المجلة الأردنية في القانون والعلوم السياسية

اسم المقال: الروبوتات الذكية والمسؤولية المدنية في الأردن: رحلة بحثية نحو تكامل قانوني في عصر الأتمتة
اسم الكاتب: أحمد محمد حوامدة، طارق الحسن
رابط ثابت: https://political-encyclopedia.org/index.php/library/8247
تاريخ الاسترداد: 2026/11/02 06:56 +03

الموسوعة السياسيّة هي مبادرة أكاديمية غير هادفة للربح، تساعد الباحثين والطلاب على الوصول واستخدام وبناء مجموعات أوسع من المحتوى العلمي العربي في مجال علم السياسة واستخدامها في الأرشيف الرقمي الموثوق به لإغناء المحتوى العربي على الإنترنت.
لمزيد من المعلومات حول الموسوعة السياسيّة – Encyclopedia Political، يرجى التواصل على info@political-encyclopedia.org

استخدامكم لأرشيف مكتبة الموسوعة السياسيّة – Encyclopedia Political يعني موافقتك على شروط وأحكام الاستخدام المتاحة على الموقع https://political-encyclopedia.org/terms-of-use

تم الحصول على هذا المقال من موقع المجلة الأردنية في القانون والعلوم السياسية جامعة مؤتة ورفده في مكتبة الموسوعة السياسيّة مستوفياً شروط حقوق الملكية الفكريّة ومتطلبات رخصة المشاع الإبداعي التي ينضوي المقال تحتها.

Smart Robots and Civil Liability in Jordan: A Quest for Legal Synthesis in the Age of Automation

Ahmed M. Al-Hawamdeh [1]

Tariq K. Alhasan[2]

Received:30/9/2023
Revised:11/12/2023
Accepted: 10/1/2024
Published:30/06/2024

DOI:
https://doi.org/10.35682/jjlps.v16i2.743

Corresponding author:
t.alhasan@ammanu.edu.jo

All Rights Resaved for Mutah University, Karak, Jordan.

All Rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means: electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher.

Abstract

This paper embarks on a pivotal scholarly journey to scrutinize the civil liability implications of Artificial Intelligence (AI) within the Jordanian legal framework. As AI transforms from a speculative concept into an omnipresent reality, it presents unique jurisprudential challenges, particularly civil liability. This study aims to bridge the jurisprudential vacuum in Jordan, where an absence of judicial precedents highlights the urgency for legal exploration in this emerging field. Adopting a doctrinal legal research methodology, the study rigorously examines Jordanian liability theories and their applicability to AI and undertakes a comparative analysis with more advanced legal systems in AI regulation. The paper navigates the intricacies of AI in the context of traditional Jordanian legal theories, such as objective and personal liability theories. It extends to explore the challenges of attributing liability in the age of AI. Key findings reveal significant inadequacies in Jordan's current legal provisions to address AI-induced liabilities, the disconnection between civil liability and AI accountability, jurisdictional ambiguities, and challenges in applying traditional legal concepts to the unpredictable nature of AI. The study proposes granting AI legal personality, legislative intervention, enforcing global accountability standards, advocating for international cooperation, and exploring technological limitations with ethical programming. This research contributes profoundly to academic discourse and policy formulation, particularly in the Jordanian context, highlighting the need for a comprehensive, adaptable, and robust legal framework that addresses the unique challenges posed by AI and robotics in the legal domain.

Keywords: AI Law; Automated Robot Liability, AI Liability, Robot Liability; Robot Legal Entity; Liability of the Custodian of Objects and Machines.

[1] Vice president and Professor in Commercial Law at Jerash University
A.hawamdeh@jpu.edu.jo https://orcid.org/0009-0002-0018-1879
[2] Lecturer of Commercial Law- Private Law Department, Faculty of Law, Al-Ahliyya Amman University
t.alhasan@ammanu.edu.jo https://orcid.org/0000-0003-2957-334X
https://www.scopus.com/authid/detail.uri?authorId=58220752400

الروبوتات الذكية والمسؤولية المدنية في الأردن: رحلة بحثية نحو تكامل قانوني في عصر الأتمتة

أحمد محمد حوامدة

طارق الحسن

تاريخ الاستلام: 2023/9/30
تاريخ المراجعة:2023/12/11
تاريخ موافقة النشر: 2024/1/10
تاريخ النشر:2024/06/30

الباحث المراسل:
t.alhasan@ammanu.edu.jo

حقوق النشر محفوظة لجامعة مؤتة، الكرك، الأردن.

جميع الحقوق محفوظة، فلا يسمح بإعادة طباعة هذه المادة أو النقل منها أو تخزينها، سواء أكان ذلك عن طريق النسخ، أم التصوير، أم التسجيل، أم غيره، وبأية وسيلة كانت: إلكترونية، أو ميكانيكية، إلا بإذن خطي من الناشر نفسه.

المُلخّص

تهدف هذه البحثية، التي تحمل عنوان "الروبوتات الذكية والمسؤولية المدنية في الأردن: رحلة بحثية نحو تكامل قانوني في عصر الأتمتة"، بتحليل دقيق لتبعات المسؤولية المدنية المترتبة على استخدام الذكاء الاصطناعي (AI) في إطار النظام القانوني الأردني. في سياق تحول الذكاء الاصطناعي من مفهوم نظري إلى واقع ملموس، والذي طرح تحديات قانونية فريدة، خاصةً في مجال المسؤولية المدنية. يهدف هذا البحث إلى سد الفجوة الفقهية في الأردن، عبر تسليط الضوء على الحاجة الملحة للبحث القانوني في هذا المجال الناشئ بسبب ندرة السوابق القضائية. من خلال اتباع منهجية بحث قانوني تحليلي معمق لنظريات المسؤولية المدنية وتطبيقها على الذكاء الاصطناعي، ويقوم بتحليل مقارن مع أنظمة قانونية أكثر تقدماً في تنظيم الذكاء الاصطناعي. يستعرض البحث تعقيدات الذكاء الاصطناعي في سياق النظريات القانونية الأردنية التقليدية مثل نظريات المسؤولية الموضوعية والشخصية، ويمتد لاستكشاف تحديات إسناد المسؤولية في عصر الذكاء الاصطناعي. تكشف النتائج الرئيسة عن نقص كبير في الأحكام القانونية الأردنية الحالية لمعالجة المسؤوليات المترتبة على الذكاء الاصطناعي، والانفصال بين المسؤولية المدنية والمحاسبة في مجال الذكاء الاصطناعي، والغموض القضائي، والتحديات في تطبيق المفاهيم القانونية التقليدية على طبيعة الذكاء الاصطناعي غير المتوقعة. يقترح البحث منح الذكاء الاصطناعي شخصية قانونية، والتدخل التشريعي، وتطبيق معايير المسؤولية العالمية، والدعوة للتعاون الدولي، واستكشاف القيود التكنولوجية مع البرمجة الأخلاقية. يسهم هذا البحث بشكل كبير في الحوار الأكاديمي وصياغة السياسات، خاصة في السياق الأردني، مما يبرز الحاجة إلى إطار قانوني شامل وقابل للتكيف ومتين يتناول التحديات الفريدة التي يطرحها الذكاء الاصطناعي والروبوتات في المجال القانوني.

الكلمات الدالّة: الروبوتات الذكية، المسؤولية المدنية، عصر الأتمتة، الذكاء الاصطناعي، النظام القانوني الأردني.

1. Introduction

1.1 Background

In the contemporary epoch, where Artificial Intelligence (AI) has metamorphosed from a speculative construct into an omnipresent technological phenomenon, the jurisprudential ramifications of its pervasive integration into various societal sectors have become increasingly intricate and exigent. Originating as a formal academic discipline in 1956, AI has burgeoned into a multi-faceted field encompassing machine learning, natural language processing, and robotics, among other sub-disciplines (Čerka, P., Grigienė, J., & Sirbikytė, G., 2015). Such technological advancements have catalyzed transformative shifts in diverse sectors, ranging from healthcare diagnostics to artistic creation, thereby engendering a plethora of unprecedented challenges to extant legal paradigms governing civil liability (Mazzone & Elgammal, 2019; Soyer & Tettenborn, 2022).

Within the Jordanian legal system's specific ambit, a conspicuous jurisprudential vacuum is discernible concerning the codification and adjudication of civil liabilities emanating from AI operations. This lacuna is accentuated by the dearth of judicial precedents in Jordan, thereby rendering the need for scholarly exploration into this uncharted legal territory both immediate and imperative. The recent incident involving the apprehension of an individual by the Jordanian police for utilizing remote driving technology serves as a poignant exemplar of the pressing nature of these legal quandaries (Alsharqiya, August 11, 2023).

1.2 Purpose and Objectives of the Study

The study aims to dissect the civil liability implications of deploying AI-powered 'smart robots' within the Jordanian legislative milieu. To achieve this, the study has outlined the following specific objectives:

1. **Clarification of Applicability**: To rigorously examine the extent to which Jordanian liability theories can be unambiguously applied to AI systems.
2. **Technological Contextualization**: To provide a nuanced analysis of AI's technological advancements and their subsequent impact on traditional liability theories.
3. **Evaluation of Existing Legal Framework**: To undertake a critical comparative analysis with legal systems that have made strides in AI regulation.
4. **Identification of Legal Gaps**: To identify and elaborate on the legislative loopholes that could result in ambiguous or unjust liability attribution.
5. **Proposal for Legal Innovation**: Conducting a comprehensive feasibility study to assess establishing an independent legal personality for AI systems, considering the global implications of this potentially revolutionary legal shift.

By fulfilling these objectives, the study aims to contribute seminal to academic discourse and policy formulation, particularly within the Jordanian context.

1.3 Scope and Limitations of the Study

Scope:

1. **Civil Liability**: The study will focus exclusively on civil liability issues arising from AI activities within the Jordanian legal framework.
2. **AI-Powered Robots**: The study will limit its scope to AI systems capable of autonomous decision-making.
3. **Jordanian Legal Framework**: The study aims to provide an in-depth analysis of Jordan's unique legal landscape.
4.

Limitations:

1. **Geographic Limitation**: The study's findings may not be universally applicable due to its narrow geographic scope.
2. **Legal Focus**: The research is intentionally circumscribed to legal aspects, excluding socio-economic, ethical, or philosophical dimensions of AI, which could provide a more holistic understanding of its impact.
3.

Methodology

This study adopts a doctrinal legal research methodology, which involves a comprehensive and systematic analysis of legal principles, statutes, case law, and academic literature pertaining to the civil liabilities associated with AI systems, particularly within the Jordanian legal context. The doctrinal approach facilitates a critical examination of existing legal norms and the identification of jurisprudential gaps in the regulation of AI.

Data for this research is primarily sourced from secondary materials, including:

Legal Texts and Case Law: Jordanian statutes, regulations, and case law pertinent to civil liability, as well as relevant international legal instruments.

Academic Literature: Peer-reviewed articles, books, and conference papers focusing on AI and civil liability, both within Jordan and in comparative jurisdictions.

2. Navigating AI with Traditional Theories

Jordanian Civil Law adopts an intermediate stance amalgamating objective and personal liability theories. Article 256 of the Jordanian Civil Code stipulates, "Any infliction of harm upon another obligates the perpetrator to indemnify the damage, irrespective of the level of discernment involved." This legal provision serves as a linchpin in reconciling the harshness of objective theory with the restrictiveness of personal theory, mainly when applied to non-human agents like Artificial Intelligence (Al-Awamleh, 2019).

The advent of Artificial Intelligence (AI), particularly machine learning models, complicates this legal landscape. These AI systems operate on intricate algorithms, often eluding straightforward human interpretation. This absence of 'intentionality' engenders a legal quandary: Should liability for damages be attributed to the machine, or does it reside solely with its human operators or creators?

The existing Jordanian legal framework is steeped in the Muslim Hanafi School of Thought, which predominantly aligns with objective theory. This raises salient questions regarding its adaptability to the rapidly evolving realm of AI, which can make autonomous decisions that lead to unforeseen damages (Bader, 2022; Yew & Yip, 2021).

Given these complexities, more than relying on traditional theories is required. A paradigmatic shift in our conceptualization of liability and damages is imperative, especially in legal contexts that now include AI as a non-human agent.

This preliminary inquiry is an entry point into the intricate interplay between traditional legal theories and contemporary technological advancements. It underscores the need for a more comprehensive legal framework that can adapt to the unique challenges posed by AI. Future research should explore specific case studies and hypothetical scenarios to elucidate these complexities further.

2.1 Liability of Object Keepers and Subordinates in AI Context

Article 291 of the Jordanian Civil Code serves as a seminal legislation that adapts conventional liability frameworks to modern exigencies, particularly those relating to objects demanding specialized care, such as machinery. The article explicitly states, "Anyone with objects requiring special attention to prevent their damage or mechanical machinery shall be liable for damage caused by such objects, except as may not be avoided, without prejudice to the special provisions contained therein." This legal provision signifies an essential advancement in jurisprudence, acknowledging the intricate nuances introduced by technological advancements (Hadzovic et al., 2023; Lohsse, 2019).

As we delve into artificial intelligence (AI), the legislation prompts us to contemplate a foundational query: Does AI merely fit the conventional designation of an 'object' under established theories of liability, or do its complexities necessitate an entirely new legal classification? A cursory review of the literature and emerging judicial philosophies indicates that AI technologies are not mere objects but complex learning systems warranting unique juridical attention (Gerke et al., 2020).

The conventional framework of civil liability is primarily anchored in three elements: damage, fault, and causality. These elements, while clearly defined in the context of human actors, become ambiguous when applied to AI systems. AI algorithms' cryptic operations—often termed the "black box" phenomena—impede straightforward fault determinations. Furthermore, vicarious liability, which stipulates that subordinates are liable to their superiors, faces challenges given the autonomous functionalities inherent in AI systems (Almaharmeh, 2022).

Emerging scholarship has begun to address these anomalies. For instance, Hiyari (2013) argues for a 'legal personality' for intelligent machines, suggesting that current legal paradigms are inadequate. Wagner (2019) further postulates the concept of 'electronic personality,' an innovative approach to AI liability. This notion intriguingly aligns with the Jordanian Civil Law's emphasis on amoral personality' and 'literary rights,' suggesting that legal frameworks need to evolve to encompass AI's ethical and intellectual capacities (Nikolinakos, 2023 Borghetti, 2019).

The moral and ethical tapestry surrounding AI technologies calls for intensive scrutiny. As these technologies burgeon, they create unprecedented ethical dilemmas that compel existing legal paradigms to evolve (Zekos, 2021). Consequently, integrating AI into contemporary society requires a sweeping reassessment of prevailing legal doctrines.

In Jordan, as an illustrative case, drivers of automated cars are still held accountable under current legal stipulations, thereby underscoring the pressing need for reformative action. The overarching implication is that traditional theories, though invaluable as foundational pillars, necessitate substantive modifications to account for the unprecedented challenges proffered by AI. Therefore, the fusion of law and technology, particularly in the Jordanian context, offers critical insights into the jurisprudential recalibrations required for an increasingly automated world (Lior, 2020).

2.2 The Rise of Robots: Modern Theories and Robot Uses

Legal systems have traditionally been designed to administer justice through established judicial processes or alternative dispute-resolution mechanisms. However, integrating robots and AI into these systems necessitates a re-evaluation of existing legal frameworks to ensure they are congruent with the principles of justice and fairness. Girardi (2020) posits that law firms reluctant to invest in AI technologies are inadvertently forfeiting a strategic advantage that could significantly expedite dispute resolution processes.

Modern jurisprudential theories advocate for extending legal personality to intelligent robotic systems. This notion introduces the concept of 'subsidiary liability,' where legal accountability could be ascribed to various stakeholders such as manufacturers, controllers, operators, or end-users. However, attributing legal personality to robots is fraught with complexities and necessitates meticulous legislative scrutiny to mitigate inherent risks and resolve potential conflicts with service providers (Raposo, 2022; Cheong, 2022).

The European Parliament has been at the forefront of legislative innovation in this domain. In 2017, it introduced a draft proposal delineating the civil liability arising from robotic actions. The proposal adopts a dual approach, incorporating risk-based and direct liability models. The latter model relies on three fundamental elements: the harmful act, the causal relationship, and the harm incurred. These elements are further categorized into performance errors, design defects, and risks associated with negligence (Eling et al., 2022). The European legislative body also promulgated a law concerning robot liability insurance, drawing parallels with existing vehicle insurance frameworks. This law further recommends establishing a specialized

compensation fund for damages incurred due to robotic actions, offering a viable model for Jordanian legislators to consider. AI technologies have proven invaluable assets in legal research, substantially alleviating the workload of legal practitioners.

Moreover, robots with advanced AI algorithms can perform tasks such as client interviews and data collection with remarkable accuracy. Studies indicate that individuals are often more candid when interacting with AI, enhancing the efficacy of client-attorney discussions (Karmaza et al., 2021; Re et al., 2019). As AI technologies evolve, they invariably raise many ethical and moral questions. For instance, humanoid robots that mimic human actions blur the lines between traditional legal categories, necessitating a comprehensive re-evaluation of existing legal frameworks (Musch et al., 2023; Sen, 2023).

Integrating AI and robotics into the legal landscape necessitates profoundly re-evaluating existing legal frameworks. While traditional theories of liability offer foundational principles, more is needed to address the complexities introduced by these advanced technologies. The Jordanian Civil Law, although rooted in historical and cultural contexts, must adapt to the technological advancements of the 21st century. The liability of natural persons in the context of automated technologies, such as autonomous vehicles, remains a pressing issue in Jordan due to the lack of legal advancement.

The European model offers a compelling framework that could serve as a blueprint for Jordan and other jurisdictions. Moreover, the rise of AI in legal research and client interactions presents both opportunities and challenges that the legal profession must be prepared to navigate.

From a jurisprudential standpoint, the Latin legal tradition has undergone significant transformations in civil liability, particularly securing liability. These changes have weakened the role of fault in compensation law and led to the obfuscation of responsibility as parties increasingly seek to hide behind guarantors (Justo-Hanani, 2022).

In summary, the legal challenges posed by the advent of AI and robotics are manifold and complex. They require a multi-faceted approach that combines legal innovation with ethical considerations. As AI technologies become increasingly integrated into various aspects of society, the urgency to evolve existing legal theories and frameworks becomes more pressing. Therefore, future research should focus on developing a comprehensive, adaptable, robust legal framework that addresses the unique challenges posed by AI and robotics in the legal domain.

3. Liability of AI in Civil Law: An Examination of the Relationship between AI and Legal Responsibility

The advent of artificial intelligence (AI) has precipitated a seismic shift in technological innovation, engendering unparalleled opportunities for societal betterment. However, the expeditious diffusion of AI technologies concurrently engenders many legal quandaries, most saliently in the domain of civil law. Traditional jurisprudential frameworks, conceived in an epoch where the human agency was the sine qua non of legal action, find themselves increasingly obsolescent in grappling with the labyrinthine complexities of AI systems. This exigency begets urgent interrogatives concerning liability, accountability, and the ethical ramifications of AI technologies (Soyer & Tettenborn, 2022).

This section is meticulously organized into discrete subsections to facilitate a coherent and logical exposition. Section 1 scrutinizes the complexities of contractual and tortious liabilities within the ambit of Jordanian civil law, accentuating the lacunae in extant frameworks vis-à-vis AI-centric issues. Section 2 delves into the legal enigmas and prospective remediations in AI liability, accenting European legislative avant-gardism. Ensuing sections dissect the vicissitudes and potentialities proffered by AI in the purview of tort law, the European legislative panorama, and the Jordanian legal corpus. The paper culminates by amalgamating the salient findings and proffering trajectories for impending scholarly inquiry.

By assiduously examining these multi-faceted issues through the prism of both Jordanian and European civil law, this treatise aspires to augment the burgeoning corpus of scholarly literature on the legal ramifications of AI technologies. It endeavors to furnish an exhaustive compendium of the contemporaneous landscape of AI liability, pinpoint deficiencies in prevailing legal architectures, and tender sagacious counsel for prospective legislative initiatives.

3.1 Contractual and Tortious Liabilities in the Age of AI

The Dichotomy of Civil Liability: Contractual vs. Tortious

Civil liability is traditionally categorized into two distinct paradigms: contractual and tortious liability. Contractual liability is invoked when a legally binding agreement is breached, resulting in demonstrable damages. This is predicated on the triad of error, damage, and causation. Conversely, tortious liability is established in the absence of a contractual relationship but involves the commission of a harmful act, as stipulated by Article 256 of the Jordanian Civil Law (Al-Amawi, 2023; Al-Dweikat, 2022; Heif & Helo, 2022).

The Jordanian Perspective: Normative 0053tandards and Judicial Interpretations

As articulated in Article 358/1, Jordanian Civil Law adopts the 'reasonable person' standard for assessing due diligence in contractual obligations. This standard is a legal yardstick against which a debtor's actions are measured. The Jordanian Court of Cassation has further nuanced this by incorporating actual and consequential damages, provided they emanate from a breach of contractual obligations (Jordanian Court of Cassation, 4370 of 2019; Jordanian Court of Cassation 3052 of 2014).

AI and Contractual Liability: A Legal Conundrum

The advent of AI technologies poses unprecedented challenges to the traditional framework of contractual liability. Given the autonomous nature of AI systems, attributing fault becomes a complex endeavor (Bleher & Braun, 2022). Contractual agreements may offer some solace, but more is needed to address the multi-faceted risks posed by AI (Pfeifer-Chomiczewska, 2022). This inadequacy is further exacerbated by the nebulous legal status of AI under Jordanian law, necessitating urgent legislative reforms. A deeper analysis of specific AI-related cases would

provide valuable insights into these complexities (de Graaf & Veldt, 2022; de Graaf & Wuisman, 2022).

3.2 Legal Conundrums and Solutions in AI Liability

The Jordanian legal framework is conspicuously silent on the issue of tortious liability in the context of AI. This gap is particularly glaring given AI systems' autonomous capabilities, which defy traditional legal categorizations (Asaro, 2016). The absence of a legal personality for AI technologies complicates the attribution of fault, especially when the damage is inflicted by an intelligent machine (Alabady, 2023; Chesterman, 2020).

The European Union has taken pioneering steps to address these complexities. A draft legislation introduced in 2017 aims to establish civil liability for AI systems based on risk and direct liability. This groundbreaking approach has been lauded for its innovative stance on AI liability (Bratu & Freeland, 2023). The approach is predicated on three core elements: the harmful act, the harm itself, and the causal relationship between the two (European Parliament resolution of October 20, 2020, on a civil liability regime for artificial intelligence, 2020/2014(INL)). The European Parliament has also enacted legislation on liability insurance for AI technologies, drawing parallels with vehicle insurance (Ulnicane, 2022).

Jordanian law, as evidenced by Article 856 of the Civil Law and Article 3/A/2 of the Consumer Protection Law, emphasizes the importance of transparent disclosure. In AI, this could be extrapolated to mean that AI systems, once endowed with legal personality, must provide clear and accurate information, thereby enhancing accountability (Hiyari, 2013; Ibrahim, 2023; Khalf, 2023).

The concept of legal personalization for AI systems is gaining traction among legal scholars (Zimmerman, 2015). This would entail imposing subsidiary liability on the AI system's manufacturer, controller, operator, or user. However, this approach is fraught with ethical and legal dilemmas, particularly concerning the potential conflict with human legal personalities (Verdicchio & Perin, 2022).

Integrating AI into the socio-legal fabric necessitates radically re-evaluating existing legal paradigms (Chamberlain, 2023). While the Jordanian Civil Law provides a foundational framework, it must be equipped to address the unique challenges posed by AI technologies (Rachum-Twaig, O., 2020). The European model offers valuable insights that could inform future legislative endeavors in Jordan. As AI continues to evolve, so must the legal frameworks that govern its application, ensuring a harmonious coexistence between technological innovation and legal responsibility.

4. Conclusion

4.1 Summary of Key Findings

This paper comprehensively explores the inadequacies of the Jordanian legal framework in addressing civil liabilities arising from AI operations. The paper's key findings are as follows.

1. **Insufficiency of Current Legal Provisions:** This analysis underscores a profound inadequacy within the Jordanian legal system to address AI-specific civil liabilities. This insufficiency stems from a need for tailored legislation acknowledging AI's unique characteristics. The existing legal frameworks, largely designed for human actors, need to be equipped to accommodate the complexities and peculiarities of AI-induced liabilities. This gap necessitates the development of specific statutes or amendments to current laws to address the liability issues associated with AI operations explicitly.
2. **Pitfalls of Civil Liability Independence:** The Jordanian legal paradigm exhibits a significant disconnection between civil liability and AI accountability. This separation creates a legal vacuum where AI-induced damages could occur without adequate redressal mechanisms, potentially leading to situations of impunity. This finding highlights the necessity for legal reforms that bridge the gap between AI operations and liability attribution, ensuring that victims of AI-related harm have clear and effective legal recourse.
3. **Jurisdictional Quandaries:** A notable ambiguity arises concerning jurisdictional competence in AI-related cases. The current legal framework does not delineate which judicial bodies are authorized to adjudicate AI disputes, leading to procedural uncertainties and potential jurisdictional conflicts. This lack of clarity could impede the efficient and fair resolution of AI-related civil liability cases.
4. **Uncertainty Principle of AI:** AI's unpredictability poses a significant challenge to traditional legal concepts such as "damnum" (damage) and "injuria" (injury). AI systems, with their capacity for autonomous decision-making and learning, can create unforeseen outcomes, complicating the application of these established legal principles. This unpredictability necessitates a legal re-evaluation of how liability is attributed in scenarios where AI behavior deviates from expected norms.
5. **AI's Legal Incapacity:** Under current Jordanian law, AI entities are not recognized as legal persons. This absence of legal personhood creates complications in assigning liability for actions performed by AI. Thus, the legal system is confronted with the challenge of attributing responsibility for harm caused by entities that fall outside the traditional legal categories of personhood.
6. **Incongruity of AI with Legal Error:** The concept of 'Ghafla' (negligence) in Jordanian law is inapplicable to AI, as these systems lack the capacity for moral or legal fault. This raises complex questions about addressing situations where AI actions, devoid of human-like intention or negligence, cause harm. The legal system must grapple with attributing liability in a manner that transcends traditional notions of fault and negligence.

4.2 Recommendations for Establishing the Liability of AI under Jordanian Law

Building upon these findings, the paper suggests several recommendations:

1. **Legal Personality for AI**: A nuanced exploration into granting AI entities a distinct form of legal personality akin to corporate entities should be undertaken. This initiative involves assessing the implications of such legal recognition, including the ability to sue and be sued on property and enter into contracts. An in-depth analysis of various models of legal personhood, drawing from corporate and international legal precedents, can offer a framework for attributing responsibility and accountability to AI systems.
2. **Legislative Intervention**: Forming a specialized committee comprising legal experts and technologists is essential. This committee should focus on drafting AI-specific amendments to the Jordanian Civil Code. These amendments must encompass provisions for AI accountability, liability for damages, and establishing regulatory standards for AI operations. The committee should also consider the dynamic nature of AI technology and provide a flexible legal framework that can adapt to technological advancements.
3. **Global Accountability Standards**: Enforcing legal obligations on multinational corporations operating AI systems in Jordan is imperative. These standards should ensure that such entities are liable for AI-induced damages and adhere to Jordanian legal norms and international best practices. Establishing a regulatory body to oversee and enforce these standards can be considered.
4. **International Cooperation**: Advocating for an international legal framework is crucial. This framework should focus on standardizing AI's legal status, liability norms, and ethical guidelines. Jordan's active participation in international forums and treaty negotiations can pave the way for a globally harmonized approach to AI regulation.
5. **Technological Limitations and Ethical Programming**: Delving into engineering solutions to set legal and ethical boundaries on AI functionality is vital. This includes developing AI systems with built-in ethical constraints and legal compliance mechanisms. A focus should be on creating AI that is transparent, auditable, and adheres to predefined ethical standards. Collaborations with AI developers and engineers are essential to ensure these systems are designed with legal and ethical considerations.
6. **Educational and Awareness Programs**: Implementing educational initiatives to increase legal professionals' understanding of AI technologies and their implications. This includes seminars, workshops, and courses on AI and the law aimed at judges, lawyers, and legal scholars. An informed legal community is better equipped to handle the challenges posed by AI in the legal realm.
7. **Monitoring and Evaluation Mechanism**: Establishing a mechanism for ongoing monitoring and evaluation of AI-related legal developments nationally and globally. This mechanism should regularly assess the effectiveness of legal reforms, identify emerging challenges, and propose timely updates to the legal framework.

By implementing these recommendations, Jordan can develop a robust legal infrastructure capable of addressing the complexities posed by AI, ensuring justice and accountability in the age of automation.

References

Alabady, H. S. (2023). Towards a legal framework for civil liability of smart robots in Jordanian legislation. *International Journal of Cyber Criminology, 17*(1), 23-39. https://doi.org/10.5281/zenodo.4766602

Al-Amawi, M. A. (2023). The legal basis for guaranteeing the wrongful act on funds in the Jordanian civil law. *Russian Law Journal, 11*(5). https://www.russianlawjournal.org/index.php/journal/article/view/2811/1661

Al-Awamleh, A. S. (2019). The provisions of supervisor responsibility in the Jordanian civil code. *Journal of Law, Policy & Globalization, 86*, 100. https://doi.org/10.7176/JLPG/86-10

Al-Dweikat, N. A. F. (2022). Negligence liability for artificial intelligence robots in Jordanian civil law. *Al-Zaytoonah University of Jordan Journal for Legal Studies, 3*(3). https://doi.org/10.15849/ZUJJLS.221130.12

Almaharmeh, M. M. (2022). Compensating a legal person for moral damage in Jordanian law. *Journal of Politics & Law, 15*, 1. https://doi.org/10.5539/jpl.v15n2p1

Alsharqiya. (2023, August 11). Jordanian police stop a person for driving his car remotely. *Alsharqiya*. https://www.alsharqiya.com/en/news/jordanian-police-stop-a-person-for-driving-his-car-remotely

Asaro, P. M. (2016, March). The liability problem for autonomous artificial agents. In *2016 AAAI Spring Symposium Series*. http://www.aaai.org/ocs/index.php/SSS/SSS16/paper/view/12699

Bader, M. R. (2022). Civil liability arising from the use of artificial intelligence techniques in Jordanian legislation. (Master's thesis, Middle East University, Amman, Jordan). https://shorturl.at/ftMQZ

Bleher, H., & Braun, M. (2022). Diffused responsibility: attributions of responsibility in the use of AI-driven clinical decision support systems. *AI and Ethics, 2*(4), 747-761. https://doi.org/10.1007/s43681-022-00135-x

Bratu, I., & Freeland, S. (2023). Artificial intelligence, space liability and regulation for the future: A transcontinental analysis of national space laws. *Forthcoming: Proceedings of the International Institute of Space Law, 2024*. https://ssrn.com/abstract=4230848

Čerka, P., Grigienė, J., & Sirbikytė, G. (2015). Liability for damages caused by artificial intelligence. *Computer Law & Security Review, 31*(3), 376-389. https://doi.org/10.1016/j.clsr.2015.03.008

Chamberlain, J. (2023). The risk-based approach of the European Union's proposed artificial intelligence regulation: Some comments from a tort law perspective. *European Journal of Risk Regulation, 14*(1), 1–13. https://doi.org/10.1017/err.2022.38

Cheong, B. C. (2022). Avatars in the metaverse: Potential legal issues and remedies. *International Cybersecurity Law Review, 3*(2), 467-494. https://doi.org/10.1365/s43439-022-00056-9

Chesterman, S. (2020). Artificial intelligence and the limits of legal personality. *International & Comparative Law Quarterly, 69*(4), 819–844. https://doi.org/10.1017/S0020589320000366

de Graaf, T. J., & Wuisman, I. S. (2022). Contractual liability for the use of AI under Dutch law and EU legislative proposals. In *Law and artificial intelligence: Regulating AI and applying AI in legal practice* (pp. 259-277). The Hague: TMC Asser Press. https://doi.org/10.1007/978-94-6265-523-2_14

de Graaf, T., & Veldt, G. (2022). The AI Act and its impact on product safety, contracts and liability. *European Review of Private Law, 30*(5). https://doi.org/10.54648/erpl2022038

Eling, M., Nuessle, D., & Staubli, J. (2022). The impact of artificial intelligence along the insurance value chain and on the insurability of risks. *The Geneva Papers on Risk and Insurance-Issues and Practice, 47*(2), 205-241. https://doi.org/10.1057/s41288-020-00201-7

Gerke, S., Minssen, T., & Cohen, G. (2020). Ethical and legal challenges of artificial intelligence-driven healthcare. In *Artificial intelligence in healthcare* (pp. 295-336). Academic Press. https://doi.org/10.1016/B978-0-12-818438-7.00012-5

Girardi, R. (2020). *Inteligência artificial aplicada ao direito*. Rosario Girardi. https://books.google.com/books?hl=en&lr=&id=PDF3EAAAQBAJ&oi=fnd&pg=PA2&dq=Intelig%C3%AAncia+Artificial+Aplicada+ao+Direito+Girardi&ots=RBJNkJhq4K&sig=dj8k6KOwwjq6Cu_Xh_Qf5VvXkOg

Hadzovic, S., Mrdovic, S., & Radonjic, M. (2023). A path towards an internet of things and artificial intelligence regulatory framework. *IEEE Communications Magazine*. https://doi.org/10.1109/MCOM.002.2200373

Heif, M., & Helo, S. A. (2022). Civil liability arising from the use of nanotechnology in the medical field: A comparative study between Jordanian, Emirati and Egyptian legislation. *J. Legal Ethical & Regul. Issue, 25*, 1.

https://heinonline.org/HOL/LandingPage?handle=hein.journals/jnlolletl25&div=219&id=&page=

Hiyari, A. (2013). *Tort liability for the actions of others*. Dar Wael for Publishing.

Ibrahim, M. A. (2023). The legal nature of artificial intelligence systems and their impact on civil liability: A comparative study. *Al-Bahith Journal of Legal Sciences, 4*(1 Part 2). https://www.uofjls.net/index.php/new/article/view/143

Justo-Hanani, R. (2022). The politics of artificial intelligence regulation and governance reform in the European Union. *Policy Sciences, 55*(1), 137-159. https://doi.org/10.1007/s11077-022-09452-8

Karmaza, O. O., Koroied, S., Makhinchuk, V. M., Strilko, V. Y., & Iosypenko, S. T. (2021). Artificial intelligence in justice. *Linguistics and Culture Review, 5*(S4), 1413-1425. https://doi.org/10.21744/lingcure.v5nS4.1764

Khalf, F. S. (2023). The objective approach to civil liability for artificial intelligence activities. *Al-Bahith Journal of Legal Sciences, 4*(1). https://uofjls.net/index.php/new/article/view/127

Lohsse, S. (2019). Liability for artificial intelligence and the Internet of Things. In R. Schulze, & D. Staudenmayer (Eds.), Baden-Baden: Nomos. https://doi.org/10.5771/9783845294797

Mazzone, M., & Elgammal, A. (2019, February). Art, creativity, and the potential of artificial intelligence. *Arts, 8*(1), 26. https://doi.org/10.3390/arts8010026

Musch, S., Borrelli, M., & Kerrigan, C. (2023). The EU AI Act: A comprehensive regulatory framework for ethical AI development. Available at SSRN. https://doi.org/10.2139/ssrn.4549248

Nikolinakos, N. T. (2023). EU policy and legal framework for artificial intelligence, robotics and related technologies-the AI Act. *Law, Governance and Technology Series, 53*.

Pfeifer-Chomiczewska, K. (2022). Artificial intelligence and contractual liability under Polish law: Selected issues. *Studia Prawno-Ekonomiczne, 124*, 59-80. https://doi.org/10.26485/SPE/2022/124/4

Rachum-Twaig, O. (2020). Whose robot is it anyway?: Liability for artificial-intelligence-based robots. *University of Illinois

Raposo, V. L. (2022). Ex machina: Preliminary critical assessment of the European Draft Act on artificial intelligence. *International Journal of Law and Information Technology, 30*(1), 88-109. https://doi.org/10.1093/ijlit/eaac007

Re, R. M., & Solow-Niederman, A. (2019). Developing artificially intelligent justice. *Stanford Technology Law Review, 22*, 242. https://ssrn.com/abstract=3390854

Sen, A. (2023). Artificial intelligence and autonomous systems: A legal perspective on granting personhood and implications of such a decision. *DME Journal of Law, 4*(1), 15–26. https://www.dmejournals.com/index.php/DMEJL/article/view/281

Soyer, B., & Tettenborn, A. (2022). Artificial intelligence and civil liability—Do we need a new regime? *International Journal of Law and Information Technology, 30*(4), 385-397. https://doi.org/10.1093/ijlit/eaad001

Ulnicane, I. (2022). Artificial intelligence in the European Union: Policy, ethics and regulation. In *The Routledge Handbook of European Integrations*. Taylor & Francis. https://doi.org/10.4324/9780429262081-19

Verdicchio, M., & Perin, A. (2022). When doctors and AI interact: On human responsibility for artificial risks. *Philosophy & Technology, 35*(1), 11. https://doi.org/10.1007/s13347-022-00506-6

Wagner, G. (2019). Robot, inc.: Personhood for autonomous systems? *Fordham Law Review, 88*(2), 591. https://ir.lawnet.fordham.edu/flr/vol88/iss2/8

Yew, G. C. K., & Yip, M. (Eds.). (2021). *AI, data and private law: Translating theory into practice*. Bloomsbury.

Zimmerman, E. J. (2015). Machine minds: Frontiers in legal personhood. Available at SSRN.