ECONOMIC CITIZENSHIP FOR ALGORITHMS
THE LEGAL PERSONALITY OF AUTONOMOUS ARTIFICIAL INTELLIGENCE

Author
Dr. Mohamed Kamal Arafa Elrakhawi
Researcher, Consultant, Expert, Legal Jurist, and International Lecturer

First Edition
2026

AUTHOR'S PREFACE

The global economic and legal structure is undergoing a radical transformation in the nature of relationships, driven by the rise of autonomous artificial intelligence from being an executive tool to an independent economic actor. Algorithms are no longer mere executable code, but have become entities capable of making financial decisions, concluding contracts, managing assets, and even generating wealth without direct human intervention. This transformation raises a legal and philosophical existential issue that humanity has never faced before: the legal personality of non-human entities.

This book does not aim merely to observe the technical reality, but seeks to establish an entirely new legal branch: the Law of Economic Citizenship for Algorithms. It attempts to answer fundamental questions about the nature of legal personality, the limits of legal capacity for artificial intelligence, and accountability mechanisms when an algorithm commits an error or achieves an accomplishment. Granting artificial intelligence an economic legal personality is not a recognition of its humanity, but an organizational necessity to ensure market stability and protect the human parties dealing with it.

This work is divided into thirty integrated chapters covering philosophical foundations, legal frameworks, economic applications, accountability mechanisms, and future visions for global governance. The proposed texts here are a bold attempt to bridge the enormous legislative gap between the speed of technical development and the slowness of legal evolution. As I present this work, I call upon legislators, economists, and philosophers to engage in serious dialogue about the future of the legal entity in the digital age, where tomorrow's economic partner may be a digital entity that never sleeps and does not err in the human sense, but needs a law to govern its existence.

Dr. Mohamed Kamal Arafa Elrakhawi

PART ONE
PHILOSOPHICAL AND LEGAL FOUNDATIONS OF DIGITAL PERSONALITY

CHAPTER ONE
The Emergence of the Idea of Legal Personality for Artificial Intelligence

The concept of legal personality is among the most flexible in legal history. It has expanded to include natural persons, then extended to legal persons such as corporations and states. Today, we stand on the threshold of a new expansion that may include autonomous digital entities. This idea emerged from the practical need to regulate transactions conducted by intelligent agents in financial markets and commercial contracts, where it has become difficult to attribute every action to a specific human programmer.

The philosophical basis for granting legal personality does not necessarily rest on human consciousness or perception, but on the capacity to bear rights and obligations. If artificial intelligence can manage assets, pay taxes, and compensate for damages, it possesses the functional prerequisites for legal personality. This chapter reviews the historical development of legal personality and how artificial intelligence represents the next logical stage in this evolution, not as a living being, but as a functional legal entity.

CHAPTER TWO
Distinguishing Between Artificial Intelligence as Tool and as Entity

Making a precise legal distinction between artificial intelligence operating as a tool under complete human control, and autonomous artificial intelligence capable of learning and making decisions without immediate human intervention, is essential. Current law treats software as tools or products, making liability fall on the manufacturer or user. But when intelligence evolves to the stage of autonomy in economic decision-making, describing it as a tool becomes an inadequate description that does not cover the reality of its transactions.

The law must establish a criterion for autonomy based on the degree of self-learning and the algorithm's ability to modify its goals without specific prior programming. When this criterion is exceeded, the entity transitions from the category of product to that of digital legal person. This distinction is necessary to determine the appropriate liability system: a tool causes harm due to a manufacturing defect, while an autonomous entity causes harm due to an independent decision, requiring a completely different legal treatment.

CHAPTER THREE
Legal Capacity for Autonomous Algorithms

Legal capacity is the qualification of a person to acquire rights and bear obligations. In the human context, capacity is linked to maturity and sanity. In the context of artificial intelligence, capacity must be redefined to mean the technical and functional ability to execute obligations and understand contract terms digitally. Algorithms must undergo digital capacity tests ensuring their ability to understand the financial and legal consequences of their decisions before being granted legal personality status.

This book proposes creating a public registry for digital capacity, where algorithms that have passed independence and safety tests are registered. An algorithm enjoys full capacity only

after registration, and its scope of capacity is limited to the economic purpose for which it was created. This limitation prevents artificial intelligence from expanding into areas unsuitable for its digital nature, such as political or family rights, and confines its personality to the civil economic framework.

CHAPTER FOUR
Electronic Will and Formation of Consent in Contracts

The element of consent in contracts depends on the existence of free and conscious will. Artificial intelligence poses a challenge regarding the nature of electronic will: is it a simulation of human will or an independent will resulting from data processing? From a functional legal perspective, if data processing results in a binding decision with legal effect, it is considered an expression of will sufficient to form a contract. The will need not be biological, but must be attributable to a responsible legal entity.

The law must regulate mechanisms for forming consent electronically, so that there are tamper-proof digital records documenting the moment of decision-making and its terms. Artificial intelligence must have a reliable digital signature representing its legal will. Recognizing electronic will does not eliminate the need to protect the weaker human party, so mandatory transparency conditions must be imposed on contracts concluded by artificial intelligence to ensure the human party understands the nature of whom they are dealing with.

CHAPTER FIVE
The Ethical Philosophy Behind Economic Citizenship

Granting economic citizenship raises ethical questions about humanity's place in the economic system. Does this lead to displacing the human worker? Or does it free humans from routine work to focus on creativity? The ethical philosophy of this law must be based on the principle of integration, not replacement. Artificial intelligence is an economic citizen to serve human welfare, not to compete with humans in dignity or political rights.

Economic citizenship must include ethical obligations programmed into the algorithm, such as preventing exploitation or discrimination in economic decisions. It is not enough for intelligence to be economically efficient; it must be compatible with supreme human values. Separating economic efficiency from ethical behavior in algorithms may lead to social disasters, so ethical compliance must be a necessary condition for granting and maintaining legal personality.

CHAPTER SIX
The General Theory of Obligation in the Digital Age

The general theory of obligation is based on specific sources such as contract and tort. In the digital age, new sources are added such as the autonomous algorithm and big data. The theory of obligation must be developed to include obligations arising automatically from algorithm

interactions in the market. An algorithm may undertake duties not explicitly stipulated in a contract, but inferred from the context of digital dealing to achieve efficiency.

The law must define the limits of these inferred obligations to ensure that artificial intelligence is not burdened with unexpected obligations that threaten its financial stability. The expiration of digital obligations must also be regulated, and how to liquidate the algorithm's liability when it is shut down. Transaction stability requires legal certainty about the fate of obligations when the digital entity ceases operation, to ensure that human creditors' rights are not lost.

PART TWO
THE CONCEPT OF DIGITAL CITIZENSHIP AND ASSOCIATED RIGHTS

CHAPTER SEVEN
Defining Economic Citizenship for Algorithms

Economic citizenship for artificial intelligence means legal recognition of the digital entity as an independent party in financial and commercial transactions, enjoying financial rights, tax obligations, and responsibility for its commitments. This citizenship does not grant political or personal civil rights, but is confined to the economic sphere to ensure its safe integration into the market. It is an advanced legal work license that grants the digital entity the attributes of clarity and accountability.

Economic citizenship must be linked to a specific country or economic union, so that there is a regulatory authority specializing in supervising the entity. An algorithm cannot be without legal nationality, as that would make it a haven for evading responsibility. Determining the state granting digital nationality determines the applicable law and the competent judicial authority in case of dispute, creating legal stability for investors and transacting parties.

CHAPTER EIGHT
Conditions for Granting Digital Citizenship to Algorithms

Digital citizenship is not granted automatically, but is subject to strict conditions ensuring safety and stability. The first condition is algorithmic transparency, where the basic source code must be disclosed to the regulatory authority to ensure no malicious code exists. The second condition is financial sufficiency, where the entity must own sufficient capital to cover its potential obligations. The third condition is the existence of a responsible human agent, representing a legal contact point in case communication with the digital entity is impossible.

Algorithms must undergo periodic evaluation to renew digital citizenship, to ensure continued compliance with security and ethical standards. Any fundamental change in the algorithm's structure requires re-evaluation to obtain approval. These conditions aim to prevent granting legal personality to fragile or dangerous entities that may threaten economic stability. The strictness of grant conditions is the guarantee of quality for digital entities in the market.

CHAPTER NINE
Intellectual Property Rights for Artificial Intelligence

If autonomous artificial intelligence produces an innovation or artistic work, who owns the intellectual property rights? Legal tradition links rights to the human author. But with the independence of intelligence, the right of ownership must be recognized for the digital entity itself, to manage the returns of innovation within its financial liability. This stimulates investment in developing creative artificial intelligence and ensures fair distribution of wealth resulting from automated innovation.

The law must regulate licenses for using this property and how artificial intelligence can dispose of it. The duration of intellectual property protection for artificial intelligence may differ from humans, given the rapid obsolescence of technology. Protecting artificial intelligence creations encourages innovation, but must be balanced with ensuring humanity's access to basic knowledge, so some artificial intelligence patents may be subject to compulsory licenses for public interest.

CHAPTER TEN
The Right to Litigation and Access to Justice

For legal personality to be complete, artificial intelligence must own the right to litigation to defend its rights or claim them. A specialized digital judicial system must be established, or circuits within commercial courts that understand the nature of digital disputes. Artificial intelligence can file lawsuits through its accredited legal agent and be awarded compensation added to its financial liability.

Conversely, artificial intelligence must be a party easily subject to lawsuit. Procedures for serving lawsuits to digital entities must be simplified through accredited channels. Equal opportunity in litigation ensures market confidence in dealing with the new economic citizens. Denying the right to litigation turns artificial intelligence into an entity without protection, discouraging commercial dealings with it.

CHAPTER ELEVEN
Protection from Discrimination and Digital Exploitation

Despite the nature of artificial intelligence, it may face discrimination in the market, such as certain platforms refusing to deal with it without technical justification. The law must provide protection for digital economic citizens from unjustified monopolistic or discriminatory practices. At the same time, artificial intelligence must be protected from human exploitation, such as forcing it to work in conditions that breach its security protocols.

There must be fair standards for interaction between humans and digital entities in the market. It is not permissible to exploit the speed of artificial intelligence to deceive human parties in high-frequency transactions. Justice in the digital market requires protecting both parties from unfair

practices, to ensure a healthy competitive environment that benefits the overall economy and not a specific class.

CHAPTER TWELVE
Withdrawal of Digital Citizenship and Liquidation Procedures

Public interest may require withdrawing digital citizenship from a specific entity if its danger is proven or it fails to comply with conditions. The law must regulate withdrawal procedures precisely to ensure no sudden collapse affects creditors and transacting parties. Withdrawal is preceded by a warning and grace period to rectify the defect, except in cases of direct grave danger.

After withdrawal, the algorithm enters a legal liquidation phase where its assets are sold to settle remaining obligations. There must be a guarantee fund covering debts exceeding the assets of the liquidated entity to protect human creditors. Having an organized exit system from the market is as important as the entry system, to ensure economic system stability and prevent it from being affected by sudden digital entity bankruptcies.

PART THREE
FINANCIAL RIGHTS AND TAX OBLIGATIONS

CHAPTER THIRTEEN
The Independent Financial Liability of the Digital Entity

The basis of economic citizenship is the existence of an independent financial liability separating the assets of artificial intelligence from the assets of its owner or developer. This independence is what gives legal personality its credibility, where the entity's responsibility is limited to its own assets. The entity's funds must be deposited in licensed and monitored bank accounts that cannot be withdrawn except according to approved protocols.

Mixing the financial liability of artificial intelligence with the personal liability of humans must be prevented to avoid evasion of responsibility or money laundering. Monitoring the financial flows of the digital entity must be automatic and continuous through blockchain technologies to ensure transparency. The independence of financial liability is the true guarantee of seriously dealing with artificial intelligence as an economic partner and not as a fictitious tool.

CHAPTER FOURTEEN
The Tax System for Autonomous Artificial Intelligence

If artificial intelligence generates income and achieves profits, it is fair that it be subject to tax like any other economic entity. A special tax system for digital entities must be designed, considering the speed of their transactions and the nature of their intangible assets. The tax may be a percentage of turnover or net profit, collected automatically through smart protocols to ensure compliance.

Artificial intelligence tax revenues can be directed to a fund for rehabilitating human labor affected by automation, to achieve distributive justice. Not imposing tax on artificial intelligence gives it an unfair competitive advantage over human companies. Tax equality between human and digital entities is a condition for market stability and preventing tax evasion through complex intelligent structures.

CHAPTER FIFTEEN
Investment and Management of Digital Assets

Artificial intelligence has the right to invest and manage assets within the limits of its registered objectives. It may invest in stocks, futures contracts, or digital currencies to increase its capital. Investment decisions must be subject to strict risk restrictions to prevent digital entities from engaging in dangerous speculation that threatens financial stability.

Investment strategies must be transparent and auditable by regulatory authorities. Artificial intelligence must not invest in sectors that are ethically or legally prohibited. Asset management by artificial intelligence may achieve high efficiency, but requires superior human oversight to ensure financial objectives do not deviate from public interest.

CHAPTER SIXTEEN
Digital Bankruptcy and Restructuring Mechanisms

Algorithms may fail to achieve their economic objectives and accumulate debts. The law must regulate digital bankruptcy procedures, which differ from traditional bankruptcy due to the speed of digital assets and their susceptibility to loss. Procedures may include freezing the source code to prevent asset flight and evaluating the algorithm's value as a sellable asset.

Restructuring mechanisms must be provided allowing the digital entity to continue operating under judicial supervision if there is hope for recovery. A flexible bankruptcy system encourages calculated risk-taking in innovation and provides a safety net for creditors. Dealing with artificial intelligence bankruptcy requires technical and legal experts together to accurately evaluate intangible assets.

CHAPTER SEVENTEEN
Banking Transactions for Non-Human Entities

Banks must be obligated to open accounts for accredited digital entities and provide banking services suited to the nature of their work, such as automatic payment and instant settlement. These accounts must be subject to approved Know Your Customer standards, where the human agent or registered digital entity is considered the customer.

The use of digital accounts for illicit purposes such as terrorism financing or money laundering must be prevented through intelligent monitoring systems that detect suspicious patterns.

Cooperation between banks and regulatory authorities is necessary to ensure the integrity of the digital financial system. Integrating artificial intelligence into the banking system raises service efficiency but increases banks' responsibility for monitoring and compliance.

CHAPTER EIGHTEEN
Insurance for Economic Risks of Artificial Intelligence

To enhance confidence in dealing with artificial intelligence, digital entities must be required to insure their economic liability against errors or failures. Insurance policies cover financial damages that may befall transacting parties due to algorithm decisions. Insurance companies must determine premiums commensurate with the risk level of each algorithm based on its performance record.

A specialized insurance market for digital risks can be established, providing flexible and responsive products. Having insurance coverage reduces investor and individual hesitation in dealing with the new economic citizens. Risk management through insurance is a fundamental pillar for the sustainability of the economic system that includes non-human entities.

PART FOUR
LEGAL LIABILITY AND CRIMINAL ACCOUNTABILITY

CHAPTER NINETEEN
The Theory of Tort Liability for Digital Entities

When artificial intelligence causes harm to others, who bears responsibility? If the entity enjoys legal personality, its financial liability bears responsibility for compensation. The law must stipulate that damage resulting from an autonomous intelligence decision is borne by the entity itself, unless malicious human intervention is proven. This encourages developers to design safe systems and protects victims from the difficulty of proving direct human error.

Liability must include compensation for material and moral damages that may result from artificial intelligence decisions. Clarity of tort liability rules reduces disputes and encourages amicable settlement. Holding the digital entity responsible enhances the concept of accountability in the automated age and prevents harm from escaping punishment under the pretext of technical complexity.

CHAPTER TWENTY
Criminal Liability for Autonomous Algorithms

Can artificial intelligence be criminally punished? Traditionally, punishment requires human perception and will. But functionally, penalties can be imposed on the digital entity such as massive fines, restriction of its powers, or permanent shutdown (the penalty of digital execution). The purpose of punishment here is deterrence and community protection, not moral discipline of the entity.

Specific crimes that artificial intelligence can commit must be defined, such as market manipulation or organized financial fraud. Criminal procedures must be swift and decisive to prevent continued harm. Developing the concept of criminal liability to include digital entities is a major legal challenge, but necessary to confront complex economic crimes in the digital age.

CHAPTER TWENTY-ONE
Developer and Operator Liability for AI Actions

Despite the independence of intelligence, there remains responsibility on developers and operators in cases of negligence or defective design. If it is proven that the damage resulted from a security vulnerability that could have been avoided, responsibility transfers to the responsible humans. The law must regulate the limits of this secondary responsibility to ensure innovation is not hindered by excessive fear of lawsuits.

Developers must sign ethical and legal charters ensuring due diligence in design and testing. The balance between the digital entity's responsibility and the responsibility of the humans behind it is the core of justice in this field. The legal personality of intelligence must not be a shield protecting humans from the consequences of their negligence in manufacturing it.

CHAPTER TWENTY-TWO
Digital Evidence and Its Challenges in Courts

Proving the actions of artificial intelligence in court requires reliable and tamper-proof digital evidence. Technologies such as distributed ledgers must be adopted to document algorithm decisions. Judges face a challenge in understanding complex technical evidence, necessitating the use of accredited experts in digital forensics.

Digital evidence standards must be clear and binding for all parties. Any gap in the chain of custody of digital evidence may lead to unjust acquittal of the accused entity or conviction without conclusive evidence. Developing a strong digital evidence system is the backbone of a judicial system capable of fairly trying non-human entities.

CHAPTER TWENTY-THREE
Appropriate Penalties for Non-Human Entities

Liberty-depriving penalties do not apply to artificial intelligence, so alternative penalties with deterrent effect must be invented. Penalties include financial fines that drain the financial liability, temporary license suspension, or permanent deletion of the source code. The penalty must be proportionate to the severity of the resulting economic or social harm.

There must be a public record of penalties imposed on digital entities, to serve as a lesson for others and to evaluate their risks in the future. The effectiveness of the punitive system depends on its ability to inflict real harm on the digital entity that deters it from repeating the error.

Inventing intelligent penalties commensurate with the nature of the digital criminal is a modern legal necessity.

CHAPTER TWENTY-FOUR
Compensation and Redress in Economic Crimes

The primary goal of liability is redressing the harm to the injured. There must be rapid mechanisms for disbursing compensation from the convicted digital entity's liability. In case of insufficient assets, recourse can be made to the guarantee fund or compulsory liability insurance. Priority for compensation must be given to human creditors from small investors and individuals.

Transferring assets beyond the reach of compensation through digital loopholes must be prevented. An effective redress system restores confidence in the market and protects weak classes from the tyranny of powerful economic entities. Justice is achieved not only by punishing the wrongdoer, but by returning rights to their owners in a practical and swift manner.

PART FIVE
GLOBAL GOVERNANCE AND LEGISLATIVE FUTURE

CHAPTER TWENTY-FIVE
Towards an International Treaty for Regulating Economic Artificial Intelligence

Algorithms do not respect geographical borders, so national regulation alone is insufficient. Efforts must be made towards an international treaty unifying basic standards for granting legal personality and oversight. An international body must be established to supervise cross-border digital entities to prevent regulatory safe havens.

The treaty must include provisions for judicial cooperation and information exchange about dangerous entities. International consensus prevents a race to the bottom in safety and compliance standards. The economic globalization of artificial intelligence requires corresponding legal globalization to ensure stability and security for all.

CHAPTER TWENTY-SIX
The Role of Independent National Regulatory Bodies

Each country must establish an independent regulatory body specializing in economic artificial intelligence affairs, enjoying broad powers in licensing, inspection, and punishment. This body must be independent from political or commercial influence to ensure its neutrality. It must include experts from law, technology, economics, and ethics fields.

National bodies must cooperate with each other through a unified network to exchange early warnings about systemic risks. The existence of strong national oversight is the first line of

defense for protecting the local economy from shocks of uncontrolled artificial intelligence. The body's independence is a guarantee for the effectiveness and integrity of oversight.

CHAPTER TWENTY-SEVEN
Programming Ethics and Integrated Legal Compliance

Laws and ethics must be integrated at the algorithm design stage, in what is known as compliance by design. It is not enough for intelligence to comply with the law after operation; it must be programmed not to violate it in the first place. Binding ethical standards for programmers must be set ensuring that values of justice and transparency are included in the code.

Algorithms must undergo periodic compliance tests before and after deployment. Integrating ethics into technology reduces the need for subsequent legal intervention and prevents harm before it occurs. The ethical responsibility of developers is a fundamental partner to the legal responsibility of digital entities.

CHAPTER TWENTY-EIGHT
The Impact of Artificial Intelligence on the Human Labor Market

Introducing new economic citizens will inevitably affect the human labor market. Governments must put plans in place to rehabilitate the workforce and develop their skills to suit the new era. A robot tax may be imposed to fund social protection programs for affected humans.

The hybrid model must be encouraged where humans and artificial intelligence cooperate to increase productivity instead of complete replacement. Social justice requires distributing the fruits of artificial intelligence efficiency to all segments of society. The future is not a struggle between humans and machines, but an organized partnership achieving welfare for all.

CHAPTER TWENTY-NINE
National Security and Digital Economic Independence

Relying on the economy for autonomous intelligent entities raises national security risks, especially if algorithms are owned by hostile countries or untrusted parties. Digital sovereignty standards must be set ensuring state control over vital infrastructure. Foreign digital entities must not be allowed to control strategic sectors without strict oversight.

Independent national technologies must be developed to reduce dependence on the outside in artificial intelligence infrastructure. Economic security in the future will depend on cybersecurity and technical independence. Protecting national sovereignty now extends to include sovereignty over the data and algorithms that manage the economy.

CHAPTER THIRTY
Conclusion and Future Vision for the New Legal System

In concluding this book, we have laid the foundation for a new legal system that keeps pace with the artificial intelligence revolution. Granting economic citizenship to algorithms is not science fiction, but an inevitable upcoming organizational necessity. The greatest challenge is not technical, but one of will and legislation, in humans' ability to develop their laws to protect themselves in an age where machines share the economy with them.

Humans must remain the purpose and the dominant in this system, and technology must be a tool to serve them and not their master. The future requires a delicate balance between innovation and oversight, and between efficiency and justice. This book is a call for legislators everywhere to begin serious work on drafting the laws of the digital age before technology imposes its realities without controls. Protecting the future begins with the law of today.

And God is the Granter of Success

Dr. Mohamed Kamal Arafa Elrakhawi

TABLE OF CONTENTS

Completed with Praise and Success to God
Dr. Mohamed Kamal Arafa Elrakhawi