020 - the 4th World Conference on Smart Trends in Systems, Security and Sustainability*, pages 352–356. IEEE, 2020

13. K. Lõhmus, K. Nyman-Metcalf, R. K. Ahmed, I. Pappel, and D. Draheim. The private sector' s role in e-government from a legal perspective. In *Proceedings of the Fourth International Congress on Information and Communication Technology*, pages 283–298. Springer, 2019

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