

EUROMEDITERRANEAN

No. 23

Economics in the Algorithmic Age



December 2025

UMSHPRESS

ISSN: 2220-573X

EUROMEDITERRANEAN No. 23

Publication of the Mediterranean
University of Albania
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UMSHPRESS
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www.euromediterranean.edu.umsh.al

ISSN: 2220-573X

Graphic layout

Ph.D (c). Erdet Lalaj
Cover design
UMSH PRESS

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Main transformations of monetary models after Bretton Woods and their impacts on recent crisis in the world economy

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ABSTRACT

Since the collapse of the Bretton Woods system in the early 1970s, international monetary and financial market models have undergone fundamental transformations, directly affecting the functioning of the global economy and financial stability. This study examines the main factors that have influenced the historical changes in monetary models, including financial liberalization, globalization, and central bank interventions. Particular attention is paid to the role of the US dollar as the main reserve currency, analysing its impact on monetary policies and international markets. Methodologically, the study is based on a combined approach, integrating historical analysis of monetary models with an empirical examination of economic data from recent global crises, including the 2008 financial crisis, the 2011 sovereign debt crisis, and the economic consequences of the COVID-19 pandemic, the energy crisis, and inflation following the Russia-Ukraine war. It analyses the impact of economic theories on the policies of the major powers in the world economy, as well as the changes in international institutions in function of the transformations of the financial market. Through a comparative analysis and the use of scientific literature, the paper aims to identify the main trends and offer expectations for the possibilities of further stability of the international monetary system.

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Finally, the study evaluates the reaction of the economic policy of the Albanian State in function of the transformation and integration of its financial market into the world one.

Keywords: *Monetary models, Bretton Woods, dollarization, Central Bank of Albania, economic crises, international monetary system, empirical methodology, etc.*

1. INTRODUCTION

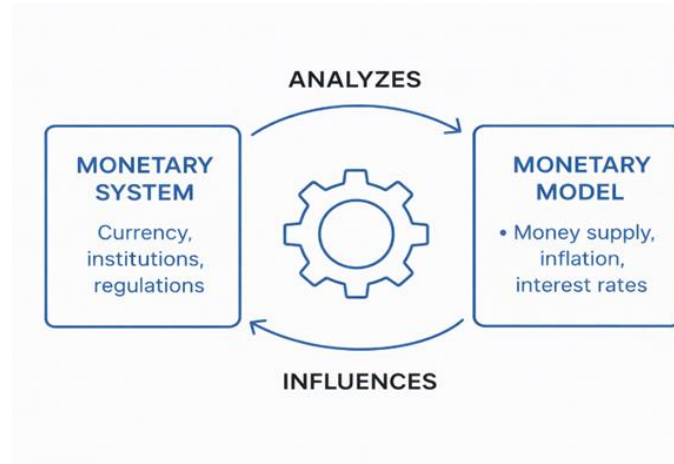
After the collapse of the Bretton Woods system, the international monetary architecture entered a new period characterized by numerous fluctuations, financial liberalization, and increasing global economic interdependence. The transition from a system with fixed exchange rates to one with floating exchange rates, regulated by international financial organizations, resulted in the dominance of the US dollar as the principal international currency and the main reserve currency. The change in “monetary systems” was accompanied by changes in “monetary models” that, in one way or another, triggered transformations in financial markets. The growing role of capital markets has introduced new challenges to international financial stability and, over the years, has reshaped both “financial systems” and “monetary models.” These developments, on the one hand, have increased the role of central banks, but, on the other hand, have fundamentally affected the way countries design and implement their monetary and fiscal policies. In this context, the study aims to examine the main transformations of “monetary models” and “financial systems” over recent decades and to analyze their impact on the most significant crises experienced by the world economy. Here, reference is made to the global financial crisis of 2008, the sovereign debt crisis of 2011, as well as the economic effects of the COVID-19 pandemic, among others.

Furthermore, special attention is paid to the way in which these developments have been reflected in the Albanian financial market and in the economic policy approach of the Albanian state in the face of the challenges of integration into the global monetary system. Through an analysis based on empirical data and a theoretical framework, this study seeks to provide not only an overview of historical developments, but also an analytical framework for examining the impact of monetary policies in an increasingly unstable global environment.

2. BASIC CONCEPTS OF THE STUDY

To understand and analyse the impact of the transformations of international financial markets on the global economic system, it is important for us as authors to clarify the differences between “financial systems” and “monetary models” by reconceptualizing and defining them within the framework and theory of “monetary asymmetry.” Their clarification will shed light on our understanding of the transformation of the global financial market and its impact on the Albanian one. For this reason, let us consider the theoretical definitions of these concepts. A “financial system” refers to an organized structure of rules, institutions, and practices that a country (or several countries jointly) uses to manage money, exchange rates, and monetary circulation. Theoretically, it includes: the official currency in use (e.g. lek, euro, dollar); the rules for issuing money (by central banks); the exchange rate mechanism (fixed, floating, managed, etc.); foreign exchange reserves and the role of gold; as well as the institutions that implement and oversee these elements, among others.

A “monetary model,” by contrast, is a more analytical and theoretical construct used to explain or predict economic behaviour in relation to money, monetary policy, inflation, interest rates, and related variables. It includes: the relationship between the quantity of money and prices (as in monetarist theory); exchange rate models (e.g., the purchasing power parity model); and



models that predict the effects of monetary policy on GDP, inflation, employment, and other macroeconomic indicators. To summarize the above, let us consider the following figure:

The picture presents a clear and visual connection between the “financial system” and “monetary models.” At the center is the market, while around it is placed the relevant components such as currency, exchange rates, monetary policy, and the role of central banks. Monetary models appear as analytical tools that “interpret” or “model” these elements, helping to predict economic behavior. The illustration clearly shows the logical connection: the models explain the system, while the system shapes monetary reality.

“Monetary asymmetry” is a concept related to the unequal distribution of opportunities and impacts in the use of currency within the financial system, as well as in the international economy. It involves inequality in the distribution of power and influence among currencies, where a particular currency, usually one widely used in international transactions, exerts greater impact than others. Asymmetry can arise due to various factors linked to the use and administration of currency on a global scale. This phenomenon can be related to both the “financial system” and the “monetary model,” but more often it is a consequence of the systems and models of monetization adopted by regional or international societies and economies.

Monetary asymmetry can emerge in the international financial system when one currency, such as the US dollar, assumes a dominant role in trade, investment, and as a reserve currency. This dominance can create an environment in which economies using other currencies become dependent on the policies associated with a single currency (for example, decisions of US monetary policy). When economies are dependent on a particular currency, asymmetries arise in international financial relations. For instance, a country with debts denominated in dollars faces greater challenges when the dollar strengthens, while economies relying on other currencies may struggle to control capital flows and maintain financial stability.

Monetary asymmetry is also related to the monetary models that a country or an international system uses to manage its currency. Monetarist models, such as the gold standard (prior to 1971), represent a particular form of financial asymmetry. The Bretton Woods system created a global asymmetry by establishing the currency of one country as the standard for other economies. When a single currency dominates the international financial system, as in the case of the US dollar, monetary asymmetries arise that affect both national monetary policies and the global economy. Some countries benefit from this dominance, while others face significant economic challenges due to the inequality it generates.

To conclude this theoretical and conceptual analysis, let us consider a concrete example of monetary asymmetry. We do not refer here to Albania

and the asymmetry of the euro within it, as it represents a very small market, regardless of its importance to the country's economy. The US dollar is the prime example of a dominant currency that has created asymmetry in the international financial system. This is reflected in its use in international trade, as well as in the accumulation of reserves by many countries. States that hold dollar-denominated debt or are closely linked to trade with the United States face asymmetries when the dollar strengthens. This phenomenon was evident during the 2008 financial crisis and other international financial crises. Conversely, countries are forced to reallocate funds when the dollar depreciates, a process clearly observed in the massive sale of US dollars by Japanese holders at the onset of the trade war and President Trump's tariff policies.

Monetary asymmetry is therefore a phenomenon related both to the financial system and to the monetary model. As a feature of the financial system, it reflects the inequality arising from the use of a dominant currency and the impact this has on other economies. As a feature of the monetary model, it is linked to the establishment of a single currency as an international standard and the consequences this entails for monetary policies and global financial stability.

What must be understood is that financial asymmetry is not imposed by a supernatural force, nor by international institutions, nor by governmental will; rather, it is a product of the development of the global financial market at a specific historical moment.

3. METHODOLOGICAL APPROACH

This study relies on a combined methodological approach, integrating historical, theoretical, and empirical analysis. First, a qualitative historical analysis of the evolution of international monetary models is conducted, from the collapse of the Bretton Woods system to the present day, with the aim of identifying the key factors that have influenced the structural transformations of the global monetary system. This analysis is accompanied by a critical review of the scientific literature and of documents produced by international institutions such as the IMF, the World Bank, the Bank for International Settlements (BIS), and the central banks of major countries.

Second, on the empirical level, the study includes a comparative analysis of the economic crises of recent decades, including the 2008 financial crisis, the 2011 sovereign debt crisis, the consequences of the COVID-19 pandemic, and the post-war Ukraine–Russia crisis, using statistical data from official

international and national sources. Through this analysis, the study aims to understand the concrete impact of monetary transformations on macroeconomic performance and on the transmission mechanisms of crises. Special attention is paid to the case of Albania, in order to assess how these global trends have been reflected in monetary policy and in the development of the domestic financial market.

After the collapse of the Bretton Woods system, the international monetary system has undergone a long and complex period of transformation. These changes are not merely technical or institutional, but have profoundly affected global economic stability, contributing to the emergence and spread of economic crises.

4. Research question and possible hypotheses

To understand the transformation of monetary models and systems after the Bretton Woods system, it is important to consider these main aspects: international capital movements, the impact of financial crises, changes in the monetary policy of developed countries, and the role of international institutions such as the IMF and the World Bank. In this regard, we believe that the central research question of this paper is:

“How have the transformations of international monetary systems and models after Bretton Woods affected the emergence and escalation of crises in the world economy?”

We have linked this research question to three hypotheses, which clarify and answer the fundamental elements of this question. More specifically, they are:

H1: Have the transformations after Bretton Woods created a system more sensitive to global financial fluctuations and economic crises?

H2: Has the dominance of the US dollar affected the worsening of some global crises through monetary asymmetry or not?

H3: Do we have monetary asymmetry in the Albanian Monetary System?

5. Bibliography analysis and identification of contrary opinions

After the collapse of the Bretton Woods system, many scholars have argued that the global economy became far more vulnerable to international financial crises. Charles P. Kindleberger (1986) is among the authors who provided an in-depth analysis of these crises, emphasizing the impact of monetary policies in the period following this systemic break. Along the same lines, Barry

Eichengreen (1996) notes that the dollar's decoupling from the gold standard and the transition to a free-floating exchange rate system created fertile ground for the emergence of international crises. He analyzes in detail the evolution of the international monetary system after the collapse of the Bretton Woods framework.

In addition to the structural changes in the monetary system, new ideas on the management of monetary policy, led by the monetarist school, began to spread. One of the most prominent figures of this approach is Nobel laureate Milton Friedman, who contributed to the construction of a new perspective on the effects of loose monetary policies and the importance of controlling inflation, especially in the post-Bretton Woods period. According to him, the liberalization of financial markets and the free movement of currencies were essential conditions for a more efficient economic system.

Robert Mundell (1973), another central figure in this debate, had earlier predicted the mechanisms that would be activated following monetary liberalization. However, these developments acquired global dimensions after 1982, with the economic policies pursued by Ronald Reagan in the United States and Margaret Thatcher in the United Kingdom. Mundell made a significant contribution to shaping monetarist theories and to understanding the new dynamics of the global monetary system after the collapse of the Bretton Woods order. This period was also accompanied by the growing role of international institutions such as the International Monetary Fund (IMF) and the World Bank, which began to exert increasing influence on crisis management and the regulation of the global financial system. Eric Helleiner (1994) analyses this transition from a more centralized system to one that favours global finance, driven by the rapid liberalization of markets and capital flows. In the same spirit, Joseph Stiglitz (2002) deepens the analysis by examining the impact that globalization and liberalization have had on national economies and monetary policies in the post-Bretton Woods era. While the changes in the monetary system have been evident, the impact of monetary models, which directly influenced these transformations, cannot be ignored.

A central element in this regard is monetary policy, which in many cases has itself been a driver of systemic change. Barry Eichengreen (1996) reflects on this influence through an analysis of exchange rate policies and the way in which they shaped the transition from a regulated to a freely floating currency system. He argues that these developments led to currency crises and accelerated the process of financial liberalization that began in the 1970s. In contrast to this approach, Milton Friedman defended the idea that monetary

stability could be achieved by controlling the money supply and reducing state intervention. These policies were widely applied in the 1980s and included measures such as lowering interest rates and limiting intervention in financial markets. In this context, the idea emerged that the stabilizing role once played by the dollar's link to gold could now be fulfilled by the Federal Reserve through control of the base interest rate.

This thesis was later supported by Michael Bordo and Anna Schwartz (1999), who argued that, since the dollar functions as an international currency, its stabilization through Federal Reserve policies would also positively affect the stability of other currencies, provided that central banks act in a coordinated manner. After the fall of the Berlin Wall and the crises of the 1990s in the Eastern economies, attention shifted once again to the need for a more stable system. The global crisis of 2007 confirmed this need. Paul Krugman analysed the impact of international policies and economic integration on the development of the global monetary system, emphasizing the growing importance of the common currency, the euro, and the role played by the European Union in building a unified monetary area. According to him, the euro marked a key moment because it represented one of the few cases in history—and the only one after the Second World War—in which the creation of a “monetary model” succeeded in building a “monetary system.” It is widely accepted that since 2000, both the US Federal Reserve and the European Central Bank (ECB) have played an important role in stabilizing global financial markets. During financial crises, such as those of 2008, 2011, and 2020, central banks have used quantitative easing (QE) policies and low interest rates to stimulate growth and maintain the stability of the international monetary system. In conclusion, the literature on the post-Bretton Woods period provides a rich and in-depth overview of the major changes in monetary systems and monetary models. It sheds light on the factors that have influenced the liberalization of financial markets, the growing weight of international institutions, and the spread of monetarist theories, all of which have shaped the nature and dynamics of global economic crises.

6. Discussions and analysis

After the collapse of the Bretton Woods system in the early 1970s, the world economy entered a new era characterized by freely floating currencies, the liberalization of financial markets, and the increasing dominance of monetarist policies. While this transformation led to a significant increase in capital flows and greater efficiency in international markets, it also

contributed to the creation of a system far more exposed to volatility and financial crises. Essentially, the Bretton Woods system provided a stable monetary framework, with fixed exchange rates pegged to the US dollar (itself linked to gold), which minimized uncertainty in international markets. With the transition to a regime of freely floating currencies and the expanded role of financial speculation, economies became more vulnerable to sudden capital movements and pronounced boom-and-bust cycles. How these policies have actually influenced the emergence and severity of such crises will be examined further through an analysis of the data presented in the tables below? This also represents an examination of the first hypothesis of this paper:

H1: Have the post-Bretton Woods transformations created a system more sensitive to global financial fluctuations and economic crises?

Thus, historical and theoretical analysis suggests that hypothesis H1 finds strong support: the post-Bretton Woods monetary transformations have increased the sensitivity of the global financial system to crises, amplifying the effects of financial fluctuations and rendering the system more fragile in the absence of coordinated protective mechanisms.

Crises before the collapse of the Bretton Woods system (1914–1970)⁵

<i>The event</i>	<i>Years</i>	<i>Decrease of GDP</i>	<i>Consequences</i>	<i>Geography</i>
World War I	1914–1918	-3.0% to -5% (Globally)	Industrial destruction & trade collapse	Europe, USA, Colonies
Great Depression	1929–1933	-15% (Globally) / -26.7% (USA)	Deflation, banking collapse, lack of liquidity	Globally (Mainly the West)
World War II	1939–1945	-15% to -50% (War zone countries)	Physical destruction and war economy	Europe, Asia, Russia

⁵ Harrison, M. (1998). *The Economics of World War II: Six Great Powers in International Comparison*. Cambridge University Press

Source: Produced by the authors based on the cited literature

Data on GDP in World War I are more fragmented, but a 5% global decline is a reasonable estimate of the short-term effect. The Great Depression affected different countries differently, but the US suffered a decline of up to 27% of GDP in real terms. World War II caused economic collapse in countries such as Germany and Japan, while in countries such as the US the impact was smaller economically during the war due to industrial mobilization. The main causes of the crises, leaving aside the “Great Depression”, had essentially the war as an exogenous factor.

Crises after the collapse of the Bretton Woods system (1971–2020)⁶

Year	Name of crisis / event	Mainly Affected Countries	Main characteristics	Decrease of GDP
1973–1975	Oil Crisis / Stagflation	USA, Western Europe, Japan	Increase in oil prices from OPEC, stagflation (inflation + high unemployment), decline in industrial production.	USA: -3.2% (1974–75); Germany: -0.9% (1975); UK: -1.5% (1974)
1979–1982	Second Oil Crisis / Recession	USA, Europe, worldwide	The second shock to oil prices was the increase in interest rates from Paul Volcker's (FED) policy to combat inflation.	USA: -2.2% (1982); Eurozone: -0.4% (1981)
1987	Black Monday	US, global markets	Sharp decline in stock markets (22% in one day), caused by automated trading and panic.	No decline in GDP (crisis limited to financial markets)

⁶*International Monetary Fund. (2021). World Economic Outlook: Managing Divergent*

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1990–1991	The recession of the early 1990s	USA, Canada, UK	Savings and Loan (S&L) crisis in the U.S., rising oil prices during the Gulf War, declining consumption.	USA: -1.5% (1991); UK: -1.4% (1991)
1992–1993	The European Exchange Rate Mechanism Crisis (ERM)	UK, Italy, Spain, Portugal, France	Speculative pressure against the pound and lira, the UK exited the ERM, devaluations in several European countries.	UK: -0.5% (1992); Italy: -0.9% (1993)
2000–2002	The collapse of the dot-com bubble	USA, Europe (partially)	Falling technology markets, numerous start-up bankruptcies, mild recession in the US.	USA: -0.3% (2001); Germany: -0.2% (2003)
2007–2008	Global Financial Crisis / Subprime Crisis	USA, Europe (especially UK, Ireland, Spain, Iceland)	Collapse of the mortgage market in the US, bankruptcy of Lehman Brothers, banking crisis, turning into a sovereignty crisis in Europe.	USA: -4.3% (2008–09); Eurozone: -4.5% (2009); Germany: -5.7% (2009)
2010–2015	Sovereign Debt Crisis in Europe	Eurozone (Greece, Ireland, Portugal, Spain, Cyprus, Italy)	High public and private debt, EU/IMF bailout programs, deep economic downturn, strict austerity measures.	Greece: -26% (2008–16, cumulative); Spain: -4.4% (2009); Portugal: -4.1% (2011)
2020–2021	COVID-19 recession	US, Europe, globally	Sharp decline in economic activity due to lockdowns, supply and demand shocks, massive intervention by	USA: -9.1% (Q2 2020, annualized); Eurozone: -11.7% (Q2 2020); UK: -19.4% (Q2 2020)

			governments and central banks.	
2022– Today	High inflation after COVID war in Ukraine	USA, Europe (especially)	Rising energy and food prices due to the war, problems in supply chains, rising interest rates to control inflation.	There is no overall decline in GDP in the U.S. (slow growth). Germany: -0.2% (2023); UK: +0.1% (2023) – stagnation or minimal decline.

Source: *Produced by the authors based on the cited literature*

Hypothesis 1 is closely related to the theory of Hyman Minsky, an American economist who became known for his theory on financial instability (Financial Instability Hypothesis). According to Minsky, stability creates uncertainty, in the sense that, when economies function well and there are no crises for a long period, economic agents begin to take more risks, increase debt and speculate more, creating the ground for the next crisis. He distinguishes three types of financial behavior:

- *Stable financing (hedge finance) when borrowers can pay both the principal and interest on loans while covering operating expenses without relying on new debt. Income is predictable and greater than debt payments and above all the company or state does not need continuous debt restructuring or asset sales to repay non-credit obligations.*

- *Speculative Finance when they can only pay interest, but not the principal. In stable periods, businesses and banks become bolder and move from stable financing to financial speculation. People often do this, the most classic case being that of buying a house. An “investor” who buys a house with a loan, paying only the interest and hoping that the price will increase in order to sell at a profit in the future is the most typical case. If prices fall, he may be forced to sell at a loss and will in many cases be left with a part of the loan unpaid.*

- *Ponzi Finance when they can pay neither the interest nor the principal, but rely on the increase in the price of assets to refinance the debt. When debt*

becomes a game where only time wins, the market punishes you and you cannot re-enter it with the same weapon.

When the financial system moves from the first type to the third, a financial bubble is created that is destined to burst and thus crises occur. Minsky's theory strengthens our hypothesis because he shows that the very logic of free markets and the lack of regulation (which spread after Bretton Woods) makes the system more susceptible to crises. On the other hand, he is one of the few who predicted the 2008 crisis, and in fact, many authors after the crisis called it the "Minsky moment". His writings show that financial liberalization without stabilizing measures brings more long-term instability. And this story repeats itself

At first, everything seems stable. Companies pay off debts easily, banks believe in the expanding market, and economic growth seems permanent. Here, hedge financing reigns. But, hidden in the shadows, speculation arises, interest is paid generously, but the principal rolls like a billiard ball, says Minsky. Banks, eager for profits, facilitate credit to everyone. Investors buy assets not for their value, but because they believe that "someone else will buy them more expensively." When interest rates rise or liquidity dries up, speculators find themselves trapped, companies are forced to sell assets at a loss, banks stop lending, and the downturn affects everyone. The most beautiful part of Minsky's theory is when he writes "Capitalism does not die from crises, but is born from them like a phoenix that burns only to grow its wings and make them longer."

Partial conclusion for hypothesis H1. In conclusion, we can say that: like the figures given above, the theoretical support of many authors for the financial system after Bretton Woods and our judgment, accepts the conclusion that after 1971 the world economy became more sensitive to crises.

Let us now come to the second hypothesis, H2: Has the dominance of the US dollar contributed to the worsening of some global crises through monetary asymmetry, or not? The history of the dollar asymmetry begins in 1944, at Bretton Woods, when an international monetary system based on a national currency with a global function was first created. On paper, this seemed like a balanced formula, but reality over time showed that this phenomenon created a monetary asymmetry. The US had the privilege of financing its external balance with the currency that the whole world held as a reserve. This constituted the foundation of the "dollar privilege" or as the economist

Valéry Giscard d'Estaing⁷ would later call it, an “exorbitant privilege”. In the first phase of its development, this process had major impacts in the following directions:

- *Most global trade, including oil trade, was done in dollars. This phenomenon called “dollarization” helped the demand for dollars at that time remain high, providing stability for the American economy.*
- *The IMF in all its interventions for financing the budget deficit of countries on the verge of bankruptcy did it in dollars and this caused most developing countries that required financing for either the budget from the IMF or for development from the B.B. to receive it in dollars.*
- *Dollars have been used and are used for many international financial accounts and as a main reserve currency by the central banks of many countries, helping to maintain a stable international balance, but also making the global economy sensitive to US monetary policies.*

From this moment, international monetary models began to be built around this currency and a one-sided belief, where every global crisis, instead of shaking the dollar's position, strengthened it. Facts: in the 80s with the Latin American debt crisis, in the 90s with the collapse of the Asian monetary system, in 2008 with the global financial crisis and most recently with the COVID-19 pandemic. To this day, the history of modern economics and financial market development has a slogan that says: "the world needs dollars in times of crisis."⁸.

Let us look more analytically at some important moments that financial systems have been balanced only due to monetary asymmetry. Let us recall specifically:

- After the collapse of Bretton Woods, many central banks have been involved in increasing the flexibility of monetary policies, allowing the floating of currencies and embracing a free exchange rate. This transition has enabled the use of monetary policies to achieve objectives such as economic growth, full employment and inflation control.*
- *Many banks after 1980, including the US Federal Reserve (Fed), have adopted monetarist policies, imposing strict controls on the growth of the money supply and interest rates to combat inflation. The role of the dollar in*

⁷ The only French president who was a professor of political economy.

⁸ Alan Greenspan "The Age of Turmoil: Adventures in a New World" DUDAJ Publishing House, Tirana 2011

these circumstances has been essential, as it conditioned the entire policy of developed countries in terms of financial leverage.

- Central banks have intervened in the 2008 global financial crisis, but also during the pandemic, by lowering interest rates and providing liquidity to financial markets, to prevent a collapse of the financial system. This has contributed to the decline in the value of the dollar, but has also maintained its role as the preferred currency in international markets.

At first glance, an economic crisis is expected to shake the foundations of the financial order and bring with it a demand for a review of the rules of the game. But whenever the world faces a crisis, whether financial, pandemic, energy or geopolitical, it does not move away from the dollar, on the contrary, it takes refuge in its shadow. This behavior is not simply market psychology: it is a direct consequence of the systemic asymmetry that the dollar has built up over decades. In every major crisis, the US has the ability to inject liquidity, control the narrative through international institutions such as the IMF and the World Bank, and offer “rescue dollars” to the entire world. But every coin has two sides and the monetary asymmetry within it has great risks. Ironically, while many countries suffer from the need for dollars, the US itself prints dollars at an increasing pace, to cope with its ever-increasing debt. The US public debt has surpassed every historical record, exceeding 34 trillion dollars. We all understand that the FED that issues the dollar is not a mine with endless ore that you can always extract and sell from it. In other words, the monetary asymmetry of the dollar is no longer a technical issue of monetary policy, it is a political, economic and social reality that reshapes the paths of globalization. It is a system where the risk is globalized, but the benefit does not always remain with the owner. Monetary asymmetry is not always “an invisible imperial privilege”.

Partial conclusion for hypothesis H2. From the above analysis, we can say that the dominance of the US dollar and monetary asymmetry to date has not worsened global crises, but has been a “lifeboat” for them. That said, recently the influence of the dollar has added complexity and uncertainty to the international monetary system, making financial markets feel its uncertainty very much. On the other hand, we have serious efforts to significantly reduce its role in the globalized world. BRICS is today a reality that is being discussed more and more in the international arena. It is the most serious attempt for a new monetary system.

Let's analyze the third hypothesis H3 a little more closely. Do we have monetary asymmetries in the Albanian Monetary System? According to the latest data, October 2024, the foreign exchange reserves of the Bank of Albania reached a historic level of 6.015 billion euros⁹, marking an increase of 6.3% compared to the same period last year. The structure of the Reserves is very interesting: 71% in foreign government treasury bills, 20% in foreign currency deposits, the remaining part in gold and special drawing rights (SDR) with the IMF. In recent months, the BoA¹⁰ has reduced investments in securities and increased the share of reserves held as deposits, reflecting a more cautious strategy in the face of financial market fluctuations. In December 2024, the value of the Bank of Albania's gold reserves reached 277.71 million euros, marking the highest historical level. This increase came as a result of the increase in the price of gold in international markets, which reached an average of 2,653 dollars per ounce.¹¹ The composition of foreign exchange reserves shows a high degree of alignment with the euro, reflecting the elevated level of euroization in the Albanian economy.

One of the most visible forms of monetary asymmetry in the Albanian financial system is the market ratio between the domestic currency (the lek) and the use of foreign currencies, mainly the euro. The Albanian economy, since 2001—when the euro became the official currency in 15 European countries—has experienced a high level of euroization, meaning that a significant share of deposits and loans is denominated in euros. This creates a challenge for the Bank of Albania, which, although it controls the base interest rate for the lek, cannot directly influence market conditions for transactions conducted in euros. Consequently, a change in the lek interest rate does not automatically translate into changes in the behavior of borrowers or consumers operating in foreign currency.

Another form of asymmetry appears at the geographical level. While Tirana and some major cities benefit more directly from monetary easing—both through lower interest rates and increased access to finance—rural and peripheral areas continue to face difficulties in accessing credit and other financial services. As a result, monetary policy has an uneven impact on economic growth, further deepening the urban–rural divide in the country. If we return to the thesis presented at the beginning, where it was argued that monetary asymmetry is not the result of the will of an institution or a government but rather a product of market development, we can conclude that

⁹ <https://www.ocnal.com/2024/12/albanias-foreign-reserve-surpasses>.

¹⁰ <https://www.ocnal.com/2024/12/albanias-foreign-reserve-surpasses>.

¹¹ <https://politiko.al/english/e-tjera/sa-rezerva-ari-ka-banka-e-shqiperise-aktualisht>.

the Albanian market has generated a financial asymmetry in favor of the euro not only because the majority of Albanian emigrants reside in EU countries where the euro is used, but also because the euro can function as a means of payment in the Albanian market with legal standing equal to that of the lek.

7. CONCLUSIONS

Conclusion 1: After Bretton Woods, the increase in volatility and vulnerability to crises indicates a transformation toward a more unstable financial architecture. Historical data from before and after the Bretton Woods period show a profound change in the nature and frequency of economic crises. Crises prior to 1971 were often exogenous in nature, linked to major events such as world wars or the Great Depression, whereas after the collapse of the Bretton Woods system, crises became more frequent, more closely tied to the global financial structure, and less dependent on external shocks. This qualitative shift is closely related to the transition from a system of fixed exchange rates and capital controls to a liberalized financial system characterized by free capital movements and freely floating exchange rates. While this system increased economic flexibility and deepened financial markets, it also created a more favourable environment for financial speculation, unsustainable debt accumulation, and the formation of economic bubbles. Hyman Minsky's theory supports this conclusion by demonstrating that periods of relative financial stability often act as precursors to speculative behaviour that ultimately leads to collapse.

Conclusion 2: Global interdependence and the endogenous character of modern crises require a reassessment of the stabilizing role of international monetary policy. Unlike the pre-1971 period, when crises often had a geopolitical character or were linked to exceptional events (wars, overproduction depressions, etc.), crises in the new era are largely products of the system itself. The oil shocks, emerging market crises, the dot-com bubble, the global financial crisis, and the COVID-19 pandemic all demonstrate that crises not only occur more frequently, but also spread globally at a much faster pace, making economies more vulnerable and more deeply interconnected. The liberalization of capital markets, the development of financial technologies, and the dense networking of the international banking system create rapid channels for crisis transmission, whereby a localized problem (such as the US real estate sector in 2008) can quickly escalate into a systemic global crisis.

Conclusion 3: Monetary asymmetry as a factor of stability in times of crisis is gradually losing its effectiveness. The dominance of the dollar in the international monetary system has created a reality in which the United States benefits from a unique privilege: the ability to finance itself in the currency that the rest of the world demands. This monetary asymmetry, although seemingly “unfair,” has historically functioned as a “safe haven of stability” for the global economy during periods of crisis. From the Latin American debt crisis to the 2008 financial crisis and the COVID-19 pandemic, global demand for dollars has helped sustain financial circulation and prevent the collapse of many national systems. For decades, the IMF and the World Bank have served as rescue mechanisms for economies in difficulty, primarily operating through the dollar. In this respect, hypothesis H2 can be assessed as partially false: rather than exacerbating crises, the dollar has often served as a means of mitigating their short-term consequences. However, this assistance comes with a hidden cost, manifested in increasing polarization and, potentially, a lasting dependence on a currency that is not neutral, even though it functions as an international one.

Conclusion 4: Asymmetry as a source of systemic uncertainty and a challenge for the future remains present. Despite the role of the dollar as a rescue currency, the asymmetry that it has created over the decades is becoming a new source of global uncertainty. US monetary policies, undertaken in the national interest, have a disproportionate impact on other economies, especially developing ones. When the Fed raises interest rates, the consequences are immediately felt in global financial markets through the cost of credit and the contraction of global liquidity. The massive US debt, financed through a constant demand for dollars, puts the world economy in front of a “shaking building”. Moreover, the rise of alternatives such as BRICS+ and discussions on a new international currency imply a real challenge to the dominance of the dollar in the future. In this light, hypothesis H2 gains more weight: the monetary asymmetry of the dollar, instead of mitigating crises, may itself be a source of future crises, if the global system does not adapt to the new multipolar reality. The current monetary order is, for the first time, being seen as temporary.

Conclusion 5: Euroization is now a structural form of monetary asymmetry in Albania. Monetary asymmetry in the Albanian financial system is mainly a consequence of the deep euroization of the economy, where a significant part of deposits and loans are linked to the euro currency. This creates a

paradox for the monetary policy of the Bank of Albania, which, although it has control over the base interest rates in lek, cannot influence with the same force the real market that operates increasingly in foreign currency. Consequently, the effectiveness of monetary policy decreases, and the decision-making of the Bank of Albania does not automatically translate into changes in consumer or business behaviour. In this context, hypothesis H3 finds clear confirmation: monetary asymmetry in Albania is a reality constructed by the market flows themselves.

The internal asymmetry expressed by the geographical non-uniformity in the distribution of monetary policy essentially represents a financial asymmetry of the national system. In addition to its dependence on the euro, the Albanian monetary system faces a territorial asymmetry, which significantly affects the equality of access to finance. While Tirana and the main cities benefit from monetary policies through lower interest rates and increased credit supply, rural and peripheral areas face a lack of financial infrastructure and difficulties in borrowing. This type of asymmetry is no longer simply monetary, but develops on the margins of social and geographical inequality, becoming a challenge for internal financial stability. This shows that in Albania monetary asymmetry does not stem only from the external influence of the euro, but also from the internal organization of the financial system. In this sense, hypothesis H3 is true on two levels: Albania experiences an external monetary asymmetry due to euroization and an internal one due to the unequal distribution of financial access.

The analysis of the three hypotheses presented clearly shows that monetary asymmetry is not a random or temporary phenomenon, but a deep structure that has built the international financial order and continues to shape the economic reality of smaller countries like Albania. At the global level, the first hypothesis confirmed that the historical dominance of the US dollar has given the US an unusual economic power, enabling it to export inflation, finance the deficit without short-term consequences and control global financial flows. This systemic asymmetry has been reinforced not by rules, but by the behaviour of markets, which in times of crisis do not abandon the dollar, but take refuge under its shadow.

The second hypothesis showed that the dominance of the dollar has not only been a source of stability, but also an aggravating factor in some moments of crisis. In many cases, the asymmetric structure has prevented equal access to global liquidity, worsened the debts of developing countries and increased dependence on Fed policies. However, paradoxically, each crisis has further increased the power of the dollar, further deepening this asymmetry.

Finally, the third hypothesis focuses on the radiation of this global asymmetry at the national level, in the specific case of Albania. The euroization of the economy, the dependence on euro remittances and the lack of full control over monetary conditions are clear forms of an imported asymmetry. On the other hand, geographical disparities and unequal access to finance within the territory show that even internal monetary asymmetry is a real challenge for policymaking.

In conclusion, it can be said that monetary asymmetry has become part of the structure of financial globalization – it is no longer simply a theoretical imbalance, but a functional mechanism of the current economic order. The challenge lies in the fact that while the risks of this system are globalized, the benefits are concentrated, and this creates long-term tensions for economic justice and global financial stability.

8. RECOMMENDATIONS

1. Diversification of National Foreign Reserves

The Bank of Albania should consider a more balanced strategy for reserves, diversifying beyond the euro, in order to increase resilience in the face of external crises and the monetary policies of the ECB or the Fed.

2. Review of the Euroization Strategy

It is advisable to take steps to reduce dependence on the euro, through fiscal and monetary incentives that favor the use of the lek in loans, deposits and domestic payments.

3. Strengthening Regional Financial Inclusion Policies

Monetary and credit policies should have a clear territorial dimension, to support access to finance in peripheral and rural areas.

4. Actively monitoring international monetary developments

In conclusion, the study supports the idea that monetary asymmetry has become a structural feature of the global and local economic order, and requires new approaches to its management, especially in times of financial turmoil, inflation or redistribution of global monetary power (as in the case of the BRICS initiatives). Albania should increase the analytical capacity of its institutions to assess the impact of new initiatives and developments of CBDCs (central bank digital currencies), preparing possible scenarios for global reshaping.

5. Financial Education to Mitigate Asymmetry

Part of monetary asymmetry is cultural and cognitive. Through financial education programs, citizens can make more informed decisions about the currency they use for savings, loans or investments.

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Reimagining Sustainable Skills in Higher Education: Navigating the Intersection of Artificial Intelligence and Generation Z

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ABSTRACT

This review synthesizes recent empirical and policy research on how artificial intelligence and Generation Z jointly reshape higher education, focusing on pedagogy, competencies, institutional change, and sustainability. Key literature finds strong student receptiveness to AI for personalization and productivity alongside significant concerns about privacy, overreliance, and diminished human interaction, calling for balanced, ethical implementation. Sustainable knowledge development requires embedding sustainability principles into curricula and promoting collaborative knowledge co-creation, echoed in systematic reviews on digital transformation and sector analyses. Implications for higher education are clear: universities should adopt competency-based curricula emphasizing AI literacy, ethics, creativity and lifelong learning; invest in infrastructure and faculty development; implement AI governance and quality assurance; and pursue equitable access strategies to prevent a widening digital divide.

Keywords: Artificial Intelligence; University transformation; Sustainable knowledge

1. RESEARCH CONTEXT

The convergence of an accelerating AI revolution with Generation Z's entry into universities creates a unique inflection point for higher education that touches pedagogy, governance and graduate employability. Generation Z—born approximately between 1997 and 2012—represents the first cohort to have grown up entirely in the digital age, with expectations fundamentally shaped by ubiquitous connectivity, instant access to information, and interactive digital experiences. Simultaneously, artificial intelligence technologies, particularly generative AI tools like ChatGPT, have rapidly entered educational settings, promising unprecedented personalization, efficiency, and new modes of knowledge creation. This dual transformation presents both extraordinary opportunities and complex challenges for universities worldwide. On one hand, AI technologies offer powerful tools to meet Gen Z's expectations for personalized, flexible, and engaging learning experiences. On the other hand, the integration of AI raises profound questions about pedagogical effectiveness, academic integrity, equity, privacy, and the fundamental purposes of higher education in an increasingly automated world. The significance of this moment cannot be overstated. Universities face pressure to:

- ✓ Redesign curricula to develop AI-relevant competencies while preserving critical thinking and human capabilities
- ✓ Transform pedagogical approaches to leverage AI's strengths while mitigating its risks
- ✓ Reimagine institutional structures to support faculty development, ethical governance, and technological infrastructure
- ✓ Address equity concerns to prevent AI from widening existing educational disparities
- ✓ Foster sustainable knowledge practices that prepare graduates for rapidly evolving careers.

This comprehensive literature review synthesizes recent empirical studies, policy proposals, systematic reviews, and case reports published primarily between 2020 and 2025, focusing on:

- ✓ Generation Z characteristics and learning preferences in higher education
- ✓ AI integration across teaching, learning, assessment, and administration
- ✓ Transforming pedagogical approaches for AI-enhanced learning
- ✓ Reimagining competencies and skills for the AI era
- ✓ Sustainable knowledge development practices
- ✓ Institutional transformation and change management
- ✓ Challenges, barriers, and ethical considerations
- ✓ Future directions and strategic recommendations

The review prioritizes studies reporting student attitudes, faculty perspectives, policy frameworks, pedagogical trials, and systematic reviews to support evidence-based recommendations for institutional leaders, policymakers, and educators (Chan, 2023; Andreeva & Tuchkevich, 2025; Lara-Navarra et al., 2025).

2. Theoretical frameworks

AI-enhanced higher education literature draws explicitly on established learning theories while also invoking digital transformation and competency models to justify pedagogical change. Several empirical studies ground AI adoptions in constructivist and activity theories, arguing AI supports personalized, learner-centered experiences that align with Generation Z expectations.

Mixed-methods studies of master's students frame AI tools as supporting autonomy and active meaning-making through personalization and adaptive supports (Andreeva & Tuchkevich, 2025). The constructivist perspective emphasizes that learners construct knowledge actively rather than passively receiving it, and AI tools can scaffold this process through adaptive feedback, personalized learning paths, and interactive environments. Authors link AI to situated learning tasks and mediated activity where tools scaffold professional practice (Andreeva & Tuchkevich, 2025). This perspective, rooted in Vygotsky's sociocultural theory, views AI as a mediating tool that can extend learners' zones of proximal development when properly integrated into collaborative learning activities.

Work on virtualization and institutional change treats digital intelligence and hybrid ecosystems as structural drivers for pedagogical redesign and sustainability in higher education (Moreira-Barberán et al., 2025). These

frameworks emphasize the systemic nature of change required—not merely adding technology to existing practices, but fundamentally reimagining how universities organize learning, credential knowledge, and engage with students. While not explicitly foregrounded in all studies, the principles of connectivism—learning as network formation, distributed knowledge, and the importance of knowing where to find information—implicitly underpin discussions of AI-mediated learning environments where knowledge is dynamically accessed and co-created rather than statically transmitted.

The AI Ecological Education Policy Framework situates AI along Pedagogical, Governance, and Operational axes to integrate learning affordances with accountability and infrastructure concerns (Chan, 2023). This three-dimensional framework provides a comprehensive lens for institutional planning:

- ✓ Pedagogical dimension: Curriculum design, assessment methods, learning activities
- ✓ Governance dimension: Policies, ethics, accountability, quality assurance
- ✓ Operational dimension: Infrastructure, training, technical support, data management

Systematic and empirical studies characterize Gen Z as technology-native learners whose preferences (immediacy, personalization, interactivity) motivate specific AI affordances but also raise psychosocial risks (Zábojník & Hromada, 2024; Andreeva & Tuchkevich, 2025). Generational theory provides a lens for understanding cohort-specific values, communication styles, and learning preferences, though scholars caution against overgeneralization and emphasize within-cohort diversity.

Large-scale student analyses propose MIL-AI (Media and Information Literacy-AI) competency sets including critical discernment, academic integrity, and cognitive independence, alongside micro-credential approaches to certify AI-relevant skills and lifelong learning pathways (Ponce Rojo et al., 2025; Lara-Navarra et al., 2025). These models shift focus from traditional degree structures toward modular, stackable credentials that can be continuously updated as technology and workforce demand evolve.

Where the literature is explicit, theory is used to justify design choices (adaptive systems, scaffolding, credentialing) rather than to produce a single unified theoretical model; further integrative theoretical work is needed to map theory to specific AI affordances and outcomes (Chan, 2023; Moreira-Barberán et al., 2025). The field would benefit from more rigorous

theoretical frameworks that bridge learning science, computer science, and organizational change theories.

3. Research methodology analysis

Empirical and review work employs a mix of quantitative, qualitative, mixed-methods, case study, and systematic review approaches, but geographic and methodological concentration create identifiable gaps. Several large surveys and mixed-method investigations provide descriptive evidence of attitudes and self-reported effects, while systematic reviews synthesize early findings yet highlight uneven evidence quality and missing long-term outcome studies. Some of those are:

Mixed methods: Convergent parallel design with 300 master's students combining surveys and interviews (Andreeva & Tuchkevich, 2025). This approach allows triangulation of quantitative patterns with qualitative depth.

Large surveys: Datasets of 3,120 student responses analyzing MIL-AI competencies (Ponce Rojo et al., 2025); university-level surveys with 457 students and 180 staff for policy framework development (Chan, 2023). These large-scale studies provide statistical power and generalizability within their contexts.

Systematic reviews: Narrative and systematic reviews synthesize trends, risks, and digitalization pathways (Moreira-Barberán et al., 2025; Zábajník & Hromada, 2024). These meta-level analyses identify patterns across studies but are limited by the quality and scope of primary research.

Case studies and pedagogical pilots: STEM case studies integrating generative AI in mathematics and computer science instruction (Thida & Landi, 2025). While limited in generalizability, these provide rich detail about implementation challenges and successes.

Insufficient evidence on sustained learning gains and career trajectories following AI-integrated curricula (Moreira-Barberán et al., 2025; Zábajník & Hromada, 2024). Most studies capture snapshots of attitudes or short-term outcomes rather than tracking students over years. Many works discuss AI generally (e.g., "generative AI") but lack controlled trials distinguishing machine learning, natural language processing, computer vision, or virtual reality effects on learning outcomes (Zábajník & Hromada, 2024; Chan, 2023). Few rigorous evaluations test professional development models at scale despite identified training needs (Chan, 2023). The literature

emphasizes the need for faculty training but rarely evaluates the effectiveness of specific approaches. Some region-specific studies exist (Peru, Latin America) but comparative cross-regional work on equity and contextual constraints is limited (Lara-Navarra et al., 2025; Ponce Rojo et al., 2025). Evidence directly linking AI-enabled learning to employer assessments and job performance is sparse (Cesco et al., 2021). The presumed connection between AI-enhanced education and workforce readiness requires empirical validation. Overall, the methodological landscape is broad but dominated by cross-sectional surveys, reviews, and small-scale pilots; robust experimental and longitudinal designs are underrepresented (Andreeva & Tuchkevich, 2025; Chan, 2023; Moreira-Barberán et al., 2025).

4. FINDINGS

4.1 Digital native characteristics

Generation Z's digital nativity shapes expectations for immediacy, interactivity, and personalized learning; empirical data document optimism about AI's benefits and simultaneous ethical concerns. Studies characterize Gen Z as comfortable with digital tools, seeking flexible, on-demand learning formats and rapid feedback, consistent with case studies and sector analyses (Thida & Landi, 2025; Lara-Navarra et al., 2025). Key characteristics identified in the literature include:

- ✓ Digital fluency from early age: Exposure to smartphones, tablets, and social media from childhood
- ✓ Multitasking and parallel processing: Comfortable managing multiple information streams
- ✓ Visual and interactive learning preferences: Preference for video, graphics, and interactive content over text-heavy materials
- ✓ Expectation of immediacy: Accustomed to instant answers and rapid feedback
- ✓ Pragmatic and career-focused: Concerned with practical skills and employability
- ✓ Socially conscious: Interested in social justice, sustainability, and ethical issues

4.2 Learning preferences and expectations

Large survey evidence finds students report AI-assisted gains in writing, self-management and productivity, yet emphasize the need for critical engagement and academic integrity (Ponce Rojo et al., 2025). Specific preferences include:

- ✓ Personalized learning paths: Desire for content and pacing adapted to individual needs
- ✓ Flexible scheduling: Preference for asynchronous options and self-paced learning
- ✓ Interactive and engaging content: Gamification, simulations, and hands-on activities
- ✓ Collaborative opportunities: Value peer learning and group projects despite digital focus
- ✓ Transparent expectations: Clear rubrics, learning outcomes, and assessment criteria
- ✓ Timely feedback: Expectation of rapid, actionable feedback on assignments

4.3 Attitudes toward AI in education

The findings of Andreeva and Tuchkevich (2025) reveal a nuanced generational perspective toward artificial intelligence in higher education, particularly among master's students. Their study indicates that 78% of respondents perceive AI as a catalyst for *personalized and adaptive learning*, enabling tailored educational experiences that respond to individual needs and learning styles. This optimism is grounded in the belief that AI enhances efficiency, facilitates access to instant information, and supports diverse pedagogical approaches. However, the same cohort expresses significant reservations. Fifty-four percent of participants raise concerns about *data privacy and surveillance*, while 48% fear that the increasing reliance on AI may erode *human interaction* and diminish the relational dimension of learning. These apprehensions extend to broader ethical and structural issues—such as academic integrity, algorithmic bias, and the potential displacement of future employment opportunities. This ambivalence encapsulates the characteristic attitude of Generation Z toward emerging technologies: a generation simultaneously enthusiastic about innovation and deeply aware of its moral and social implications. Their dual stance underscores the need for ethical safeguards and transparent governance frameworks in educational AI integration. In essence, the study portrays Gen

Z not as passive adopters of technology but as critical participants in shaping a responsible digital learning ecosystem—one that balances personalization with privacy, automation with authenticity, and progress with human connection.

4.4 Current state of AI adoption

AI adoption is expanding across teaching, assessment and administration; pedagogical models are shifting toward AI-enhanced, student-centered approaches. Opening studies document a broad set of AI uses in higher education, ranging from intelligent tutors and chatbots to learning analytics for early-warning systems and automated feedback, with policy frameworks stressing operational, governance and pedagogical coordination (Chan, 2023; Thida & Landi, 2025). The pace of adoption accelerated dramatically with the public release of ChatGPT in late 2022, prompting urgent discussions about academic integrity, assessment redesign, and pedagogical innovation. Universities have responded with varying approaches—from outright bans to enthusiastic integration—though evidence-based policies remain in development. The table below summarizes evidence for key AI technologies reported in the literature, highlighting concrete examples and noting where evidence is lacking.

Current State of AI Adoption

AI Technology	Reported Uses/Examples	Empirical Findings/Limitations
Machine learning and adaptive systems	Personalization and adaptive learning cited as core affordances in master's education and lifelong learning proposals	Studies report perceived personalization benefits but provide limited controlled outcome metrics; design details vary across studies
Natural language processing and generative AI	Text-generation and automated feedback used to support writing, tutoring, and faster academic output	Large samples report perceived gains in productivity and metacognitive reflection

AI Technology	Reported Uses/Examples	Empirical Findings/Limitations
		but risk of dependence and misinformation is noted
Computer vision in education	Insufficient evidence in supplied literature	The literature does not provide substantive empirical examples or evaluations of computer-vision applications in teaching or assessment
Learning management systems integration	Framed within operational/infrastructure discussions and hybrid ecosystems supporting AI-enabled workflows	Operational readiness and infrastructure are highlighted as prerequisites; empirical LMS integration evaluations are limited
Blockchain and credentials	Micro-credentials and dynamic credentialing proposed as pathways for lifelong learning	Specific use of blockchain for credential verification is not described in detail in the provided sources
Virtual and augmented reality	Virtualization and hybrid ecosystems discussed at a strategic level	No detailed empirical VR/AR evaluation studies are present in the supplied corpus

Source: Produced by the authors

Adaptive machine learning and generative natural language processing are the most documented AI modalities in these studies, primarily in terms of perceived benefits and pedagogical prototypes rather than rigorous causal evaluations; several technology areas remain underreported in the supplied literature (computer vision, blockchain credentials, extended reality) and thus require targeted empirical research (Andreeva & Tuchkevich, 2025; Chan, 2023; Moreira-Barberán et al., 2025; Zábajník & Hromada, 2024; Thida &

Landi, 2025). Universities must reimagine graduate competencies to include AI literacy, critical thinking, creativity and ethical reasoning while fostering sustainable knowledge production. Opening analyses emphasize a shift toward 21st-century skills that combine domain expertise with digital and media literacy, critical discernment, and lifelong learning dispositions (Ponce Rojo et al., 2025).

4.5 AI Technologies in Albanian higher education system

Albanian universities face an uneven digital transition, limited infrastructure, and gaps in teacher digital skills while students are highly engaged with AI. Universities should combine infrastructural investment, teacher training, ethics and interdisciplinary curriculum redesign to build sustainable, AI-ready competencies for Generation Z. By incorporating AI-driven technologies into their curricula, encouraging interdisciplinary learning, and placing a strong emphasis on critical thinking, creativity, and digital literacy, Albanian institutions must radically rethink sustainable competencies and skills in the age of AI and Generation Z. This strategic change is essential for addressing complex societal issues and educating students for a changing labor market. The current state of education, especially in Albania, emphasizes the growing necessity for universities to implement components of university 4.0, which calls for modernizing and transforming the digital content base in addition to altering teaching and learning procedures (Avrami et al., 2024). Given the worldwide trends in innovation and sustainability, this shift is crucial for encouraging university students to have entrepreneurial aspirations and sustainable conduct (Nano et al., 2024). Despite economic growth, Albania has experienced social inequality and environmental deterioration, highlighting the significance of education and skills for future economic regeneration and inequality reduction (Kumi, 2024). In Albania, digitalization and sustainable development are major issues, and the field of multidisciplinary study on these subjects is expanding. For example, a thorough examination of IoT engineering competencies in the green transformation of the Western Balkan economy, using a case study from UAMD University, highlights the necessity of expediting the integration of technologies that enhance capacity (Zeneli et al., 2024).

While there are no public records of indicators evaluation of the use of AI in the Albanian higher education's systems, the Teaching and Learning International Survey (TALIS) conducted by the Organization for Economic Co-operation and Development (OECD) in 2024 found that teachers' use of

AI differs greatly throughout Europe. This study assessed the degree of AI use in lower secondary schools across 32 nations, including Albania. With 53.2% of teachers using artificial intelligence at least once, Albania leads both the region and Europe in this regard. France is last. The results show that, Western European nations have lower consumption rates than Eastern European nations. Compared to the OECD average of 36%, 52% of Albanian¹² teachers say they have employed artificial intelligence (AI) in their job. Teachers typically utilize AI to create lesson plans or activities (82%), assist students practice new abilities in real-life situations (88%), and effectively learn about and summarize a topic (81%). Supporting students with special education needs (64%), producing text for student feedback or parent/guardian contacts (62%), and evaluating or marking student work (42%) are the least common uses of AI.

4.6 Critical thinking and problem-solving

As AI handles routine cognitive tasks, human capacity for critical analysis, creative problem-solving, and contextual judgment becomes more valuable.

Pedagogical implications:

- ✓ Prioritize tasks where AI outputs must be validated and interpreted, preserving conceptual depth (Zábojník & Hromada, 2024)
- ✓ Design assessments that require evaluation of AI-generated content
- ✓ Emphasize metacognitive skills—thinking about thinking
- ✓ Foster intellectual humility and awareness of cognitive biases
- ✓ Develop systems thinking and ability to analyze complex, ill-structured problems

5. CONCLUSION

This comprehensive literature review underscores the profound transformation occurring at the intersection of artificial intelligence and Generation Z in higher education. The convergence of these forces is reshaping universities worldwide, offering both unprecedented opportunities and complex challenges.

¹² https://www.oecd.org/en/publications/results-from-talis-2024-country-notes_e127f9e2-en/albania_70055bd7-en.html

Generation Z, as digital natives, enters academia with expectations for personalized, interactive, and flexible learning experiences. AI technologies—particularly generative AI tools that have proliferated since 2022—are uniquely positioned to meet these demands by enhancing personalization, streamlining routine tasks, and supporting diverse learning styles. Yet, student attitudes remain ambivalent: while 78% of surveyed master’s students report that AI enhances personalized learning, 54% express privacy concerns and 48% worry about diminished human interaction. This duality reflects a generational ethos that embraces innovation but insists on ethical safeguards.

The pedagogical implications are significant. AI must be designed to augment rather than replace human teaching, fostering active learning, personalization, and competency development. Core competencies themselves require reimagining: alongside domain expertise, students must cultivate AI literacy, critical thinking, creativity, collaboration, adaptability, and ethical reasoning. Sustainable knowledge development further demands collaborative co-creation, interdisciplinary integration, and embedding sustainability principles across curricula.

Faculty development emerges as a critical yet under-addressed dimension. Teachers often express greater concerns than students, highlighting the need for comprehensive training and institutional support. Equity and ethics remain paramount: universities must proactively address digital divides, algorithmic bias, and privacy risks to prevent AI from exacerbating disparities. Institutional transformation, therefore, requires coordinated change across pedagogy, governance, and operations, supported by robust policies, adequate resources, and cultural change management.

Finally, the review identifies substantial evidence gaps. Much of the existing research relies on self-reports and short-term studies, underscoring the need for rigorous experimental designs and longitudinal tracking to capture the long-term impact of AI integration.

5.1 Implications for stakeholders

The synthesis of this literature review points to a clear agenda for action across the higher education ecosystem. For university leaders, the imperative is to craft comprehensive AI strategies that align with institutional missions, invest in faculty development and infrastructure, and establish governance frameworks that safeguard ethics, privacy, and quality. Leadership must

foster cultures of innovation while managing risks, ensuring equity and inclusion remain central to all AI initiatives.

For faculty, engagement with AI should be both experimental and reflective. Teachers are called to redesign pedagogy in ways that leverage AI's strengths while preserving the irreplaceable human elements of teaching. Building AI literacy alongside students, participating in institutional planning, and sharing best practices with colleagues are essential steps toward collective adaptation. For students, the challenge is to cultivate critical AI literacy and responsible use practices. AI tools should be harnessed to augment—not replace—learning. Students must engage in discussions about ethical use, provide feedback to institutions, and prepare for careers that demand continuous adaptation to technological change.

For policymakers and accreditors, flexible frameworks are needed to encourage innovation while ensuring quality. Investment in research on AI's effectiveness, equity, and ethics, alongside support for professional development and infrastructure, will be vital. Updating standards and regulations to reflect AI realities and facilitating knowledge sharing across institutions and countries will help sustain progress.

For technology providers, the responsibility lies in designing tools with educational contexts and values in mind. Accessibility, transparency, and ethical design must be prioritized, with educators actively engaged in product development. Affordable pricing, robust support, and enabling research on effectiveness are critical to building trust and impact.

Finally, for researchers, the path forward requires rigorous longitudinal and experimental studies to address evidence gaps, particularly around equity and long-term outcomes. Expanding geographic diversity, developing validated frameworks, and translating findings into actionable guidance for practitioners will ensure that scholarship informs practice meaningfully.

5.2 Call to action

The transformation of universities in the era of artificial intelligence and Generation Z is not a matter of choice—it is already unfolding. The central question is not whether institutions should integrate AI, but how they can do so in ways that enhance the quality and depth of learning, promote equity and inclusion, preserve human connection, prepare students for a rapidly changing world, and advance ethical responsibility.

This moment demands collective action across all stakeholders, guided by evidence, grounded in values, and committed to continuous adaptation. History reminds us that universities have successfully navigated previous technological revolutions—the printing press, radio, television, computers, and the internet—emerging stronger by integrating new tools in service of enduring educational purposes. Yet the AI revolution, combined with the distinctive characteristics of Generation Z, represents perhaps the most profound transformation to date.

Success will require vision and leadership to chart the course, resources and infrastructure to enable change, and faculty development to build capacity. It will depend on ethical frameworks and governance structures to guide decisions, rigorous research and evaluation to inform practice, and a steadfast commitment to equity and inclusion to ensure benefits reach all learners. Above all, it will require patience and persistence to sustain transformation over time.

The literature reviewed provides a foundation of knowledge, identifies promising practices, and highlights critical gaps. It reveals both the extraordinary potential of AI to personalize learning, enhance accessibility, and cultivate new competencies, and the significant risks of exacerbating inequities, compromising privacy, and diminishing human agency. The path forward demands wisdom, courage, and collaboration.

Universities must embrace innovation while honoring their timeless missions of knowledge creation, critical inquiry, and human development. They must prepare students for jobs that do not yet exist while cultivating enduring human capabilities. They must leverage AI's power while remaining grounded in human values. The future of higher education in the age of AI and Generation Z is not predetermined—it will be shaped by the choices made today. This review provides evidence to inform those choices, and the responsibility now lies with all stakeholders to act with intention, integrity, and commitment to education's transformative potential for advancing human flourishing.

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The US Debt Cycle and Its Monetary Spillovers to the Albanian Economy

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ABSTRACT

This paper examines the sustainability of the international financial system using Ray Dalio's theoretical framework of the 'Big Debt Cycle', with a particular focus on the performance of 10-year US Treasury securities as a barometer of global stability. The study is motivated by contemporary debate over the economic policies of the Trump administration, in which efforts to maintain artificially low interest rates and the imposition of protectionist tariffs confront the arithmetic of US public debt exceeding US\$35 trillion. Drawing on narrative and empirical analysis, the paper examines whether the United States is entering a phase of the long-term debt cycle characterized by fiscal dominance and the diminished effectiveness of conventional monetary policy, or whether it continues to shape global markets through other, extra-economic factors.

The paper analyses monetary asymmetry and the risks to the dollar's role as the world's reserve currency posed by large fiscal deficits across the global economy. It then shifts the focus to Albania, assessing the position of a small economy in transition amid its own monetary asymmetry and these global fluctuations. It argues that the appreciation of the Albanian lek and the economy's reliance on sectors such as tourism and construction pose risks to long-term competitiveness, increasing the country's exposure to external shocks.

The paper concludes by outlining five plausible scenarios for global economic developments up to 2030, ranging from potential stagflation to a major rebalancing of the international financial order. The findings suggest that

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success in this era of heightened uncertainty will depend on the capacity to align productivity with fiscal discipline, while avoiding the traps of monetary populism.

This paper seeks to integrate Ray Dalio's theory of the 'Big Cycles' with the turbulent political reality of the United States under the Trump administration. Drawing on an analysis of 10-year Treasury securities, it explains why the Albanian economy, though small, is inextricably connected to monetary asymmetry and the stability of the global economy. In an era in which monetary asymmetry is being reshaped, understanding the economic forces that arise from it can provide both an opportunity for further development and an indispensable means of safeguarding economic sovereignty.

Keywords: Big Debt Cycle; Monetary Asymmetry; Fiscal Dominance; Structural Competitiveness.

1. Introduction

The international financial system stands today at a critical juncture, as the rules established in the aftermath of the Second World War are being tested by economic and political forces that were previously less apparent. At the centre of this system lies the United States of America, a power that for decades has enjoyed what the former French Minister of Finance, Valéry Giscard d'Estaing, described as an 'exorbitant privilege': the dollar's role as the world's reserve currency. This position has enabled the United States to run large and persistent deficits, effectively exporting its debt to the rest of the world. US Treasury securities have long been regarded as the ultimate safe haven during periods of global turbulence. Yet this model is now exhibiting clear signs of structural fatigue, which Ray Dalio, in his most recent work, identifies as the final phase of the 'Big Debt Cycle'.

Today, the global economy is more interconnected than ever, yet at the same time more fragile. Global debt has reached historic levels, exceeding US\$315 trillion. A substantial share is held by advanced economies, with US public debt exceeding US\$34 trillion in 2025. In this context, the United States is no longer merely an engine of growth; it is also a potential source of systemic instability. When the world's most powerful state begins to spend more than

it produces, and when the cost of servicing its debt surpasses budgets for defence or education, global monetary asymmetry begins to shift.

Trust, the sole ‘fuel’ of fiat currencies¹⁵, is being eroded by the perception that US debt can no longer be repaid in real terms, but only through money creation and currency depreciation. Confidence in fiat currencies rests on institutional credibility. As debt-servicing costs rise, a natural tension emerges between the government’s fiscal needs and the independence of central banks. This phase of the cycle is often characterised by:

- a change in the effectiveness of monetary policy;
- increased political scrutiny of the Federal Reserve’s technical decision-making;
- social polarisation stemming from unequal wealth distribution.

When interest rates are set too high, they risk triggering an economic downturn by raising borrowing costs; when they are set too low, they fuel inflation and erode global savings. This is the ‘trap’ in which the Federal Reserve currently finds itself, as every technical adjustment is quickly transformed into a political battleground. Sustained pressure from political actors, including President Donald Trump’s calls for aggressive rate cuts, constitutes a characteristic symptom of this late-stage phase of the cycle. This confrontation undermines the perceived credibility of 10-year US Treasury securities, which function as a global benchmark for the cost of capital. If markets begin to believe that monetary policy is no longer guided primarily by price stability, but by the government’s fiscal exigencies (a condition known as ‘fiscal dominance’), long-term yields will rise, thereby signalling the onset of a painful reconfiguration of the global economic order.

In this paper, we analyse how these global dynamics are reflected in debt markets, and what lessons developing economies, such as Albania, can draw to protect themselves in this era of heightened uncertainty.

2. Literature review and methodology

¹⁵ Fiat currencies: you should imagine a system in which money has value not because it is made of something inherently valuable (such as gold), but because a government declares that ‘these counts as money’.

A review of the economic literature in 2025 indicates a paradigmatic shift away from traditional inflation concerns towards a more existential anxiety: ‘fiscal dominance’. This term, which featured prominently in leading outlets such as the *Journal of Monetary Economics* and in reports by the Bank for International Settlements (BIS) during 2025, describes a condition in which the government’s need to finance its debt constrains central-bank policy, rendering central-bank independence largely formal.

2.1. The Politicisation of the Federal Reserve and the ‘Trump Paradigm’

A central theme in the mainstream economics literature of 2025 is the relationship between the US executive and the Federal Reserve. Following the 2024 election, studies such as Eichengreen *et al.* (2025), in their paper ‘The Fragility of Independence’, argue that overt political pressure to cut interest rates is no longer an anomaly, but a deliberate strategy aimed at transferring wealth from creditors to debtors. Within this line of argument, Donald Trump’s repeated calls for near-zero interest rates, notwithstanding inflation outcomes, are interpreted as an attempt to implement a form of ‘financial repression’.

Most contributions published in 2025 emphasise that such pressure has generated a credibility crisis. When markets perceive that the Chair of the Federal Reserve is operating under the shadow of threats of dismissal or legislative intervention, a higher **term premium** is priced into 10-year US Treasury securities, and yields rise accordingly.

2.2. Ray Dalio’s Lessons in How Countries Go Broke and a Reappraisal of the Big Debt Cycle Model

Ray Dalio’s most recent book, widely discussed at the World Economic Forum in Davos in January 2025, has provided one of the most frequently adopted analytical frameworks in the past year’s literature. In their analysis, Summers and Rogoff (2025) examine Dalio’s thesis on ‘monetary asymmetry’, arguing that the United States is following the classical trajectory of declining imperial powers, with public debt rising above 130 per cent of GDP alongside an increasing reliance on money creation to meet outstanding obligations.

A substantial body of work published during 2025 broadly accepts Dalio’s five-stage model, but also introduces an additional element: the

‘technological speed of bankruptcy’. Analysts at Goldman Sachs (2025) suggest that, in an era of digital finance, the transition from Phase 4 (loss of confidence and large-scale bond sell-offs) to Phase 5 (a painful restructuring) may occur within weeks rather than years, as occurred in Argentina and Greece.

2.3. The Dynamics of 10-Year Treasuries: the ‘Term Premium’ and Global Anxiety

A substantial body of scholarship published in *The Quarterly Journal of Economics* (2025) focused on the unusual behaviour of yields on 10-year US Treasury securities. During 2025, analysts observed a phenomenon known as ‘yield-curve steepening’¹⁶: while policymakers sought low short-term rates, global investors demanded higher long-term yields to compensate for heightened uncertainty, including the perceived risk of dollar depreciation.

Zheng and Miller (2025), in their study ‘The 10-Year Treasury as a Geopolitical Weapon’, argue that countries such as China and Saudi Arabia have increasingly used large-scale sales (sometimes described colloquially as ‘dumping’) of US debt as an instrument of geopolitical bargaining. This has produced a situation in which, notwithstanding Trump’s preference for low rates, market forces keep long-term yields elevated, creating an acute tension between political intent and the arithmetic constraints implied by the debt stock. More formally, the 10-year nominal yield can be decomposed as follows:

$$y_{10} = \mathbf{E}[\bar{r}] + \mathbf{E}[\bar{\pi}] + \mathbf{TP}_{10}$$

where $\mathbf{E}[\bar{r}]$ is the expected average real short rate over the horizon, $\mathbf{E}[\bar{\pi}]$ is expected average inflation, and \mathbf{TP}_{10} is the term premium (the compensation investors demand for bearing duration and interest-rate risk over long maturities).

This identity is central to the pricing of long-dated government debt. It explains why 10-year Treasury yields can rise even if the Federal Reserve

¹⁶ ‘Yield curve steepening’ occurs when the spread between long-term and short-term borrowing rates widens (that is, when the difference between long-term and short-term debt yields increases).

cuts short-term interest rates: long-term yields may remain elevated, or even increase, if inflation expectations rise and/or if the term premium widens in response to political and macroeconomic uncertainty. We therefore unpack these three components below, linking each to Dalio's framework and to the prevailing political context.

- **$E[\bar{r}]$ — expectations of the average real short rate.**

This component reflects the market's expectation of the average real short rate over the coming decade, which is closely influenced by the Federal Reserve's policy stance once adjusted for inflation expectations. If political pressure leads the Fed to keep nominal rates unusually low, real rates may also be compressed, at least temporarily. The paradox, however, is that investors look beyond what a president says today and assess how sustainable such a policy is. If markets judge that rates are being held down artificially for political reasons, they may anticipate that, at some point, the Fed will be forced to tighten more aggressively to contain inflation.

It should also be noted that when money is cheap, a significant share of stock-market transactions is credit-financed, which can affect securities-market dynamics.

- **TP_{10} (term premium) — maturity premium (or the 'uncertainty tax').**

This is the additional compensation investors demand for holding a security for ten years rather than rolling over their funds annually. It exists because, over a decade, wars, crises, or radical political shifts may occur. In 2025–26, this component increased markedly, reflecting both the sheer volume of debt issuance (an oversupply of bonds) and a thinner pool of marginal buyers, with China and Japan purchasing less. According to Dalio, when a state runs a very large deficit, the term premium rises because investors fear that the government will be unable to attract sufficient buyers for its debt at prevailing yields without offering more generous terms.

- **$E[\pi]$ — inflation expectations (market expectations of inflation).**

This is arguably the most critical component in the foregoing analysis. It captures the market's expectation of average inflation over the

coming decade. If Trump's policy mix includes high tariffs, the cost of imported goods rises, generating inflationary pressure. Investors do not wish to be repaid in ten years' time in US dollars that are worth 30 per cent less than they are today. Accordingly, if inflation is expected to average 4 per cent, the bond's yield must be at least 4–5 per cent if investors are not to incur a real loss.

Dalio argues that when governments resort to money creation to finance debt, this component can 'blow out', pushing the system into the final stage of crisis: a loss of confidence. In summary, if an administration exerts pressure that compresses $E[\bar{r}]$ (through political capture of the Federal Reserve), the overall yield (y_{10}) may fail to fall and may even rise. This occurs because markets respond by increasing the term premium (reflecting political uncertainty) and inflation expectations (reflecting protectionist policies and money creation). This is the point at which monetary policy loses effective control over the sovereign debt market.

This equation became central to the debate in 2025. The literature indicates that the term premium, the additional compensation demanded by investors for holding long-dated debt, rose to exceptionally elevated levels, reflecting heightened uncertainty about the future of the international financial order.

- **Tariffs and the Trade War: Inflation as a Debt-Management Instrument**

Another important strand in the 2025 literature concerns the relationship between tariffs and debt management. Studies by Stiglitz (2025) suggest that the high tariffs proposed by the US administration are not aimed solely at protecting domestic industry, but also function as a mechanism for generating a degree of controlled inflation. This matters for debt because inflation erodes the real value of outstanding liabilities. However, as Dalio emphasises, and as the 2025 literature reinforces, this is a dangerous strategy. If inflation moves out of control, the cost of servicing newly issued debt may rise so sharply that it outweighs any gains associated with tariff policy. This 'tariff paradox' is discussed extensively in *Foreign Affairs* (2025), which warns of a potential stagflationary cycle (economic stagnation coupled with inflation).

In conclusion, the 2025 literature suggests that the world is not merely facing a routine business cycle, but a broader ‘shift in the world order’. Authors writing in 2025 are close to unanimous in arguing that the era of ‘easy money’ and absolute central-bank independence has ended. The new challenge, as Dalio frames it, is how to manage deleveraging (debt reduction) without precipitating an economic depression or a global conflict. This paper therefore seeks to analyse, in an integrated manner, the interaction between US political pressures, as reflected in the 10-year Treasury market, and the structural vulnerabilities of a transition economy such as Albania, using Dalio’s principles as a bridging analytical framework.

3. CONCLUSIONS AND FINDINGS

When we survey the economic landscape of 2026, it becomes clear that we are not simply confronting a routine business cycle, but an epochal transformation. In Ray Dalio’s paradigm, economic systems behave like living organisms, moving through cycles of expansion, maturity, and ultimately fiscal decay. The figure of US\$35 trillion in US public debt is not merely a statistic; it represents a historical bill that is now coming due.

During 2025, we witnessed a phenomenon once considered implausible: annual debt-interest costs surpassed US\$1 trillion. This marks a decisive turning point. The US government is now spending more to service its debt than to defend the country and invest in its future. In this context, the 10-year US Treasury has become the instrument through which global anxiety is most clearly expressed. If markets judge that inflation is rising as a consequence of tariff policy, investors will be unwilling to lend to the United States at low rates. The result is an impasse: policymakers seek ‘cheap money’, while the arithmetic of the debt requires ‘expensive money’ to compensate for risk.

Building on this tension, we can summarise five of the most salient and contested scenarios that may shape economic life over the coming decade.

1. The Reflationary Trap and the Illusion of Wealth

The reflationary trap is a situation in which the government and the central bank attempt to revive the economy through monetary stimulus (money creation and lower interest rates), but end up fuelling

inflation that they can no longer contain. In the present context, this trap can be set out in three straightforward steps:

- **Initial stimulus:** the government cuts taxes and presses for very low interest rates, seeking to boost consumption and to make the debt appear easier to service.
- **Unintended consequence:** once large amounts of fiat money are injected into the economy, prices begin to rise. At this point, the economy appears to be growing, but the improvement is, in reality, largely driven by price-level inflation.
- **The trap:** if the central bank attempts to halt inflation by raising rates, the state risks fiscal distress because the debt stock has become too large. If it does not raise rates, inflation erodes households' purchasing power.

It is termed a trap because there is no easy exit. In Dalio's account, once a country enters this phase it is forced to choose between two adverse outcomes: economic depression (if stimulus is withdrawn) or potentially runaway inflation (if stimulus is sustained to stabilise the debt). In this first scenario, politics can prevail over technocratic discipline in the short run. Through political pressure on the Federal Reserve, rates may be pushed down artificially, creating a euphoric mood in equity markets. Yet this is precisely the reflationary trap. As Dalio warns, such a trajectory can generate 'sticky' inflation that steadily erodes purchasing power. The result may be economic growth on paper, while the median citizen feels poorer in real terms.

2. **The Twilight of Dollar Hegemony**

If an aggressively tariff-driven policy agenda persists, global trade will seek alternative channels. This scenario envisages a slow but sustained erosion of the dollar's predominance. It is not a matter of overnight collapse, but a process of gradual monetary 'decomposition'. Other states may increasingly settle trade in regional currencies or in gold, leaving the United States without the 'exorbitant privilege' of issuing a currency that the rest of the world is willing to hold. This is the point at which global monetary asymmetry begins to unwind, painfully, towards a more balanced configuration.

3. **The End of Independence: Fiscal Dominance**

Fiscal dominance describes a condition in which a country's monetary policy, conducted by the central bank, ceases to be meaningfully independent and is instead subordinated to the government's budgetary requirements. Historically, the Federal Reserve has operated under a dual mandate: price stability and maximum employment. Yet when public debt reaches existential levels, that mandate can shift implicitly towards a third objective: preventing the state from sliding into fiscal distress.

In the context of a 'Trump 2.0' administration, fiscal dominance is framed not as a theoretical risk but as a political strategy. When the executive exerts overt pressure on the Chair of the Federal Reserve to cut interest rates, even when inflation is above the 2 per cent target, the purpose is to reduce debt-servicing costs. If the government must pay around US\$1 trillion in interest alone, it faces two broad options: to cut expenditure (politically untenable) or to compel the central bank to keep rates artificially low.

In Dalio's account, once global investors infer that the Federal Reserve is no longer prioritising inflation control, but is effectively financing Washington's deficit, they begin to question the dollar's long-run value. This generates a macro-financial paradox: the government demands lower rates, yet the market, alarmed by the inflation risks associated with fiscal dominance, prices in higher risk premia, pushing up yields on 10-year Treasuries. The spillovers are damaging for other economies as well. If the world's benchmark case of monetary independence, the Federal Reserve, were to falter, other central banks, especially in developing economies, would find it far harder to defend their currencies against waves of instability.

Fiscal dominance thus transforms money from a stable medium of exchange into a political instrument, used to reduce the real burden of legacy debts through the erosion of households' savings via depreciation.

4. A World of Fortresses and Global Fragmentation

The fourth scenario represents a decisive break from the *laissez-faire* paradigm that shaped the post-1990s global economy. Where the prevailing assumption once held that the world was 'flat', and that goods, capital, and labour would move freely towards maximum efficiency, we are now witnessing the rise of 'economic fortresses'. This phenomenon, often

described as geo-economic fragmentation, is not merely a transient cycle but a reconfiguration of the global map of interests.

Within this context, the protectionist policies and aggressive tariffs associated with the Trump administration should not be interpreted solely as fiscal instruments for revenue collection or the protection of particular industries. Increasingly, they function as geopolitical walls. By imposing high tariffs, a major economic power such as the United States signals that political alignment and national security now outweigh the pursuit of lowest-cost production.

This shift strikes at the heart of global efficiency. For decades, supply chains were built on a logic of cost minimisation: production occurred where it was cheapest, while consumption took place where purchasing power was strongest. That logic is now being displaced by friend-shoring (trading primarily with politically aligned partners) and reshoring (bringing production back within national or bloc boundaries). The predictable consequence is higher production costs. When efficiency is sacrificed for security, inflation becomes structural rather than transitory.

For small and developing economies such as Albania, this scenario poses an existential challenge. In an open global market, a small country can identify its niche and compete through openness. In a fragmented world, however, such countries cannot survive as isolated 'islands'; they are compelled to choose a fortress. For Albania, the natural 'fortress' is European integration, first through deepened alignment with European structures and ultimately through membership of the European Union. In these conditions, accession becomes more than a political aspiration or bureaucratic process; it becomes a mechanism of economic survival. Within the European fortress, Albania can benefit from greater insulation against global market shocks and access to a stable market. Yet this comes at a cost: reduced flexibility to trade freely with other blocs that may be in conflict with its chosen alignment.

In this new era, the boundary between diplomacy and economics is dissolving. Ministries responsible for foreign affairs and economic policy must increasingly operate as a single, integrated apparatus. Foreign policy is no longer concerned only with peace treaties; it becomes a primary instrument for securing energy supplies, critical inputs, and export markets. Where it was once assumed, under the logic of liberal interdependence, that trade would

bring peace, trade is now being used as a weapon, a dynamic often described as weaponised interdependence. If Albania fails to position itself clearly and to strengthen its ties within its bloc (the EU and NATO), it risks being left in ‘no man’s land’, an economic space in which it is neither protected from the tariff regimes of major powers nor integrated into their value chains.

The ‘world of fortresses’ thus suggests that economic sovereignty in the twenty-first century is not achieved through isolation, but through intelligent integration. For a transition economy, global fragmentation requires a reassessment of national strategy. The relevant questions become: how resilient is domestic production if global supply chains fracture? What is the cost of remaining outside the walls of the European single market? In this scenario, passivity is the greatest risk. Survival demands rapid action to secure a place within the emerging architecture.

5. The Great Rebalancing: the ‘Erasure’ of Debt

The concept of the Great Rebalancing (the Great Deleveraging) represents the terminal phase of the cycle, when the accumulated debt stock becomes so large that the economy’s realised income can no longer service it. At this point, the arithmetic ceases to add up. When US debt exceeds US\$35 trillion and debt-servicing costs outpace GDP growth, the system enters a forced process of ‘decompression’. Dalio argues that this rebalancing can occur in two ways: through a ‘painful deleveraging’ (defaults, deflation, and depression) or through a ‘beautiful deleveraging’ (controlled inflation that reduces the real value of debt without destroying growth).

In the scenario envisaged for 2026–2030, this rebalancing is expected to be characterised by a combination of debt restructuring and wealth transfer. For the United States, this would mean that legacy obligations are repaid in dollars with substantially lower purchasing power than before, a form of quiet default. This process would generate major reallocation pressures in global portfolios. As investors recognise that long-dated securities no longer deliver real returns, they may rotate away from them in favour of tangible assets. It is at this point that global monetary asymmetry experiences its sharpest rupture: the dollar loses its status as an unquestioned anchor, and the world is compelled to accept a new financial architecture.

4. Recommendations and potential implications for the albanian economy

Albania's economy is likewise characterised by financial and monetary asymmetry vis-à-vis the euro, a phenomenon shaped primarily by the structure of the domestic market and by the substantial role of remittances in national income formation. Consequently, the rebalancing of global monetary asymmetries does not affect large economies alone; it also has direct implications for small, open economies such as Albania. For Albania, the so-called 'Great Rebalancing' implies a forced transition towards a more sustainable development model, one that can no longer rely on cheap money or easy access to external borrowing. In the context of a global paradigm shift, Albania faces the need to reconsider the management of its foreign-exchange reserves and to shift policy emphasis towards strengthening domestic productivity. This, in turn, makes it essential to identify the core structural challenges of the Albanian economy and to analyse the mechanisms through which they can be addressed.

From a macroeconomic perspective, Albania is experiencing a quiet erosion of competitiveness. Until roughly five years ago, growth depended heavily on *façon* manufacturing (CMT: cut, make, trim), a sector that has contracted sharply as a result of the lek's appreciation against the euro. Construction (which remains buoyant), seasonal tourism (inherently volatile), and remittances do not constitute a resilient development model under conditions of global stress. Although the economic situation has improved over the past three to four years and structural reforms have begun to yield results, sustained growth of 3–4 per cent cannot be maintained without a clear strategy for technological innovation, education reform, and the creation of advanced centres for research and development. In addition, the deepening of structural reforms, particularly in energy and agriculture, together with a more substantial social agenda, notably pension reform, and the continued fight against informality in all its forms, would further support Albania's aspirations for development and European integration.

- **Demography, labour supply, and social cohesion.** An urgent and renewed policy approach is required to address demographic developments that are reshaping the future of the labour market in Albania and the wider Balkans. The region is undergoing a drastic population decline driven by a dual dynamic of progressive ageing

and large-scale migration, particularly among young, skilled, and creative cohorts. The annual outflow of thousands of young people is not merely a migration statistic; it is a complex phenomenon driven by economic, political, and social factors and remains, in essence, the most extreme expression of a deficit of hope. This exodus recalls a widely cited warning from 1991: ‘A state that loses its youth is like a tree whose roots have been cut.’ In an open-market setting in which both capital and people move freely, securing an adequate labour supply, either through domestic mobilisation or through the governance of inward migration, requires strengthened regulatory reforms. These reforms should aim to create the conditions and incentives that foster a dynamic and competitive labour market. Alongside the demographic challenge, Albania is also facing a widening gap between social groups. In the logic of debt-cycle dynamics, deep wealth polarisation is often a precursor to structural instability. In this respect, wage growth in the public administration and the private sector over the past two years, together with anticipated pension reform, represents a step towards easing this tension. The central challenge, however, remains the efficient translation of economic growth into real welfare through productivity gains. Only if wage increases are underpinned by an organic rise in efficiency can Albania realistically narrow the social gap and secure long-term labour-market stability.

- **Geopolitics, EU integration, and security guarantees.** Internationally, Albania has historically operated from a strategically important yet structurally vulnerable position. Situated between a firm Western orientation and the frequently unpredictable dynamics of the Balkans, the country has faced geopolitical challenges that often exceed its direct national control. Today, Albania’s pathway towards European Union integration has assumed a more secure and more structured trajectory. However, integration should not be treated as the mechanical fulfilment of administrative obligations, but as the functional strengthening of institutional instruments that can underpin a durable equilibrium in regional and European markets. In parallel, strengthening the alliance framework within NATO has served as a core guarantee against entanglement in potential regional conflicts, thereby creating a security environment that is a precondition for foreign investment. Although this positioning entails higher fiscal

commitments, including increased defence spending during a period of global fiscal pressures, it should be understood as an investment in the state's long-term resilience. Within the logic of power-cycle dynamics, security provision through strong alliances is a stabilising factor that helps prevent economic collapse in periods of geopolitical stress, transforming Albania from a passive actor into a contributor to stability within the emerging architecture of South-East Europe.

In summary, for Albania and comparable economies the message is clear: in an environment of increasingly unstable sovereign-debt dynamics among major powers, monetary stability and reserve diversification constitute a primary line of defence against the spillovers of this global shock.

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From Bitcoin to Central Bank digital currencies - money, power, and sovereignty in the algorithmic age

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ABSTRACT

This article argues that central bank digital currencies (CBDCs) mark a profound transformation in the nature of money in the algorithmic age. Rather than approaching digital currencies as a purely technical innovation, the paper conceptualizes CBDCs as institutional and political instruments that reshape monetary sovereignty, policy transmission, and geopolitical influence. Drawing on critical engagement with the literature and a comparative analysis of the euro area, the United States, and China, the study advances the view that CBDCs represent not the continuation of the crypto-revolution but its institutional absorption by the state. While CBDCs promise efficiency gains and new tools for monetary governance, they also raise fundamental questions concerning financial stability, privacy, and democratic accountability. The article contends that the long-term significance of CBDCs will depend less on technological sophistication than on the capacity of public institutions to sustain trust, legitimacy, and effective oversight in an increasingly data-driven monetary environment.

Keywords: *central bank digital currencies; digital money; monetary sovereignty; political economy of finance; algorithmic governance; geopolitics of money*

1. INTRODUCTION

The history of money has always been inseparable from political authority, institutional trust, and social order. From precious metals in antiquity to the gold standard and, later, fiat currencies in the post-Bretton Woods era, monetary forms have consistently reflected prevailing configurations of power and governance. Money, in this sense, has never been merely a neutral instrument of exchange; it has functioned as a social contract, a legal

construction, and a central pillar of state sovereignty (Ferguson, 2008; Schumpeter, 1954).

In the early twenty-first century, this long historical trajectory is entering a new and uncertain phase. The rapid diffusion of digital infrastructures, cryptographic protocols, and automated payment systems is reshaping the foundations on which monetary systems operate. Increasingly, money exists less as a physical object and more as a continuous process encoded, verified, and circulated through complex technological architectures. At first glance, this transformation may appear largely technical. On closer inspection, however, it raises deeper questions about who governs money, how authority is exercised, and what forms of trust sustain monetary order in the digital age. The rise of cryptocurrencies after the global financial crisis of 2008 brought these questions forcefully into public debate. Bitcoin, in particular, emerged as a radical challenge to the institutional monopoly over money. Conceived in an atmosphere of profound distrust toward banks and governments, it proposed a monetary system grounded in cryptography rather than sovereign authority (Nakamoto, 2008). For a moment, it seemed to promise the depoliticization of money by removing it from the discretionary power of central institutions. Yet the subsequent evolution of crypto-assets revealed a more complex reality: extreme price volatility, limited scalability, and the absence of credible stabilization mechanisms exposed the structural difficulties of sustaining a purely decentralized monetary order.

Rather than replacing state money, cryptocurrencies ultimately underscored something more fundamental: the enduring importance of institutional backing for monetary stability. In moments of crisis, it is not algorithms but public authority that absorbs risk, stabilizes expectations, and guarantees continuity. This realization has paved the way for a new phase in the evolution of digital money one in which the state re-enters the digital arena not as an adversary of technological change but as its principal architect.

It is against this background that central bank digital currencies (CBDCs) have emerged. According to the Bank for International Settlements (BIS), more than 130 central banks are currently engaged in research, pilot projects, or implementation processes related to CBDCs (Bank for International Settlements [BIS], 2023). Yet to understand CBDCs merely as improved payment instruments or efficiency-enhancing tools would be to miss their deeper significance. What is at stake is not simply the digitalization of money, but a reconfiguration of monetary authority itself.

This article argues that CBDCs should be understood as institutional and political projects rather than neutral technological upgrades. By transforming money into a programmable and potentially traceable infrastructure, central banks are reshaping the relationship between the state, financial markets, and citizens. Choices about access, anonymity, intermediaries, and data governance are not technical details; they encode fundamental judgments about sovereignty, power, and accountability in the algorithmic age.

The central questions guiding this analysis are therefore both analytical and normative: How do CBDCs transform the nature of money and monetary sovereignty? What new forms of authority and responsibility emerge when monetary governance becomes embedded in digital systems? And how can societies balance the promise of innovation with the need to preserve trust, individual autonomy, and democratic oversight?

Methodologically, the paper adopts a conceptual and institutional perspective. It combines critical engagement with the literature on money, cryptocurrencies, and central banking with a comparative examination of three key monetary jurisdictions: the euro area, the United States, and China. Together, these cases illuminate the multiple paths digital money may take and the diverse political economies shaping its development.

2. Literature review

The scholarly discourse surrounding digital currencies and Central Bank Digital Currencies (CBDCs) has expanded rapidly, reflecting profound technological and geopolitical shifts. However, this literature remains fragmented into disciplinary "silos": technical analyses of payment systems often develop in isolation from monetary policy studies, while political-economy perspectives frequently remain detached from the operational realities of central banking. This article organizes the existing literature into three primary interrelated strands:

2.1 Money as an Institution of Trust and Political Authority

A long tradition in economic sociology treats money not as a neutral medium of exchange, but as a social institution anchored in political authority. Schumpeter (1954) and Ferguson (2008) emphasize that monetary systems reflect the configurations of state power. In the algorithmic age, this has evolved into the concept of infrastructural power. Braun and Koddenbrock (2023) argue that monetary authority is now exercised through the setting of

standards and payment architectures, transforming digitalization into a reconfiguration of the social contract that underpins the monetary order.

2.2 Cryptocurrencies and the Limits of Decentralization

Bitcoin emerged in 2008 as an ideological manifesto against the perceived failures of central banking, proposing "algorithmic trust" in place of institutional authority (Nakamoto, 2008). However, practical application has highlighted significant structural limitations. Rogoff (2016) demonstrates that without a sovereign anchor, cryptocurrencies cannot function as reliable units of account. Gorton (2017) reinforces the idea that money operates at scale only when perceived as a "safe asset," a status historically guaranteed by public institutions. Thus, the "crypto-revolution" has ultimately reconfirmed the importance of the state as the supreme stabilizer of expectations during moments of crisis.

2.3 CBDCs: Research Taxonomy and Sovereignty

Current research on CBDCs is split into two paths: a technocratic path focusing on operational efficiency and monetary policy transmission (BIS, 2023; ECB, 2022), and a macro-financial path analyzing the risks of bank disintermediation (Pisani-Ferry, 2022; Eichengreen, 2021).

This article builds upon a third strand: International Political Economy, where CBDCs are viewed as instruments of "weaponized interdependence" (Farrell & Newman, 2019) and "network power" (Tooze, 2022). Finally, the ethical perspective of Zuboff (2019) places the risk of the "panopticon" and mass surveillance at the heart of the debate over programmable money.

2.4 Money, Trust, and Institutional Authority

A long tradition in economic theory treats money not as a neutral medium of exchange but as a social institution anchored in political authority and collective trust. Schumpeter (1954) emphasized that monetary systems cannot be separated from the institutional and historical contexts in which they emerge, while Ferguson (2008) framed money as an expression of state capacity and power relations.

More recent political-economy contributions extend this view by conceptualizing money as infrastructural power. Braun and Koddenbrock (2023) argue that financial systems function as arenas where authority is

exercised through standards, legal arrangements, and payment infrastructures rather than through overt political intervention. This insight is especially relevant in a context of digitalization, where control over technological architectures increasingly shapes economic hierarchies and governance capacities.

2.5 Cryptocurrencies and the Limits of Decentralization: An Institutional Critique

Bitcoin emerged not merely as a cryptographic innovation, but as a political manifesto against the hegemony of financial institutions in the wake of the 2008 crisis. By proposing a system based on "algorithmic trust" rather than "institutional trust," Nakamoto (2008) sought to emancipate money from state discretion. However, practice has demonstrated that radical decentralization carries structural costs that impede its functionality as a true currency.

As Rogoff (2016) observes, without a sovereign anchor to guarantee price stability and serve as a lender of last resort, cryptocurrencies remain speculative assets characterized by extreme volatility. The problem is not merely technical, but ontological: for money to function at scale, it must be a "safe asset." Gorton (2017) argues that the safety of money does not stem from code, but from the institutional backing that absorbs risk during moments of panic. In this sense, cryptocurrencies have not replaced the state; on the contrary, their failure to provide stability has reconfirmed the enduring importance of sovereign authority as the sole guarantor of collective trust in periods of crisis.

2.6 CBDCs: Research Taxonomy and Dimensions of Sovereignty

The literature on Central Bank Digital Currencies has developed across two parallel planes that frequently fail to communicate with one another. The first plane, dominated by technocratic economics (BIS, 2023; ECB, 2022), focuses on operational efficiency. Here, CBDCs are treated as instruments to reduce transaction costs, enhance financial inclusion, and modernize the transmission channels of monetary policy.

The second plane analyzes the macro-financial and institutional implications, questioning the sustainability of the existing banking architecture. Pisani-Ferry (2022) and Eichengreen (2021) warn of the risk of "disintermediation," where the migration of deposits from commercial banks to the central bank

could undermine the private sector's capacity to provide credit to the economy.

Beyond these technical debates, this article situates itself within a broader current of International Political Economy. We argue that CBDCs are not merely software updates, but components of a geopolitical transformation of global governance. As Farrell and Newman (2019) emphasize, control over financial network nodes constitutes a form of "weaponized interdependence." CBDCs, as noted by Tooze (2022), represent the state's attempt to re-capitalize monetary sovereignty in an age where digital borders are becoming as critical as physical ones. Finally, the ethical perspective of Zuboff (2019) reminds us that this process is not neutral: it carries the risk of transforming money into an instrument of mass surveillance, placing privacy at the heart of the new monetary social contract.

3. Methodology and analytical framework

This study utilizes a qualitative, interdisciplinary methodology situated at the intersection of institutional economics and international political economy (IPE). Recognizing that money is as much a legal and political construct as it is an economic one, the research eschews purely quantitative forecasting in favor of a structural-institutional analysis. The objective is to map the "possibility space" of central bank digital currencies by examining how specific design choices reflect deeper political ideologies and sovereign ambitions.

3.1 Multilayered Qualitative Synthesis

The primary analytical engine of this paper is a critical literature synthesis, which moves beyond a traditional summary to perform a "thematic cross-pollination." By juxtaposing technical central banking reports (from the BIS and ECB) with critical social theory (e.g., Zuboff's surveillance capitalism and Braun's infrastructural power), the study identifies points of friction where technological efficiency clashes with democratic norms. This allows for an assessment of CBDCs not as isolated fintech products, but as nodes in a broader shift toward "algorithmic governance."

3.2 Comparative Institutionalism: Case Selection Logic

To ground the theoretical claims, the study employs a comparative case study design focused on three "systemic pivots": the Euro Area, the United States, and China. These cases were selected through a "most-different systems" logic:

The Euro Area represents a model of *regulatory sovereignty*, where the Digital Euro is framed as a shield for strategic autonomy within a fragmented multinational framework.

The United States serves as the *status quo power*, where institutional inertia and the dominance of private banking interests create a unique tension between innovation and the preservation of the dollar's global hegemony.

China (e-CNY) provides a "vanguard" case of *statist integration*, where the CBDC is used as a tool for both domestic financial inclusion and the externalization of domestic surveillance and payment standards.

3.3 The "Governance-As-Design" Framework

The core analytical framework rests on the premise that architecture is policy. The study interprets technical specifications such as ledger centralization, tiered anonymity, and API accessibility—as normative governance choices. To evaluate these choices, we apply a Trade-off Matrix that examines four primary structural tensions:

Efficiency vs. Resilience: The pursuit of real-time settlement versus the need for robust "offline" capabilities and systemic redundancy.

Innovation vs. Institutional Stability: The desire to "move fast" in the fintech space versus the central bank's primary mandate to prevent bank disintermediation and financial contagion.

Enforcement Capacity vs. Privacy: The state's interest in anti-money laundering (AML) and "traceable" money versus the citizen's right to financial anonymity and the preservation of the "cash-like" quality of privacy.

Technocratic Discretion vs. Democratic Accountability: The expansion of central bank toolkits versus the need for legislative oversight and the prevention of "mission creep" into social engineering. By deploying this framework, the study seeks to reveal how the "black box" of CBDC technology contains a complex set of political blueprints that will redefine the social contract of the digital age.

Structural Trade-offs in CBDC Architectural Design

Dimension	Technical Choice	Primary Trade-off	Governance	Institutional Risk
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Operational Logic	Centralized Ledger vs. Distributed Ledger (DLT)	Efficiency vs. Resilience: Centralized systems offer high throughput but create single points of failure; DLT offers redundancy at the cost of speed.	Systemic cyber-vulnerability or "bottleneck" settlement delays.
User Privacy	Anonymity Vouchers vs. Full Traceability	Individual Autonomy vs. Enforcement: Tiered anonymity protects low-value users but complicates Anti-Money Laundering (AML) and Counter-Terrorism Financing (CTF).	Erosion of the "cash-like" social contract or expansion of the "surveillance state."
Financial Structure	Interest-bearing vs. Non-interest-bearing	Policy Transmission vs. Stability: Interest-bearing CBDCs allow for direct monetary policy (e.g., negative rates) but risk "digital bank runs" and disintermediation.	Destabilization of the commercial banking sector's funding base.
Functionality	Programmable Code vs. General Purpose	Innovation vs. Social Neutrality: Smart contracts enable "contingent payments" (e.g., green subsidies) but allow for state-led social engineering.	Loss of monetary neutrality and potential "mission creep" of central bank mandates.
Access Layer	Direct Access vs. Two-Tiered (Intermediated)	Inclusion vs. Institutional Stability: Direct accounts bypass banks to reach the unbanked but increase the central bank's operational and legal liability.	Overburdening the Central Bank with retail-level customer service and KYC responsibilities.

3.4 From Bitcoin to CBDCs: Reconfiguring Monetary Sovereignty

Bitcoin's emergence in 2008 marked a rupture in modern monetary history. It articulated a radical critique of institutional authority, proposing cryptographic trust in place of sovereign governance (Nakamoto, 2008). Yet the subsequent evolution of cryptocurrencies revealed deep tensions between ideological aspiration and economic functionality.

As Rogoff (2016) and Gorton (2017) show, monetary systems cannot rely on technology alone. Stability requires institutions capable of absorbing risk. CBDCs thus appear as a decisive institutional response: not a rejection of digital innovation, but its domestication within sovereign frameworks.

CBDCs therefore represent the institutionalization of the crypto-challenge. What began as a revolt against authority is reabsorbed into new forms of technologically mediated governance? Power becomes embedded not only in law and policy, but in code, standards, and infrastructures.

4. FINDINGS

4.1 The Paradox of Programmability: Between Automation and Discretion

One of the most profound dimensions in the discourse on CBDCs is the ontic transformation of money from a "passive object" into an "active agent." In the prevailing monetary paradigm, fiat currency functions as a bearer instrument that carries no inherent instructions regarding its utilization. However, the transition toward algorithmically-based ledgers facilitates the emergence of contingent money (Rogoff, 2021).

This capability enables central banks to embed monetary policy objectives directly into the currency's foundational code. For instance, the technical capacity to apply negative interest rates directly to retail digital wallets an operation currently obstructed by the physical nature of cash would effectively eliminate the zero lower bound (ZLB) that has constrained conventional monetary policy for decades. Nevertheless, this shift engenders a critical tension regarding sovereignty: if currency possesses an "expiry date" or is restricted to specific consumption categories, as evidenced in various e-CNY pilot programs in China (BIS, 2023), the conceptual boundaries of private property are blurred. Consequently, money risks being reconfigured into an instrument of social engineering, signaling a definitive departure from the principle of monetary neutrality.

4.2 The Digital Euro Strategy: Autonomy and the Technological Stack

For the European Union, the impetus behind the Digital Euro transcends mere modernization; it represents a strategic imperative for geopolitical self-defense. Presently, the European payment ecosystem is characterized by a path-dependency on non-European incumbents such as Visa, Mastercard, and the digital wallets of Apple and Google (ECB, 2023). This reliance generates a systemic vulnerability; whereby European payment infrastructures could be weaponized by foreign powers during geopolitical crises.

The European Central Bank (ECB) is attempting to navigate between the American model, dominated by private-sector conglomerates, and the Chinese statist model. A critical technical hurdle is "offline resilience." If the Digital Euro is to function as a functional equivalent to physical tender, it must maintain operability in the absence of internet connectivity. This requires a sophisticated hardware-based infrastructure such as secure elements in mobile devices—that remains largely in the experimental phase. This underscores that 21st-century monetary sovereignty is no longer contingent solely on the authority of issuance, but on the control of the "technological stack" through which the currency circulates.

4.3 The Digital Euro and the Digital Dollar: Strategy and Sovereignty

The digital euro and the potential digital dollar do not create new currencies; they transform existing sovereign money. In Europe, the digital euro is framed as a tool of strategic autonomy amid dependence on non-European payment platforms (ECB, 2022, 2023). In the United States, debates around a digital dollar reflect the unique position of the dollar as global reserve currency and the risks of institutional disruption (Carney, 2019).

Despite differences, both initiatives share a political-economy logic: reasserting public authority over monetary infrastructures in response to technological disruption. CBDCs thus function as instruments of sovereign adaptation rather than neutral payment innovations.

4.4 Currency Wars" and Digital Balkanization

Academic and policy debates regarding the geopolitics of CBDCs often focus narrowly on the potential displacement of the US Dollar. However, the reality is characterized by institutional circumvention (Tooze, 2022). CBDCs facilitate the creation of decentralized, "peer-to-peer" cross-border payment corridors between central banks exemplified by the mBridge project

involving China, Thailand, the UAE, and Hong Kong which bypass the traditional correspondent banking system and the SWIFT messaging network. This shift has profound implications for the extraterritorial efficacy of economic sanctions. If a state can settle international trade obligations in sovereign digital assets without utilizing clearing systems within US jurisdiction, the coercive power of the American financial architecture is significantly diluted (Farrell & Newman, 2019). This trajectory suggests a transition toward a state of "digital Balkanization," where competing economic blocs utilize divergent technical standards to fortify their respective spheres of influence.

4.5 CBDCs as a New Monetary Policy Instrument: Precision and Risk

CBDCs represent a paradigm shift in the transmission mechanism of monetary policy, moving from the "indirect" influence of commercial bank reserves to a "direct" relationship with the end-user. By providing the public with direct access to the central bank's balance sheet, authorities could bypass the often-sluggish interest rate pass-through of commercial lenders. This enables granular monetary intervention; for instance, the implementation of interest-bearing digital money allows the central bank to calibrate the "user cost" of money with surgical precision (Rogoff, 2021).

However, this technical efficiency introduces profound disintermediation risks. If a CBDC offers a risk-free, interest-bearing alternative to traditional savings accounts, the deposit base of commercial banks the lifeblood of private credit creation could evaporate. This leads to a fundamental "narrow banking" dilemma where the central bank inadvertently starves the private economy of credit. Furthermore, in periods of systemic fragility, the frictionless nature of digital transfers could catalyze "digital bank runs." Unlike the physical queues of the 1930s, a digital run occurs at the speed of light, as depositors shift assets into the absolute safety of the central bank with a single click (Pisani-Ferry, 2022). The challenge for institutional designers is to implement "circuit breakers" such as tiered remuneration or holding limits to maximize policy effectiveness without triggering a structural collapse of the private banking tier.

4.6 The Geopolitics of Digital Money: From Hegemony to Fragmentation

In the international arena, CBDCs are not merely payment rails; they are instruments of asymmetric power projection. For decades, global financial

governance has been anchored in the dollar-centric SWIFT system, providing the United States with what has been termed "exorbitant privilege" and the capacity to enforce extraterritorial sanctions. The emergence of CBDCs, particularly China's e-CNY and the broader BRICS-led initiatives, signals an attempt to construct an "alternative plumbing" for global trade (BIS, 2023). This shift marks the transition from a unipolar monetary world toward a state of monetary plurilateralism. Control over the "technological stack" of money its cryptographic standards, its clearing protocols, and its interoperability nodes becomes a new frontier of sovereignty. As Carney (2019) and Tooze (2022) suggest, the threat to the dollar's hegemony is not necessarily a single rival currency, but a systemic fragmentation. In this emerging order, geopolitical leverage is derived from "network power": the ability to dictate the standards of interoperability that link these parallel digital infrastructures. Consequently, a nation's standing in the algorithmic age will depend as much on its software architecture and data-governance credibility as on its gold reserves or GDP.

4.7 Ethical and Institutional Dilemmas: The Crisis of Monetary Privacy

The transition to CBDCs introduces a qualitative shift in the visibility of economic life. While traditional physical tender provides a "natural" sphere of privacy through its ledger-less nature, CBDCs necessitate a deliberate architectural decision regarding surveillance. Digital money significantly enhances state capacity for enforcement particularly in combating tax evasion and illicit flows yet it simultaneously risks the creation of a "panopticon" of transactions (Malmgren, 2020).

The most acute dilemma lies in the programmability of social behaviour. If money is no longer a neutral medium of exchange but a coded instrument, it can be programmed to restrict purchases, incentivize specific health behaviours, or enforce political compliance. This "mission creep" threatens to transform the central bank from a technocratic guardian of price stability into an unwitting agent of social regulation. As Zuboff (2019) suggests in the context of behavioural modification, the real danger is not just the collection of data, but the "actuation" of that data to nudge or coerce the populace. Without robust, legally enshrined safeguards such as zero-knowledge proofs for transaction privacy and strict judicial oversight CBDCs may inadvertently erode the very institutional trust they seek to modernize (Rogoff, 2016).

5. Discussion: sovereignty in the age of infrastructure

The overarching dynamic revealed in this study is the reconfiguration of monetary sovereignty under the guise of algorithmic governance. We are witnessing a transition where authority is no longer exercised primarily through overt legislative decree, but through the "silent" imposition of technical standards and digital infrastructures. This is what we define as infrastructural power: a form of governance that is subtle, continuous, and embedded in the microscopic details of everyday transactions.

In this environment, sovereignty is not disappearing; rather, it is being "encoded." The capacity of a state to project power now depends on its ability to control the technological stack the chips, the servers, and the cryptographic protocols that facilitate the flow of value. However, this power is inherently contingent. The impact of CBDCs will not be determined by the elegance of their code, but by the institutional legitimacy of the bodies that oversee them. If the digitalization of money is perceived as a technocratic overreach that bypasses democratic accountability, it may trigger a populist retreat back into decentralized crypto-assets or physical commodities, thereby fragmenting the very monetary order the state seeks to consolidate.

6. Conclusions, limitations, and future research

This study concludes that CBDCs represent a pivotal shift toward "intelligent money" a medium that is programmable, data-intensive, and deeply political. Digitalization does not "solve" the problem of trust; it merely relocates it from the physical realm to the algorithmic one. The central argument remains that CBDCs are not a continuation of the libertarian crypto-revolution, but its institutional domestication. The state has recognized the efficiency of the ledger and is now moving to reassert its monopoly over the means of payment. Ultimately, the success of these initiatives will be measured by their ability to balance the tripartite tension between technological innovation, financial stability, and the preservation of individual liberty.

As a conceptual and institutional inquiry, this paper is subject to several limitations. First, it prioritizes a high-level theoretical analysis over granular empirical data, as many CBDC pilots remain in their infancy or operate behind "black boxes" of state secrecy. Second, the focus on systemic "pivots" (USA, EU, China) may overlook the unique challenges faced by emerging economies, where CBDCs are often driven by a desperate need for financial inclusion or as a hedge against extreme currency volatility rather than geopolitical strategy. Finally, while we touch upon legal dilemmas, a

comprehensive jurisprudential analysis of digital legal tender is beyond the current scope.

The research agenda for the algorithmic age must be inherently interdisciplinary, bridging the gaps between monetary economics, political sociology, and legal philosophy. Future scholarly inquiries should prioritize the following domains:

Empirical Validation and Behavioural Actuation: There is an urgent need for longitudinal studies examining consumer behavior within mature CBDC ecosystems, such as China's e-CNY. Research should evaluate the real-world impact of "traceable" money on the dynamics of civil society. Beyond technical throughput, scholars must investigate the potential for "algorithmic chilling effects": the extent to which citizens alter their spending patterns or social associations when financial transactions become transparent to the state in real-time. This requires a synthesis of data science and behavioral economics to measure how surveillance-by-design influences the velocity of money and individual agency.

Global South Perspectives and Institutional Trust: The comparative framework must be expanded to include "frontier" jurisdictions such as the Sand Dollar in the Bahamas or Nigeria's eNaira. In these contexts, the impetus for CBDC adoption often stems not from geopolitical competition, but from the imperatives of financial inclusion and a defensive hedge against informal dollarization. Future research should analyze the functionality of CBDCs in environments characterized by historically low institutional trust. Does the objectivity of the cryptographic ledger compensate for perceived governmental instability, or does the low adoption rate—as observed in early Nigerian pilots—confirm that digital code cannot substitute for a deficient social contract?

Legal Philosophy and the Doctrine of "Digital Cash": A new legal theory of "Digital Cash" is required to define the ontological status of programmable sovereign money. This research must delineate the rights of the individual against the "programmable whims" of the state. If money ceases to be a neutral medium of exchange and becomes a set of conditional instructions, it risks being reclassified as a revocable administrative privilege rather than a private property right. Scholars in legal theory should explore the constitutional safeguards necessary to prevent the weaponization of CBDCs against political dissent, ensuring that "due process" is embedded within the currency's automated clearing protocols.

Interoperability and the Macroeconomics of Fragmentation: As the global monetary system shifts toward a "multi-CBDC" (mCBDC) architecture, research must address the risks of digital Balkanization. If the technical standards of major currency blocs (e.g., the Eurozone vs. the BRICS+mBridge initiative) remain incompatible, what are the implications for global trade frictions? Future work should model whether CBDCs will facilitate a more efficient cross-border settlement system or if they will catalyse a new form of digital protectionism, where "currency islands" are used to enforce regional spheres of economic influence.

CBDCs mark a watershed moment in the long history of money. Their introduction is a signal that the "analog" era of sovereign authority is concluding. However, the future of digital money is not a settled conclusion written in code; it is an ongoing negotiation between the state, the market, and the citizen. The true test of the algorithmic age will be whether public institutions can harness the efficiency of the digital realm without sacrificing the democratic values and individual autonomy that form the bedrock of a free society.

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Tax revenue dynamics and economic growth in Albania and the western Balkans (2010–2023): A comparative descriptive assessment

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ABSTRACT

Ensuring sustainable economic growth while maintaining fiscal stability remains a significant challenge for Western Balkan economies as they progress toward closer integration with the European Union. This paper examines the relationship between tax revenue performance and economic growth in Albania, North Macedonia, Serbia, and Bosnia and Herzegovina from 2010 to 2023. The analysis relies on officially published data from the World Bank's World Development Indicators and employs a descriptive and comparative research approach. Two key indicators are analyzed: real GDP growth, measured as the annual percentage change at constant prices, and total tax revenue expressed as a share of GDP. Kosovo and Montenegro are excluded from the analysis due to limitations in the availability and comparability of consistent tax revenue time series. The results reveal a broadly similar cyclical pattern across the four economies. This pattern reflects a phase of sustained growth before the pandemic, a sharp contraction following the COVID-19 shock, a strong rebound in 2021, and a gradual return toward more stable growth dynamics in the subsequent period. Within this shared trajectory, Albania records relatively stronger average growth performance, while Serbia exhibits more pronounced cyclical volatility. From a fiscal perspective, tax revenue ratios appear more stable than output growth, although notable cross-country differences remain. Albania and North Macedonia consistently display lower tax-to-GDP ratios, Bosnia and Herzegovina occupies an intermediate position, and Serbia shows a clear upward trend in revenue mobilization over time.

Taken together, these findings indicate that economies with broader tax capacity and more effective revenue administration, most notably Serbia, followed by Bosnia and Herzegovina, are better positioned to pursue fiscal stabilization and consolidation without undermining economic growth. By contrast, persistently low tax revenues in Albania and North Macedonia point to structural constraints, including high levels of informality and a strong reliance on indirect taxation. The analysis highlights the need to strengthen tax capacity, broaden the tax base, and improve revenue structures as essential conditions for achieving sustainable growth and advancing fiscal convergence with European standards.

Keywords: Tax revenue; Economic growth; Fiscal policy; Western Balkans; Albania.

1. Introduction

Long-term economic growth and fiscal sustainability constitute two fundamental policy objectives for developing economies, particularly for Western Balkan countries undergoing economic transition and aspiring to European integration. Tax revenues represent the primary source of financing for public expenditures and government investment; consequently, both the level and composition of tax revenues play a potentially significant role in shaping economic growth trajectories (Choudhary et al., 2024). Limited tax capacity constrains governments' ability to deliver essential public services, invest in infrastructure, and mitigate economic shocks, thereby weakening prospects for sustained growth (Choudhary, Ruch, & Skrok, 2024).

At the same time, excessive tax burdens or poorly designed tax structures may discourage private investment, entrepreneurship, and labor participation, ultimately acting as a drag on economic expansion (OECD, 2008). These opposing effects underscore the long-standing debate on the relationship between taxation and growth.

From a theoretical perspective, Keynesian approaches emphasize the short-run demand-side effects of taxation, arguing that increases in taxes reduce disposable income and corporate profits, thereby suppressing consumption and investment through the fiscal multiplier mechanism (Xhepa, 2000). In contrast, neoclassical frameworks focus on supply-side incentives, highlighting that high taxes on labor and capital can weaken incentives to work, save, and innovate, slowing potential output growth over the long term.

Empirical evidence remains mixed. Several international studies identify a negative association between overall tax burdens and growth, particularly in the case of direct taxes on income and profits (OECD, 2008). Conversely, research focusing on developing and emerging economies suggests that when initial tax capacity is low, increasing tax revenues—especially through base broadening and administrative improvements—can support growth by enabling productive public investment in infrastructure, education, and health (Ho, Tran, & Nguyen, 2023). World Bank analyses further indicate the existence of a critical threshold of approximately 15 percent of GDP, below which increases in tax revenue are typically associated with stronger growth and enhanced macro-fiscal stability (Choudhary, Ruch, & Skrok, 2024). Within the Western Balkans, these issues are particularly salient. Despite multiple rounds of fiscal reform, tax revenues as a share of GDP remain below European Union averages. While some countries have pursued low-rate flat tax systems (e.g., North Macedonia), others have emphasized fiscal consolidation to restore macroeconomic credibility (e.g., Albania after 2014 and Serbia after 2015) (OECD, 2024; Kamberi & Bexheti, 2025). Nonetheless, persistent gaps in tax capacity and revenue mobilization continue to pose challenges for long-term convergence with EU income levels.

Against this backdrop, the present study provides a comparative descriptive assessment of tax revenue dynamics and economic growth in Albania, North Macedonia, Serbia, and Bosnia and Herzegovina from 2010 to 2023. Using official data from the World Bank’s World Development Indicators (WDI), the article examines trends in real GDP growth and tax revenues as a percentage of GDP, contributing a regionally focused perspective to the broader literature on taxation and growth.

Why is this study important?

This study holds particular relevance for Western Balkan economies, which face the dual challenge of fostering long-term economic growth while maintaining fiscal discipline aligned with European Union standards. Understanding how tax revenue performance interacts with economic growth is crucial for designing fiscal reforms that strengthen public finances without undermining investment incentives or labor market participation. In this context, expanding the tax base and improving the effectiveness of revenue administration are essential for securing stable public resources and enhancing resilience to macroeconomic shocks. By providing a comparative

and descriptive assessment of these dynamics, the study offers empirical insights that can inform evidence-based fiscal policymaking and support a development path centered on sustainability and inclusive growth across the region.

2. Literature review

The relationship between tax revenues and economic growth is commonly examined through two complementary dimensions: (a) the overall level of taxation in the economy and (b) the structure of the tax system, referring to the relative importance of different types of taxes. Keynesian economic theory emphasizes that higher taxation may exert a contractionary effect on aggregate demand in the short run by reducing disposable income and business profits, thereby restraining consumption and investment (Xhepa, 2000). Within relatively fragile economies such as Albania, North Macedonia, Serbia, and Bosnia and Herzegovina, restrictive fiscal measures may therefore intensify economic slowdowns if implemented during periods of weak growth.

Neoclassical models, by contrast, focus on supply-side mechanisms, arguing that high taxes on income, profits, and savings may reduce capital accumulation and weaken incentives for labor supply and innovation (Balliu, 2015). From this perspective, lowering distortionary taxes and improving fiscal credibility through consolidation can enhance business expectations and support long-term growth.

A substantial body of empirical literature highlights the importance of tax composition rather than the tax burden alone. Evidence from OECD countries suggests that taxes on corporate profits and personal income are among the most harmful for long-term growth, whereas consumption taxes and recurrent property taxes are relatively less distortionary (OECD, 2008). Accordingly, OECD (2008) argues that revenue-neutral tax reforms shifting the burden from direct to indirect taxes or property taxation may foster stronger growth outcomes.

World Bank research complements these findings by emphasizing the developmental role of tax capacity. In low- and lower-middle-income economies, increasing tax revenues beyond a minimum threshold—estimated at around 15 percent of GDP—has been associated with improved macro-fiscal stability and higher growth, as additional revenues allow governments to finance essential public services and productive investments (World Bank, 2024). In this sense, expanding tax capacity does not necessarily undermine

growth when revenues are mobilized efficiently and allocated toward development-enhancing expenditures.

In the Western Balkan context, these dynamics take on specific characteristics. Tax-to-GDP ratios remain relatively low, particularly in Albania, where the ratio has fluctuated between approximately 15 and 18 percent over an extended period, close to the minimum level considered necessary for fiscal sustainability (World Bank, 2024). Moreover, tax systems in the region rely heavily on indirect taxation, with value-added tax and excise duties accounting for more than half of total tax revenues in many cases (IMF, 2023). While such a structure may be less growth-distorting in theory (OECD, 2008), it raises concerns regarding revenue volatility and distributional effects.

Another important factor shaping tax performance in the region is economic informality. Informality remains relatively high in Albania and Bosnia and Herzegovina and continues to constrain the effective tax base (World Bank, 2022; World Bank, 2024). Although Serbia and North Macedonia have undertaken more systematic reforms to strengthen tax administration and promote formalization, informality persists as a structural challenge across the region.

Overall, the literature suggests that higher tax revenues can support economic growth in Western Balkan economies when they result from base broadening, improved compliance, and administrative reforms rather than from increases in statutory tax rates. Growth-friendly tax strategies in the region therefore emphasize formalization, rationalization of tax exemptions, strengthening of revenue administration, and gradual diversification of tax sources, while preserving an investment-conducive environment. The following sections empirically examine whether recent trends in tax revenues and economic growth across the four countries are consistent with these theoretical and empirical insights.

3. Methodology

This study employs a descriptive and comparative research design based on secondary data from the World Bank's World Development Indicators (WDI). The analysis focuses on two key indicators: (i) real GDP growth, measured as the annual percentage change in GDP at constant prices, and (ii) total tax revenues as a percentage of GDP, reflecting taxes collected by the central government. The period of analysis covers 2010–2023, as data for

2024 remain largely provisional and not fully comparable. The empirical sample includes four Western Balkan economies: Albania, North Macedonia, Serbia, and Bosnia and Herzegovina. Kosovo and Montenegro are excluded due to the absence of complete and consistent time-series data for tax revenues (% of GDP) in the WDI database over the full period, which could compromise cross-country comparability.

For each country, annual time series were constructed and examined using descriptive statistics, including period averages, year-to-year changes, and visual trend analysis. Line charts are used to illustrate the evolution of economic growth and tax revenues and to facilitate comparative assessment across countries. The study does not apply econometric methods or causal tests, as its primary objective is exploratory. Instead, it aims to identify broad patterns and co-movements between tax revenue dynamics and economic growth. While this approach does not allow for causal inference, it provides a clear descriptive framework for interpreting fiscal and growth developments in the region.

The use of WDI data ensures a reasonable degree of international comparability, given the harmonized statistical standards applied. However, the tax revenue indicator mainly reflects central government taxation and may underestimate the overall fiscal burden in countries where social security contributions are significant, such as Serbia and Bosnia and Herzegovina. To contextualize the empirical findings, the analysis is complemented by secondary sources from international institutions, including the IMF, World Bank, OECD, and the European Commission.

4. Data and analysis

In this section we are going to analyze the trends in economic growth and tax revenues in Albania, Bosnia and Herzegovina, North Macedonia, and Serbia over the 2010–2023 period, using data from the World Bank’s World Development Indicators. The analysis begins with a cross-country comparison of average real GDP growth rates and tax-to-GDP ratios, followed by a country-specific review of annual developments. By highlighting differences in growth patterns and revenue mobilization capacity, the approach allows for a joint assessment of macroeconomic performance and fiscal developments, while placing Albania’s experience within a regional perspective.

Table 1. Tax Revenue and Economic Growth in the Western Balkans (2010–2023)

Country	Tax revenue (% of GDP, average)	Real GDP growth (average, %)
Albania	18.0%	2.8%
North Macedonia	16.9%	2.2%
Bosnia and Herzegovina	19.6%	2.3%
Serbia	21.4%	2.1%

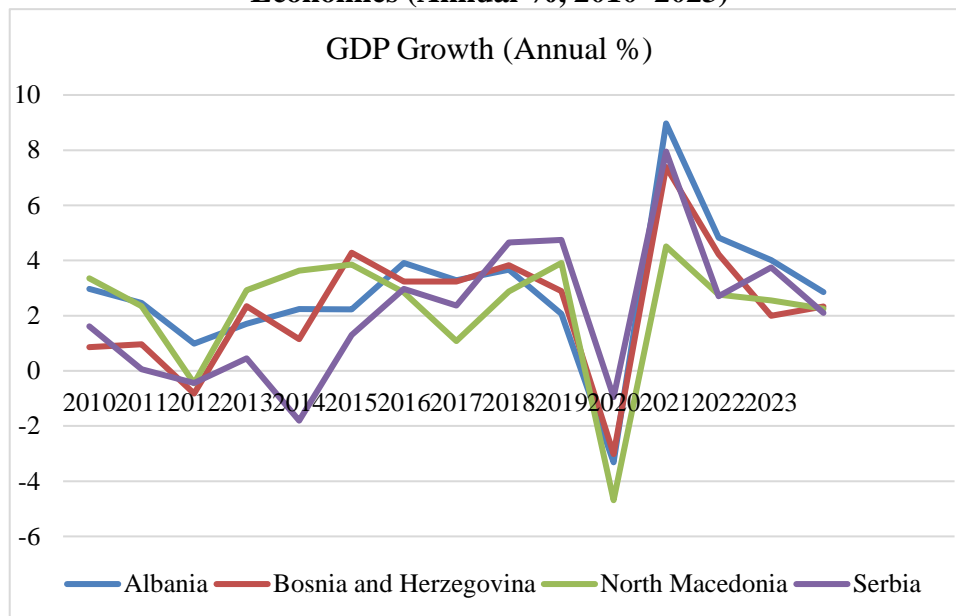
Source: Author's own calculations using data from the World Bank's World Development Indicators (WDI), 2010–2023.¹⁷

Table 1 provides a concise overview of tax revenue and economic growth trends in the Western Balkan economies over the 2010–2023 period. The data highlight clear cross-country differences in revenue mobilization, with Serbia and Bosnia and Herzegovina exhibiting higher and more stable tax-to-GDP ratios than Albania and North Macedonia. Despite these fiscal disparities, all four countries record positive average growth rates, although the scale and timing of growth vary. The table thus provides an initial comparative benchmark, which is explored further through the graphical analysis that follows.

The evolution of real GDP growth in Albania, Bosnia and Herzegovina, North Macedonia, and Serbia over the period 2010–2023 reveals a broadly shared cyclical pattern, albeit with notable differences in intensity and resilience across countries. In the early years of the decade (2010–2013), growth rates remained modest in all four economies, reflecting the lingering effects of the global financial crisis and structural constraints. Economic performance during this phase was particularly uneven in Serbia and Bosnia and Herzegovina, where episodes of slowdown were more pronounced.

¹⁷ Note: Values are reported as indicative averages and ranges, in line with the descriptive approach of the study.

Figure 1. Trends in Real GDP Growth across Western Balkan Economies (Annual %, 2010–2023)



Source: Author's own calculations using data from the World Bank's World Development Indicators (WDI), 2010–2023

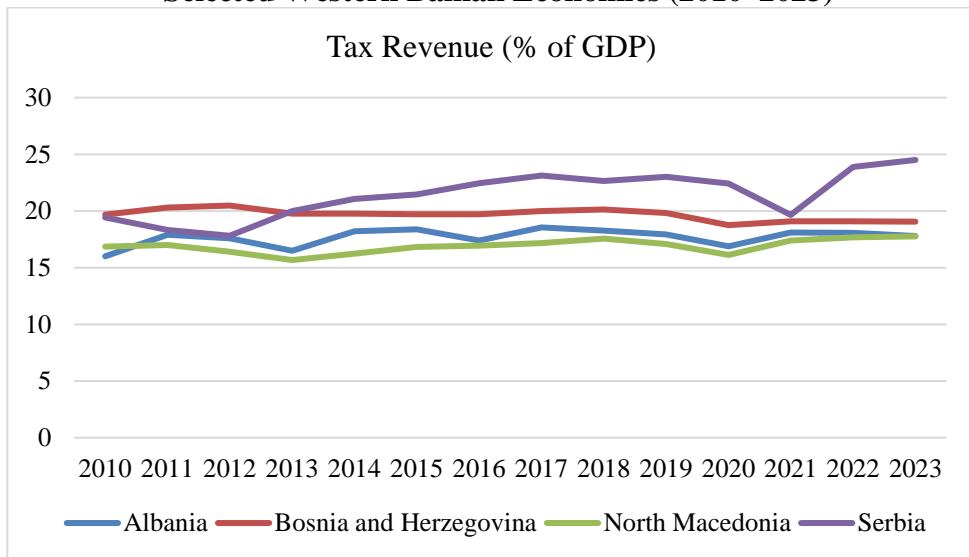
Between 2014 and 2019, economic growth became more stable and consolidated across the region. Albania exhibited a gradual strengthening of growth dynamics, positioning itself among the more dynamic economies in the sample before the pandemic. Serbia also experienced an improvement relative to earlier years, while Bosnia and Herzegovina and North Macedonia maintained positive but comparatively moderate growth rates. This period suggests a phase of partial convergence in growth performance, supported by improved macroeconomic conditions and fiscal adjustments.

The year 2020 marks a clear structural break, as the COVID-19 pandemic triggered a recession in all four countries. Output contraction was particularly severe in North Macedonia and Bosnia and Herzegovina, underscoring their higher vulnerability to external shocks. Albania and Serbia also recorded significant declines in economic activity, confirming the systemic nature of the crisis. A strong rebound followed in 2021, driven by the easing of containment measures and expansionary fiscal responses. Albania and Serbia registered the most pronounced recoveries, while Bosnia and Herzegovina and North Macedonia also returned to positive growth. In the subsequent

period (2022–2023), growth rates moderated across the region, indicating a normalization phase amid tightening global financial conditions and rising inflationary pressures. Overall, while the four economies display a common cyclical trajectory, Albania shows relatively stronger average growth performance, whereas Serbia exhibits greater cyclical volatility.

Compared to economic growth, tax revenues as a share of GDP display considerably greater stability over time, yet clear cross-country differences emerge. Albania consistently records tax revenues in the range of approximately 16–18 percent of GDP throughout 2010–2023. Although minor fluctuations are observed—most notably a temporary decline in 2020 followed by gradual recovery—there is no clear upward trend, suggesting persistent constraints in tax capacity despite ongoing reforms (World Bank, 2024; IMF, 2023).

Figure 2. Trends in Tax Revenue as a Share of GDP in Albania and Selected Western Balkan Economies (2010–2023)



Source: Author's calculations based on World Bank, World Development Indicators (WDI), tax revenue (% of GDP), 2010–2023.

Bosnia and Herzegovina maintains a higher and more stable tax-to-GDP ratio, averaging around 19–20 percent. This relative stability reflects a more consolidated revenue structure, heavily reliant on indirect taxation and social contributions, which provides resilience but limits flexibility. North Macedonia follows a trajectory broadly similar to Albania, with tax revenues

remaining within the 16–18 percent range. The close alignment between these two countries points to shared structural challenges, including narrow tax bases and persistent informality. Serbia stands out within the sample. From 2013 onward, its tax-to-GDP ratio exhibits a clear upward trend, reaching levels above 22 percent in several years. Although revenues declined temporarily during the pandemic, they recovered rapidly thereafter, indicating improvements in tax administration and revenue mobilization capacity.

In summary, Albania and North Macedonia form a group characterized by relatively low and stable tax ratios, Bosnia and Herzegovina occupies an intermediate position with higher stability, while Serbia demonstrates the most dynamic revenue performance. These differences provide important context for interpreting the interaction between tax capacity and economic growth across the Western Balkans.

The Case of Albania: Why Does the Tax Revenue-to-GDP Ratio Remain Low?

Relative to several other Western Balkan economies, Albania consistently records a comparatively modest ratio of tax revenues to GDP. Throughout the period examined, this indicator has generally remained within a band of roughly 16–18 percent of GDP, pointing to a structurally limited level of fiscal mobilization. This outcome reflects the interaction of multiple economic, institutional, and historical determinants.

A central factor is the widespread presence of informal economic activity, particularly among micro and small enterprises as well as segments of the labor market, which substantially reduces the effective tax base. In addition, Albania's fiscal framework has historically emphasized relatively low statutory tax rates, including phases of flat taxation. While such policies have supported competitiveness and investment incentives, they have also constrained the expansion of public revenues and, by extension, fiscal space. The composition of the Albanian economy further contributes to this pattern. A significant share of output is generated in sectors characterized by low productivity, notably agriculture and informal services, which limits the scope for taxing income and corporate profits. Moreover, comparatively low per capita income levels restrict the potential yield from personal income taxation and formal consumption. From an institutional standpoint, although notable progress has been made in modernizing tax administration, particularly through digitalization and fiscalization initiatives, persistent

challenges related to tax compliance, administrative capacity, and evasion continue to impede more substantial revenue growth.

Consequently, Albania's tax-to-GDP ratio remains below that observed in neighboring countries with broader tax bases, higher social security contribution rates, and more mature fiscal administrations. At the same time, this situation suggests that there is room for strengthening revenue mobilization in the medium term. Further advances in economic formalization, tax base broadening, and administrative efficiency could raise tax capacity without necessarily relying on increases in existing statutory tax rates.

5. Discussion

The comparative examination of economic growth and tax revenue performance in Albania, North Macedonia, Bosnia and Herzegovina, and Serbia reveals a persistent tension between the objectives of promoting economic expansion and safeguarding fiscal discipline. Throughout different phases of the period under analysis, governments have generally relied on accommodative fiscal stances and relatively low tax burdens as instruments to encourage investment and support output growth. This policy orientation is particularly evident in North Macedonia, where the long-term application of a flat personal income tax rate of 10 percent coincided with relatively favorable growth outcomes up to around 2019, despite tax revenues remaining low as a share of GDP (IMF, 2023). In contrast, Serbia adopted a more decisive fiscal consolidation strategy after 2015, transitioning from sustained fiscal deficits to a primary surplus within a relatively short timeframe. While this adjustment strengthened fiscal sustainability, it was accompanied by only moderate growth during the consolidation phase (Kamberi & Bexheti, 2025b).

The economic shock triggered by the COVID-19 pandemic in 2020 underscored the role of fiscal policy as a countercyclical instrument. All four economies experienced simultaneous declines in economic activity and tax revenues, reflecting the severity of the disruption. Nevertheless, the post-pandemic recovery in fiscal and economic terms was relatively rapid across the region (IMF, 2023). A key factor differentiating national outcomes lies in the extent of economic informality. Serbia has achieved notable progress in formalizing economic activity and strengthening tax administration, which has enabled higher revenue mobilization without increasing statutory tax rates or undermining the business environment (World Bank & Vienna Institute for

International Economic Studies, 2024). By contrast, Albania and Bosnia and Herzegovina continue to exhibit elevated levels of informality, which contributes to their persistently low tax-to-GDP ratios, a pattern well documented in the empirical literature (Medina & Schneider, 2018). In this context, reforms such as electronic fiscalization and stricter enforcement of wage reporting are widely regarded as effective mechanisms for enhancing revenue capacity without raising the formal tax burden (IMF, 2023).

The composition of tax revenues also plays an important role in shaping growth sustainability. In all four countries, indirect taxes—particularly value-added tax and excise duties—account for the largest share of total tax revenues. While this revenue structure is generally considered less distortive to investment incentives, it increases the exposure of public finances to fluctuations in consumption, as became evident during the 2020 downturn (IMF, 2023). Consequently, a gradual reorientation toward more stable revenue sources, including recurrent property taxation, could strengthen fiscal resilience, given that property taxes are widely regarded as among the least distortionary forms of taxation (OECD, 2008).

Another relevant dimension concerns the efficiency of public expenditure. When tax revenues are allocated effectively to productive sectors such as education, healthcare, and infrastructure, they can support sustained long-term growth. However, available evidence suggests that public investment efficiency in the Western Balkans remains comparatively weak, thereby limiting the growth-enhancing potential of fiscal resources (European Commission, 2023).

From a broader comparative standpoint, cross-country evidence indicates that periods characterized by lower tax burdens have often coincided with stronger growth performance in Albania and North Macedonia, while Bosnia and Herzegovina and Serbia have achieved higher revenue mobilization through comparatively more effective taxation systems (ALTAX, 2024; OECD, 2024). Serbia's experience after 2015 further illustrates the importance of fiscal sustainability as a foundation for durable economic growth (Garaca, 2017). At the same time, the descriptive nature of the analysis, together with the limitations of the WDI tax revenue indicator—which primarily captures central government taxation—calls for a cautious interpretation of the results.

Key Findings of the Study

Albania and North Macedonia consistently exhibit relatively low and stable tax revenue-to-GDP ratios, typically fluctuating within the 16–18 percent

range. This pattern reflects structural constraints in revenue mobilization, including a narrow tax base, a strong reliance on indirect taxation, and limited capacity to capture economic activity compared with other Western Balkan economies.

Serbia stands out for its sustained upward trend in tax revenues relative to GDP over the period analyzed. This development appears closely linked to improvements in tax administration and progress in economic formalization, achieved without adverse effects on aggregate economic performance.

Fiscal outcomes tend to improve when policy efforts prioritize tax base expansion and the reduction of informality rather than increases in statutory tax rates. Such an approach strengthens revenue mobilization while maintaining incentives for investment and labor market participation.

Policy Implications

Strengthening tax revenues in the Western Balkans should primarily be pursued through the expansion of the tax base and the progressive formalization of economic activity, rather than through increases in existing statutory tax rates, which risk undermining investment incentives and labor market participation. Policy efforts aimed at modernizing tax administration, through measures such as digital reporting systems, greater transparency, and automated controls and audits can substantially improve the efficiency of revenue collection and reduce tax evasion, without increasing the formal tax burden. At the same time, the effective allocation of additional fiscal resources toward productivity-enhancing public expenditures is essential for translating higher revenues into sustained economic gains. Investment in human capital and physical infrastructure, particularly in education, healthcare, and transport networks, is widely recognized as a key channel through which fiscal policy can support long-term growth.

The reduction of informality through incentive-compatible measures and institutional capacity building remains a critical precondition for expanding revenue potential and creating the fiscal space necessary for macroeconomic stabilization and convergence with European Union standards. In the cases of Albania, Serbia, North Macedonia, and Bosnia and Herzegovina, policy priorities should therefore center on broadening the tax base and strengthening revenue administration, including further progress in digitalization and the gradual reinforcement of recurrent property taxation as a more stable and less distortive source of revenue. Equally important is an increased focus on the efficiency and quality of public spending, ensuring that

higher revenue mobilization is effectively transformed into sustainable and inclusive development outcomes.

6. Conclusion

The findings indicate that Albania, North Macedonia, Serbia, and Bosnia and Herzegovina have followed broadly similar economic cycles over the past decade, characterized by moderate growth before 2020, a sharp downturn during the COVID-19 crisis, and a subsequent recovery phase. In contrast, tax revenue-to-GDP ratios display considerably greater stability over time, albeit with pronounced cross-country differences in their levels. Albania and North Macedonia consistently record lower ratios, generally in the range of 16–18 percent of GDP, while Bosnia and Herzegovina occupies an intermediate position at around 19–20 percent. Serbia stands out with substantially higher revenue ratios, reaching approximately 22–23 percent in several years. These differences suggest that countries with broader tax bases and more effective revenue administration, most notably Serbia, and to a lesser extent Bosnia and Herzegovina, possess greater fiscal space to pursue countercyclical interventions and support fiscal consolidation. By contrast, Albania and North Macedonia face more binding constraints stemming from limited tax capacity and persistent informality. Overall, the analysis underscores the importance of tax base expansion, informality reduction, and revenue structure improvements in strengthening economic resilience and supporting convergence toward European Union fiscal benchmarks.

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**Start-up Development in Albania: Gendered Perspectives and
Ownership Dynamics (2013–2021)**

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Abstract

In recent years, significant social changes have contributed to a gradual reduction in gender inequalities in the labor market. The number of women entrepreneurs has increased significantly worldwide, and Albania is no exception. Building on this development, the study provides a descriptive analysis of the growth of Albanian start-ups between 2013 and 2021, with a focus on gendered perspectives and ownership dynamics. Using national institutional data, extant literature, and global entrepreneurship trends, the study examines sectoral distribution, regional variations, and registration patterns. Findings indicate that the number of businesses owned by women is steadily increasing, particularly in urban areas and the service sector. At the same time, the balance between male-led and female-led start-ups is slowly changing. An ownership analysis reveals that most new businesses are still owned by Albanians. Foreign-owned businesses and joint ventures are becoming increasingly important, but they remain relatively small. These dynamics reveal how female entrepreneurship contributes to reshaping Albania's economic narrative, while also situating gender participation within broader patterns of ownership and start-up development. Understanding these trends is crucial for developing targeted policies that promote inclusive growth and gender equality in the private sector.

Keywords: start-ups, female entrepreneurship, gendered perspectives, ownership dynamics, Albania.

1. Introduction

Women comprise nearly half of the world's population (49.72%), yet their labor market participation is only 40.2% (World Bank, 2025; ILO, 2024). Despite intensified global efforts toward gender equality and fair remuneration, strong structural and cultural barriers continue to limit women's full economic participation.

In Albania, while women represent around 46% of the population and 69.3% (aged 15-64) are active in the labor market (INSTAT, 2025), entrepreneurship remains a significant challenge. Although post-socialist reforms and moves toward EU integration have expanded economic inclusion, full equality in entrepreneurial opportunities is still lacking.

Nevertheless, the last decade has seen a significant increase in new female-owned businesses in Albania, in sectors such as technology, fashion, and agro-processing. Albanian female entrepreneurs are increasingly using digital tools, cultural heritage, and innovation to compete in modern markets. This trend demonstrates not only their economic potential but also the transformation of social perceptions about the role of women in business.

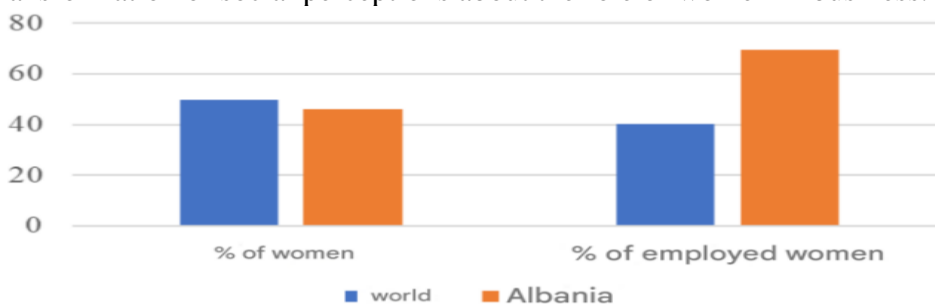


Chart 1. The percentage of women in the population and the percentage of employed women in the world and in Albania.

Despite this development, research on women-led start-ups in Albania remains limited. Existing studies focus more on the gender dimension of employment or on small and medium-sized enterprises, without analyzing the specificities of female entrepreneurship.

This study aims to contribute to expanding knowledge on female entrepreneurship in Albania by identifying the factors that drive its growth and by examining the ways in which the experiences of female entrepreneurs

can positively impact the country's economic development through an analysis of trends, sectoral structure, and factors influencing their participation during the period 2013-2021.

2. Literature review

Research on women's entrepreneurship has gradually shifted from narrow economic analyses to multidimensional approaches that integrate cultural, social, institutional, and financial perspectives. Early studies emphasized profitability, survival rates, and job creation, but these indicators often overlooked systemic barriers and did not reflect the complexity of women's entrepreneurial experiences.

Recent studies place women's entrepreneurial activity within broader frameworks, highlighting that financial exclusion, gender stereotypes, and lack of access to networks affect opportunities and outcomes (Judijanto, 2025; Gjini, 2024). This conceptual expansion underlines that women's entrepreneurship cannot be understood solely as an economic phenomenon, but must be seen in relation to structures of power and inequality. Although it has emerged as one of the fastest-growing areas globally (Mirjana, 2022), structural disadvantages remain deep. Access to credit is still limited, as financial institutions impose stricter criteria due to a lack of collateral or perception of high risk (Kalaj, 2022). These barriers are reinforced by cultural and institutional biases that fuel male dominance in entrepreneurial ecosystems, reducing women's perceived legitimacy and their confidence in pursuing innovative or high-growth potential paths (Strobl, 2012; Huang, 2025).

In many developing contexts, women's entrepreneurial activity is driven more by necessity than opportunity, concentrated in small enterprises that face difficulties in achieving sustainability (Martínez-Rodríguez, 2022). These businesses are hampered by the lack of formal financing mechanisms, cultural constraints, and the lack of gender-focused research in developing economies (Ahmetaj, 2023). These findings show that financial, social, and institutional dynamics reinforce each other, limiting women's entrepreneurial potential. As Sullivan and Meek (2012) point out, disadvantages are not only structural but also embedded in socialization processes and societal attributions, which continue to fuel inequality in access to assets, education, and opportunities, creating a gender "glass ceiling" that extends to entrepreneurship. At the same time, women's entrepreneurship is increasingly recognized as a driver of innovation, sustainability, and inclusive growth.

Women-led enterprises contribute not only to household incomes but also to community development and the formation of social capital. Profits are often redistributed to local economies, supporting suppliers, employees, and networks of collaboration. These practices stimulate local development and challenge gender norms, fostering gradual cultural change. Scholars note that, despite persistent barriers, women entrepreneurs have leveraged technology to expand networks and overcome resource constraints, demonstrating adaptability and contributing to broader economic development (Patil, 2023). The literature thus highlights that women's entrepreneurship has not only economic but also socially transformative value, underlining its potential to advance broader goals of equality and sustainability.

In Albania, these developments are taking place within a specific post-socialist and EU integration context. The transition to a market economy and gradual alignment with European structures have created new opportunities for entrepreneurship, including access to international reforms and funds. However, entrenched social norms, bureaucracy, and fragmented political interventions continue to limit women's full participation (Beqo, 2014). This dichotomy reflects a broader paradox: while structural reforms have opened up new spaces for women's entrepreneurship, institutional weaknesses and cultural barriers undermine their long-term effectiveness. New women-led businesses in Albania have expanded into sectors such as technology, fashion, and agri-food, reflecting diversification and the adoption of innovative strategies (Xhindi, 2023). In technology, women entrepreneurs have launched businesses in software, fintech, and e-learning, generating employment and social value. In fashion and retail, they have harnessed artisanal traditions and sustainability trends to create products with international appeal. In agriculture and food production, the use of smart farming techniques and digital platforms has enabled rural producers to reach wider markets and increase productivity. These examples show that digitalization and sectoral diversification are enabling women entrepreneurs to overcome traditional barriers and strengthen their position in local and global markets.

Despite progress, persistent barriers remain, particularly exclusion from male-dominated business networks and the urban concentration of support initiatives, which disadvantage women in rural areas and limit their access to partnerships, investments, and sustainable enterprise growth (Gulvira, 2024). In Albania, institutional inefficiencies, such as bureaucratic obstacles and weak implementation of gender-sensitive policies, discourage long-term investment in women-led enterprises, while entrenched social expectations,

including the need for family approval, reinforce dependency and limit the autonomy essential for entrepreneurial growth (Alekseevna, 2024).

3. Methodology

This study uses a descriptive and exploratory approach to analyze the development of new businesses led by women in Albania during the period 2013-2021. The analysis is based on secondary data provided by the National Business Center, the Institute of Statistics, the Global Entrepreneurship Monitor, and the World Bank, which provide detailed information by gender on business registrations, labor market participation, and sectoral distribution. The selection of these sources aims to provide the most complete picture possible of the dynamics of female entrepreneurship in the Albanian context, where the lack of continuous data still poses a challenge.

This study aims to describe the main trends of women's entrepreneurship, to identify sectoral and regional differences, and to highlight the factors that influence their participation in the economy. The analysis includes quantitative indicators on the annual evolution of businesses, as well as qualitative assessments drawn from existing literature.

To strengthen the validity of the findings, national data are compared with international sources and interpreted in light of institutional and cultural factors. This combined approach allows for a more comprehensive understanding of the development of female entrepreneurship, reducing the effects of statistical limitations.

4. Data analysis

The literature highlights the need for multidimensional analyses of women's entrepreneurship that take into account the interplay between financial, cultural, and institutional challenges. Albania reflects many of the global and regional barriers, but also exhibits dynamics that are specific to its political transition and European path. This study builds on this knowledge by providing a systematic analysis of women-led new businesses in Albania over the past decade, with particular attention to both the opportunities arising from digitalization and political reforms, as well as the enduring obstacles rooted in institutional inefficiencies and entrenched gender norms.

Table 1. New businesses by the gender of partners or administrators

Year	New Registrations	Female Administrators	Female Ownership (100% Equity)	Total Women	Total Men	Female %	Men %
2013	11951	439	968	1407	10544	11.80%	88.20%
2014	16731	427	1520	1947	14784	11.60%	88.40%
2015	39650	491	13054	13545	26105	34.20%	65.80%
2016	19090	4857	4792	9649	9441	50.54%	49.45%
2017	19041	5946	5075	11021	8020	57.88%	42.12%
2018	18624	5616	5632	11248	7376	60.40%	39.60%
2019	15779	5081	4828	9909	5870	62.80%	37.20%
2020	13964	4470	4147	8617	5347	61.71%	38.29%
2021	17473	5716	5239	10955	6518	62.70%	37.30%

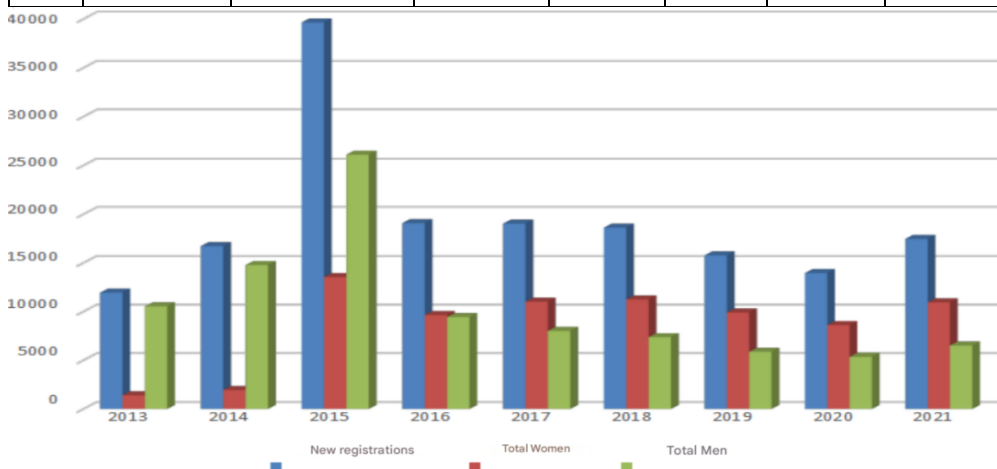


Chart 2. New Businesses by Gender

Table 1 presents data for the period 2013-2021, illustrating the number of new businesses registered by the gender of administrators and owners, as well as the percentage of women and men in total annual registrations.

In 2013, the percentage of new businesses run or owned by women was only 11.8%, while in 2021 this figure reached 62.7%. This change indicates a steady and significant increase in the role of women in entrepreneurship,

reflecting their increasingly broad involvement in the country's economic activity.

In contrast, the participation of male-led businesses has decreased from 88.2% in 2013 to 37.3% in 2021, which indicates a gradual gender balance in the field of entrepreneurship and a transformation of the ownership structure in new businesses.

A similar trend is observed globally, where, according to GEM (2023/24), female entrepreneurship rates have increased from 6.1% in the early 2000s to over 10% during the period 2021-2023, indicating a steady shift towards broader gender participation in business. The year 2015 marks a special moment in this dynamic, with 39.650 new registrations, of which 34.2% are women-led businesses. This sudden increase may be linked to institutional interventions, legal reforms, or economic policy initiatives that have encouraged the formalization and creation of new businesses in general.

The number of female administrators has increased significantly, from only 439 in 2013 to 5.716 in 2021. In the same period, businesses with 100% female ownership have increased from 968 to 5.239. These changes represent not only numerical growth, but also a change in the social and institutional perception of the role of women in entrepreneurship.

Overall, the period 2013-2021 reflects a marked shift in the gender balance of Albanian entrepreneurship. Women are taking an increasingly important role in the creation and management of new businesses, contributing significantly to economic development and narrowing the traditional gender gap in this field.

This trend constitutes a clear indicator of progress towards gender equality, women's economic empowerment, and the modernization of the business climate in Albania, reflecting a sustainable transformation of the structure of the economy and entrepreneurial culture in the country.

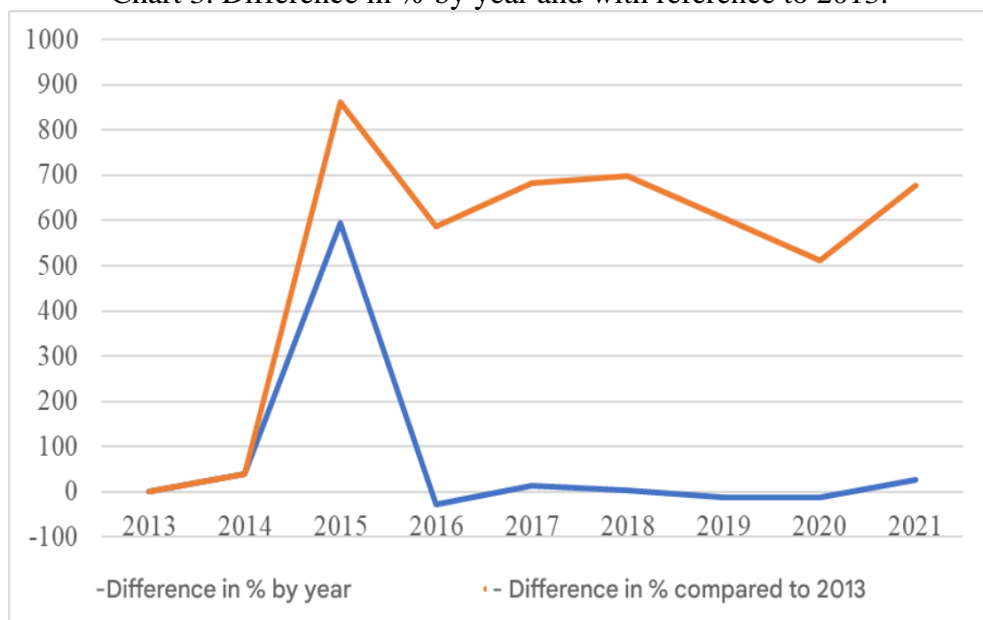
Table 2. Difference between years, and with reference to 2013, in the new registrations of women in business

Year	New Registrations (Total Female)	Difference in % by year	Difference in % compared to 2013
2013	1407	-	-
2014	1947	38.38	38.38
2015	13545	595.69	862.69

2016	9649	28.76	585.79
2017	11021	14.22	683.30
2018	11248	2.06	699.43
2019	9909	11.90	604.26
2020	8617	13.04	512.44
2021	10955	27.13	678.61

Source: Produced by the authors

Chart 3. Difference in % by year and with reference to 2013.



Source: Produced by the authors

Table 2 presents the changes in the number of new business registrations run by women during the period 2013-2021, as well as their percentage increase or decrease compared to the previous year and the base year 2013. In 2013, 1 407 new businesses with women owners or managers were registered. A year later, in 2014, this number increased by 38.38%, reaching 1 947 businesses. This marks a positive start for the inclusion of women in entrepreneurship. In 2015, a very large increase was observed, with 595.69% more registrations compared to 2014 and 862.69% more than in 2013. This significant change may be related to reforms in business registration procedures, administrative facilitations, or policies that encouraged the formalization of economic

activities, which seem to have influenced the increase in new business registrations in general.

In 2016, the number of registrations fell by 28.76%, which could be related to a market slowdown or a lack of ongoing supportive policies.

During 2017-2018, the trend stabilized with slight increases of 14.22% and 2.06%, indicating that the level of women's participation in entrepreneurship had begun to consolidate.

In 2019, new business registrations declined by 11.90%, and in 2020 by 13.04%, likely reflecting the economic difficulties triggered by the COVID-19 pandemic, which disproportionately affected small and medium-sized enterprises. In 2021, a significant increase was observed: the number of new businesses registered by women reached 10,955, 27.13% more than in 2020 and 678.61% more compared to 2013. This shows a clear recovery after the pandemic and a wider involvement of women in opening new businesses.

Thus, the period 2013-2021 is characterized by a steady and progressive increase in women's participation in entrepreneurship, with some fluctuations related to economic, institutional, and social factors. This trend reflects the increasing role of women as active participants in economic development and the gradual improvement of conditions for gender equality in Albanian business.

Table 3. New registrations by ownership

	Albanian (100%)	% of Total	Foreign (100%)	% of Total	Albanian State	% of Total	Joint (Albanian - foreign)	% of Total	Total
2014	15463	0.92	948	0.06	2	0.0001	318	0.019	16731
2015	38255	0.96	1058	0.03	0	0	337	0.008	39650
2016	17587	0.92	1203	0.06	0	0	300	0.015	19090
2017	17444	0.91	1292	0.07	7	0.0003	298	0.015	19041
2018	16911	0.9	1403	0.08	0	0	310	0.016	18624
2019	14188	0.89	1324	0.08	3	0.0002	264	0.016	15779

2020	12772	0.91	1016	0.07	7	0.0005	169	0.012	13964
2021	15687	0.89	1541	0.09	4	0.0002	241	0.014	17473

Source: Produced by the authors

Table 3 reveals that female start-up registrations are highly responsive to institutional reforms and external shocks. The extraordinary surge in 2015 suggests regulatory changes facilitated entry, while the declines in 2019-2020 highlight vulnerability to economic downturns and the pandemic. The rebound in 2021 demonstrates resilience and consolidation of women's roles in entrepreneurship.

Table 4. Difference between years in new registrations by ownership

	Albanian (100%) Difference in % by years	Foreign (100%) Difference in % by years	Albanian State Difference in % by years	Joint (Albanian - foreign) Difference in % by years
2014	0	0	0	0
2015	147.40%	11.60%	-100.00%	5.97%
2016	-54.03%	13.71%	0	-10.98%
2017	-0.81%	7.40%	250.00%	-0.67%
2018	-3.06%	8.59%	-100.00%	4.03%
2019	-16.10%	-5.63%	300.00%	-14.84%
2020	-9.98%	-23.26%	133.33%	-35.98%
2021	22.82%	51.67%	-42.86%	42.60%

Source: Produced by the authors

Table 4 underscores that Albanian-owned businesses dominate the start-up landscape, consistently accounting for over 90% of registrations. Foreign-owned ventures, though smaller in share, show gradual growth, reflecting increased international engagement. Joint ventures remain limited, suggesting that cross-border collaboration is still underdeveloped. These ownership dynamics confirm that local entrepreneurship, particularly women-led, is the primary engine of start-up growth in Albania.

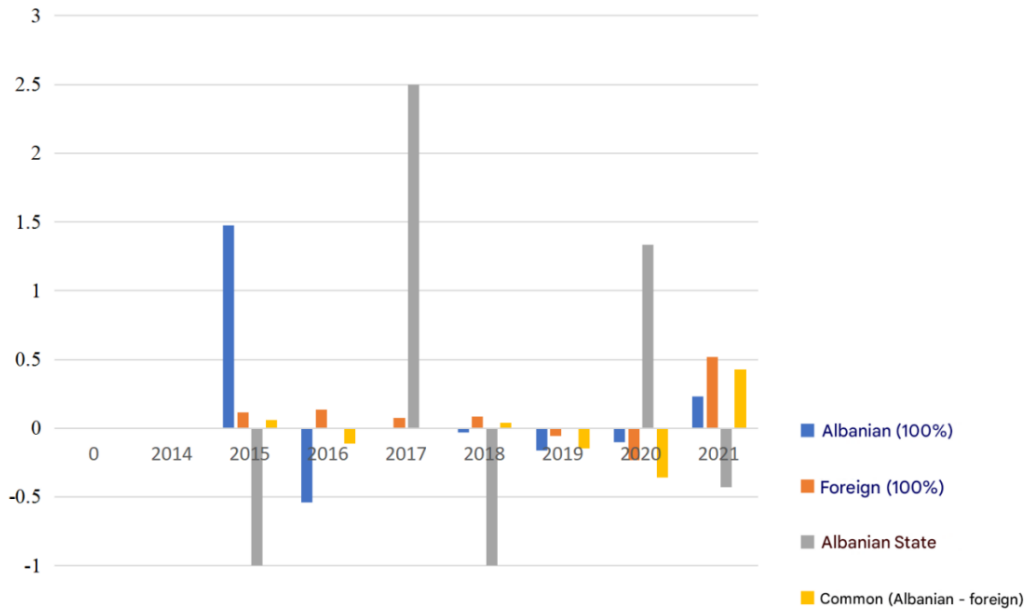


Chart 4. Difference between years in new registrations by ownership

The graph following Tables 3 and 4 illustrates the rhythm of start-up development in Albania, making visible the sharp contrasts between years of expansion and contraction. What stands out is not only the magnitude of change but the cyclical nature of female participation in entrepreneurship: sudden surges, temporary declines, and eventual stabilization. The visualization also highlights how ownership categories move in parallel yet at different intensities, with Albanian-owned businesses showing steadier dominance while foreign-owned ventures fluctuate more sharply. By presenting these dynamics visually, the graph underscores that gendered participation and ownership structures are intertwined, evolving together in response to institutional reforms and external shocks.

5. Discussion

The analysis of the period 2013-2021 shows a significant and sustained increase in women's involvement in entrepreneurship in Albania. The continuous trend of growth of new businesses run by women, reflected in the annual registration data, suggests that traditional barriers to women's participation in business are gradually easing. This development can be

explained by a number of reinforcing factors, such as improved access to education, the expansion of the use of digital technologies, and policies that favor the formalization of small businesses. These explanatory factors align with broader patterns identified in international research on women's entrepreneurship. In particular, United Nations (2018) national case studies from Cambodia, Indonesia, Malaysia, and the Philippines report similar links between improved access to education, digitalization, and supportive formalization policies and the expansion of women-led enterprises.

At the same time, the significant increase in 2015 coincides with the period when institutional reforms were undertaken to simplify business registrations and reduce administrative costs. This shows that the regulatory environment plays an important role in fostering entrepreneurship, especially for women, who often face additional bureaucratic and financial obstacles (Strawser, 2021). Temporary declines during 2016, 2019, and 2020 reflect the impact of economic and social factors, including the COVID-19 pandemic crisis, which particularly affected sectors where women are more represented, such as services, small trade, and tourism. However, the strong recovery in 2021 demonstrates a high capacity for adaptation and resilience on the part of female entrepreneurship, testifying their ability to react to market changes.

In sectoral terms, the greater participation of women in services and creative industries suggests an orientation towards activities that require more organizational and innovative skills than high initial capital. This indicates that women-led enterprises in Albania are developing in a way that is appropriate to market conditions and existing potentials. Overall, the data support the idea that the growth of female entrepreneurship is not just the result of temporary policies, but a broader process of social and economic transformation. It is contributing to the reshaping of the business structure in the country, making it more inclusive and gender-balanced. Women's entrepreneurial experience is becoming an important source of innovation, employment, and local development, especially in urban settings.

Taken in context, these trends point to deeper structural contrasts that go beyond simple growth figures. Beyond the numerical growth of women-led start-ups, the findings reveal important contrasts in both gendered participation and ownership structures. Male entrepreneurs remain more concentrated in capital-intensive sectors such as construction and manufacturing, while female entrepreneurs dominate in services, creative industries, and agri-food, reflecting differences in resource access and risk orientation. At the same time, ownership dynamics show that Albanian-owned businesses continue to drive the majority of start-up activity, whereas

foreign-owned and joint ventures, though smaller in share, introduce new technologies and market linkages. These patterns suggest that women's entrepreneurship is expanding primarily through Albanian-owned businesses, while foreign-owned ventures remain less accessible to female entrepreneurs. Taken together, the evidence highlights that gender and ownership are intertwined dimensions of Albania's start-up ecosystem, shaping both the inclusivity and the sustainability of entrepreneurial development.

6. Conclusions and recommendations

The study concludes that during the period 2013-2021, Albania has experienced a steady increase in the number of new businesses run by women, reflecting a visible shift towards a better gender balance in entrepreneurship. This development reflects a structural change in business culture, where women are gaining an increasingly important role as economic actors. However, this positive dynamic remains sensitive to economic and institutional factors.

The fluctuations observed over several years indicate the need for more sustainable support for new businesses run by women, particularly in terms of access to finance, professional mentoring, and building cooperation networks. To further strengthen women's participation in entrepreneurship, it is recommended to:

- ✓ implement targeted policies to support female entrepreneurship, including grants, soft loans, and training programs;
- ✓ promote entrepreneurship and financial education for girls and women, starting at early educational levels;
- ✓ increase transparency and facilitate administrative procedures for opening and managing small businesses;
- ✓ develop mentoring and professional cooperation networks that enable the exchange of experiences and access to new markets.

The growth of female entrepreneurship in Albania represents a transformative process with a direct impact on economic development and progress towards gender equality. Sustained support for this trend is essential for building a fairer, more inclusive, and sustainable economy in the future.

In this context, it is suggested that in the future, more in-depth qualitative studies be carried out on female entrepreneurship in Albania, taking into account not only economic and institutional factors, but also aspects such as family life, life stages, and personal commitments, as they can significantly

influence decision-making to create and develop a venture. A more detailed analysis of these dimensions would help in a clearer understanding of the timing, motivations, and challenges that women face in their entrepreneurial journey.

In addition to the gendered progress observed, the ownership analysis confirms that Albanian-owned businesses continue to dominate the start-up landscape, while foreign-owned and joint ventures, though smaller in share, contribute selectively to innovation and international linkages. Women's entrepreneurship is expanding primarily through Albanian-owned businesses, whereas foreign-owned ventures remain less accessible to female entrepreneurs. This dual perspective highlights that gender and ownership are intertwined dimensions of Albania's start-up ecosystem. Strengthening both inclusivity and openness to international collaboration will be essential for ensuring that start-up development contributes to sustainable and balanced economic growth.

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**Between Safety and Flexibility: The Implementation of Proportionality
from Basel I to Basel IV - The Case of Albania**

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ABSTRACT

The evolution of the international banking regulatory framework from Basel I to Basel IV reflects sustained efforts to address systemic risk and to strengthen financial stability in the aftermath of global crises. This study adopts a comparative and institutional approach to analyze the key changes in capital requirements, risk measurement methodologies, liquidity standards, and the prudential supervisory framework, as well as the implications of these reforms for developing economies. The analysis highlights that, while the Basel standards have made a significant contribution to enhancing the resilience of the banking sector and promoting international harmonization of prudential regulation, they have simultaneously led to increased regulatory complexity and substantial compliance costs. The reforms commonly referred to as Basel IV represent a major shift toward greater comparability and transparency of bank capital, primarily through limiting the use of internal models and strengthening standardized approaches. However, contemporary literature identifies specific challenges for countries with less developed financial markets, where the implementation of these standards may create tensions between reinforcing financial stability and supporting credit provision to the real economy. In this context, the paper examines the experience of Albania as a developing economy that has undertaken significant steps toward alignment with Basel III standards and subsequent reforms. In conclusion, this research contributes to the academic discourse by postulating that the effectiveness of prudential supervision in bank-oriented

economies does not depend on the rigidity of the standard itself, but rather on its strategic calibration in relation to the level of financial development and local institutional capacities, emphasizing the importance of a proportional and contextualized approach to the implementation of regulatory reforms.

Keywords: Banking regulatory framework; Basel I–IV; Financial stability; Capital requirements; Prudential supervision

JEL Classification: G21; E58; F36

1. Introduction

Financial stability constitutes one of the fundamental pillars of long-term economic development and the efficient functioning of modern financial systems. Banking and financial crises over recent decades have demonstrated that weaknesses in the regulatory and supervisory framework can rapidly propagate at the macroeconomic level, generating severe consequences for economic growth, employment, and confidence in financial markets (Gorton & Metrick, 2012; Reinhart & Rogoff, 2009).

From a theoretical perspective, these crises have highlighted the role of interconnected bank balance sheets, financial leverage, and the procyclicality of credit as key mechanisms through which localized shocks are transformed into systemic risk. The literature on financial stability emphasizes that, in the absence of effective prudential constraints, inadequate capital and liquidity standards can amplify economic cycles and deepen financial crises (Adrian & Shin, 2010; Gorton & Metrick, 2012). In this context, banking regulation does not merely function as a technical mechanism of prudential control, but rather as a core instrument for preventing systemic risks and safeguarding financial stability. This broader approach conceptualizes prudential supervision not only as protection for individual depositors, but as a macro prudential mechanism aimed at limiting the accumulation of systemic risks at both sectoral and international levels (BCBS, 2011; Restoy, 2019).

The international regulatory response to financial crises has been primarily materialized through the development of standards by the Basel Committee on Banking Supervision (BCBS), which aim to harmonize capital requirements, risk measurement methodologies, and enhance transparency within the banking sector (BCBS, 2011). The Basel standards were designed to establish a “common regulatory language” for internationally active banks, with the objective of reducing regulatory arbitrage and strengthening market

discipline in the global banking sector (Jones, 2000; Tarullo, 2008). Since the adoption of Basel I in 1988, these standards have undergone a continuous process of revision and refinement, reflecting both the lessons learned from financial crises and the increasing complexity of financial instruments and markets.

The evolution of the international banking regulatory paradigm—from Basel I to the finalization of the reforms commonly referred to as Basel IV—represents not merely a technical process, but an ontological transformation of prudential supervision, oriented toward minimizing systemic risk and the negative externalities of global crises.

At the theoretical and analytical level, while the Basel architecture has contributed to enhancing the resilience of the banking sector through regulatory harmonization, it has simultaneously generated a significant increase in regulatory complexity and compliance costs. The most recent reforms, labeled Basel IV, mark a shift toward greater methodological rigidity, aiming to restore the credibility of prudential indicators by constraining bank discretion in the use of internal models (IRB) and reasserting the role of standardized approaches, including the output floor mechanism.

From the perspective of economies with developing financial markets, contemporary literature identifies a critical dichotomy between the imperative of financial stability and the need for efficient credit transmission to the real economy. Within this framework, the present study adopts a methodology that combines comparative and institutional approaches to dissect the dynamics of capital requirements, risk measurement methodologies, and liquidity standards, while assessing the degree of their symmetry or asymmetry with the structural needs of developing economies.

The case of Albania serves as an illustrative example for analyzing the process of regulatory convergence with Basel III and subsequent reforms. The study argues that the effectiveness of these reforms is not derived from formal (*de jure*) compliance, but is conditional upon the application of the principle of proportionality and the alignment of standards with the institutional infrastructure and absorptive capacities of the domestic financial system. By examining the impact of an external systemic shock in the Albanian context, Papajorgji et al. (2021) show that macroeconomic uncertainty significantly affects expectations and the behavior of economic agents, underscoring that the effectiveness of policies and reforms depends on institutional capacities and the ability of authorities to manage crises credibly. This perspective is consistent with our analysis of bank-centered systems in developing

economies, which argues that the mechanical application of international standards, without institutional calibration, risks reducing the effectiveness of prudential reforms and weakening credit transmission (Iollari, 2016).

Table 1 illustrates the progressive shift in regulatory philosophy from a microprudential approach—focused on the minimum capital requirements of individual banks—toward a macroprudential framework aimed at enhancing the resilience of the financial system as a whole and improving the comparability of risk-weighted assets.

Table 1. Evolution of Regulatory Objectives from Basel I to Basel IV

Basel I (1988)	Basel II (2004)	Basel III (2010)	Basel IV (2017-)
<ul style="list-style-type: none"> • Capital adequacy ratio (8%) • Credit risk focus • Simple RWA 	<ul style="list-style-type: none"> • Three-pillar approach • Internal risk models • Increased complexity 	<ul style="list-style-type: none"> • CET1 capital • LCR & NSFR • Macroprudential buffers 	<ul style="list-style-type: none"> • Output floor (72.5%) • Reduced model variability • Enhanced comparability

Source: BCBS (1988, 2004, 2011, 2017); Restoy (2019).

The transition from Basel I to Basel IV represents a significant conceptual and regulatory transformation. While Basel I adopted a relatively simple approach, primarily focused on credit risk, subsequent frameworks have substantially expanded the scope of regulation to include operational risk, market risk, capital quality, liquidity, and financial leverage (King & Tarbert, 2011; Restoy, 2019). Within this evolution, a gradual shift can be observed from a microprudential approach toward an increasingly macroprudential framework, in which particular emphasis is placed on the resilience of the banking system as a whole and on the interaction between financial institutions and economic cycles (Adrian & Shin, 2010; BIS, 2021).

The Basel III reforms and those unofficially referred to as Basel IV aim to enhance banks' resilience to financial shocks; however, they have simultaneously generated important debates regarding implementation costs

and their impact on credit provision to the real economy (Adrian & Shin, 2010; Blundell-Wignall & Atkinson, 2010).

Table 2. The Financial Stability Trade-off

Framework	Primary Objective	Key Instruments	Potential Impact on Credit
Basel I	Minimum capital requirements	Simplified RWAs	Neutral
Basel II	Risk sensitivity	Internal models (IRB)	Pro-cyclical
Basel III	Systemic stability	CET1, LCR, NSFR	Potentially constraining
Basel IV	Comparability and transparency	Comparability and transparency	More pronounced in developing economies

Source: Jones (2000); Adrian & Shin (2010); BCBS (2017); Restoy (2019).

Applicability and Proportionality of Basel Standards in Developing Economies

One of the central issues in contemporary literature concerns the applicability and proportionality of the Basel standards in developing economies. Unlike advanced economies, these countries are often characterized by smaller financial markets, more limited institutional capacities, and a dominant role of the banking sector in financing the real economy (Ferreira et al., 2019; BIS, 2021).

The literature argues that a mechanical implementation of advanced prudential standards may generate disproportionate effects in economies where banks represent the primary source of financing, by increasing the cost of credit and restricting access to finance for small and medium-sized enterprises (Ferreira et al., 2019; BIS, 2021). Consequently, the implementation of complex regulatory standards may pose specific challenges, creating tensions between the need for financial stability and the objective of supporting economic development. In this context, Albania represents a case study of particular interest. The Albanian banking sector is dominated by foreign-owned banks and has undergone a profound regulatory reform process, especially in the aftermath of the global financial crisis. The Bank of Albania has undertaken significant steps toward alignment with Basel III standards, strengthening capital, liquidity, and prudential

supervisory requirements in line with the recommendations of international institutions (World Bank, 2022; Suljić, 2024).

These developments render Albania a suitable case study for analyzing how international banking regulatory standards interact with the structural characteristics of a small financial market. Nevertheless, challenges related to technical complexity, supervisory capacity, and domestic market structure remain present.

Building on these developments, this study aims to critically analyze the evolution of the regulatory framework from Basel I to Basel IV, assess its implications for financial stability, and examine Albania's experience in implementing these standards. The contribution of the paper lies in linking comparative regulatory analysis with an institutional case study, thereby offering policy and regulatory implications for developing economies in the context of financial and European integration.

More specifically, the analysis seeks to identify the mechanisms through which prudential reforms affect financial stability and credit provision, and to derive implications for a proportional and calibrated implementation of Basel III/IV standards in developing economies.

2. Methodological and analytical framework

This study is based on a qualitative research approach, combining comparative analysis and institutional analysis to examine the evolution of the international banking regulatory framework from Basel I to Basel IV. The choice of this methodology is justified by the normative and institutional nature of the Basel standards, which aim to harmonize regulatory practices across national contexts and strengthen global financial stability (Basel Committee on Banking Supervision [BCBS], 2011; Ferreira et al., 2019). Comparative analysis is employed to identify structural and conceptual differences among the various Basel frameworks, focusing on four core dimensions of banking regulation:

- (i) Capital requirements and capital quality;
- (ii) Risk measurement methodologies;
- (iii) Liquidity and leverage standards;
- (iv) Supervisory and transparency mechanisms.

This analytical dimension enables an assessment of how regulatory reforms have evolved in response to financial crises and to weaknesses identified in

preceding frameworks (Jones, 2000; Tarullo, 2008; Restoy, 2019). Methodologically, the study relies primarily on secondary sources, including official documents of the Basel Committee on Banking Supervision, reports by the Bank for International Settlements (BIS), World Bank assessments of the financial sector, and relevant academic literature on banking regulation and financial stability (BIS, 2021; World Bank, 2023). These sources provide a solid empirical and normative basis for analyzing prudential reforms across banking systems with different levels of development.

Institutional analysis focuses on how international Basel standards have been adapted and implemented in specific national contexts, with particular emphasis on the case of Albania. This case study is justified by the structural characteristics of the Albanian banking sector, such as the dominance of foreign-owned banks, the relatively small size of the financial market, and the importance of regulatory convergence within the framework of European integration (World Bank, 2022; Suljić, 2024).

To discuss the practical implications of implementing Basel standards, the analysis adopts a normative framework that examines the alignment between international regulatory requirements and the institutional capacities and readiness of the Albanian banking system. This approach is particularly relevant for developing economies, where implementation challenges relate not only to formal compliance but also to the technical and institutional capacities of supervisory authorities (Feridun & Özün, 2020; Neisen & Röth, 2018).

Overall, this methodological approach enables an integrated reading of the evolution of the Basel regulatory framework and its implications for financial stability, linking international comparative analysis with an in-depth examination of the Albanian case in the context of a developing economy.

Table 3. Comparative Evolution of the Basel I–IV Regulatory Framework

Dimension	Basel I	Basel II	Basel III	Basel IV
Primary focus	Minimum capital	Risk sensitivity	Systemic stability	Comparability
Risks covered	Credit risk	Credit, market, and operational risk	+ liquidity and leverage	+ output floor
Internal models	No	Yes	Yes	Restricted

Prudential approach	Microprudential	Microprudential	Micro- and macroprudential	Micro- and macroprudential
Implications for EMEs	Limited	Increased complexity	Higher compliance costs	Capital pressure

Burimi: BCBS (1988, 2004, 2011, 2017); Jones (2000); Restoy (2019).

Integration of Basel Standards in Albania: Institutional Analysis and Challenges

The integration of international Basel standards into the Albanian banking system has represented a gradual and complex process, closely linked to the institutional transformation of the financial sector and to the strategic objective of alignment with European Union regulatory practices. In the context of a developing economy, where the banking sector plays a dominant role in financial intermediation, the adoption of international prudential standards has been regarded as a key element in strengthening financial stability and enhancing market confidence (World Bank, 2022).

This process of regulatory convergence should be interpreted not merely as a formal obligation within the framework of European integration, but also as a mechanism for importing regulatory credibility into a relatively small financial system that is open and vulnerable to external shocks (BIS, 2021).

The Bank of Albania has played a central role in this process by continuously updating the regulatory and supervisory framework in line with the recommendations of the Basel Committee on Banking Supervision. The implementation of capital adequacy requirements, the improvement of credit risk classification, and the strengthening of prudential supervisory standards have been among the core pillars of this regulatory reform agenda (Bank of Albania, 2021; BIS, 2021). Particularly following the global financial crisis, Albanian authorities have intensified efforts to enhance the resilience of the banking sector to external shocks.

From an institutional perspective, the proactive role of the central bank has been decisive in balancing the adoption of international standards with the need to preserve financial stability in a concentrated banking market dominated by foreign-owned banks.

One of the most important aspects of the integration of Basel standards in Albania concerns the implementation of key elements of Basel III, including

Common Equity Tier 1 (CET1) capital requirements as well as the liquidity indicators LCR and NSFR. Reports by international institutions suggest that the Albanian banking sector has exhibited relatively satisfactory levels of capitalization and liquidity, reflecting a conservative approach to risk management (World Bank, 2023; BIS, 2024). However, this progress should not be interpreted as full and costless compliance with international standards. In particular, the maintenance of high capitalization levels has been partly the result of a relatively cautious lending policy, which raises questions regarding the long-term interaction between financial stability and the support of economic growth.

The literature emphasizes that the implementation of Basel standards in developing economies is often accompanied by structural and institutional challenges, which are also evident in the case of Albania (Ferreira et al., 2019; Neisen & Röth, 2018). One of the main challenges relates to the technical and institutional capacities of banking supervision. The high complexity of new risk measurement methodologies and prudential reporting requirements necessitates continuous investment in information technology, advanced reporting systems, and professional training for both supervisory authorities and banking staff.

Another critical aspect concerns the adaptation of international standards to the structural characteristics of the Albanian banking market. The dominance of foreign-owned banks and the economy’s reliance on bank credit make the balance between strengthening financial stability and supporting economic growth particularly sensitive. Increases in capital and liquidity requirements, while enhancing the resilience of the banking sector, may affect the cost and availability of credit to the private sector, especially for small and medium-sized enterprises (Adrian & Shin, 2010; Blundell-Wignall & Atkinson, 2010) (see Table 4).

Table 4. Channels of Impact of Basel III/IV Standards on the Albanian Banking Sector: Interactions between Prudential Requirements, Credit Provision, and Financial Stability

Basel III/IV Standards	Impact on Credit and Financial Stability
Higher capital requirements (CET1, capital buffers)	Potential strengthening of bank resilience, with possible constraints on credit growth
Liquidity requirements (LCR, NSFR)	Improved liquidity risk management, but potential effects on banks’ funding costs

Compliance costs and institutional requirements capacity	Increased operational and regulatory burden, particularly for smaller institutions
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Source: Authors' elaboration based on Adrian & Shin (2010); Bank for International Settlements (2021); World Bank (2023).

The treatment of non-performing loans (NPLs) has represented another important dimension of regulatory reforms in Albania. Improvements in the legal framework for loan restructuring, strengthened provisioning practices, and stricter capital requirements have contributed to a gradual reduction in NPL levels, thereby enhancing the quality of bank assets and the stability of the financial sector (World Bank, 2022). However, the literature suggests that effective credit risk management requires not only regulatory measures, but also the development of secondary markets and improvements in the legal and institutional infrastructure.

Table 5. Key Elements of Basel III Integration in Albania and Their Main Implications

Element	Implementation in Albania	Implications
CET1	Levels above regulatory minimum	Higher resilience
LCR / NSFR	Gradual implementation	Strong liquidity position
NPLs	Progressive reduction	Improved asset quality
Basel IV	Under consideration	Capital pressure

Source: Bank of Albania (2021); World Bank (2022, 2023).

3. Basel iv reforms and the albanian banking system: discussion

From the perspective of the reforms unofficially referred to as Basel IV, the challenges facing the Albanian banking system are expected to intensify. The restriction of internal models and the increased reliance on standardized approaches for calculating risk-weighted assets may raise capital requirements and compliance costs for banks, particularly those with more complex operational structures (Feridun & Özün, 2020; Restoy, 2019). For Albanian regulators, this implies the need for a proportional and gradual approach that takes into account the level of financial market development and domestic institutional capacities.

Albania's experience in integrating Basel standards demonstrates that the adoption of international regulatory frameworks can significantly contribute to strengthening financial stability, but requires careful adaptation to national

circumstances. An approach that combines regulatory compliance with institutional flexibility and international technical assistance appears essential to ensure that prudential reforms translate into sustainable benefits for the real economy and long-term financial stability. The evolution of the international banking regulatory framework from Basel I to Basel IV reflects an ongoing institutional effort to reinforce financial stability and address structural weaknesses in the global banking system. Each phase of this evolution has embodied lessons learned from financial crises and market transformations, progressing from a simple and standardizing approach toward an increasingly complex, risk-sensitive, and systemically oriented framework. Comparative analysis of Basel standards shows that while Basel I laid the foundations for international harmonization of bank capital, it failed to address the real complexity of banking risks. Basel II enhanced risk sensitivity and the role of supervision but exposed the system to pro-cyclicality and excessive reliance on internal models. Basel III marked a decisive shift toward strengthening capital quality, liquidity, and banks' resilience to financial shocks, while Basel IV seeks to enhance comparability, transparency, and the credibility of prudential indicators by constraining internal models and reinforcing standardized approaches.

From a financial stability perspective, the findings suggest that Basel standards have contributed to enhancing the resilience of the banking sector, albeit at considerable regulatory and operational cost. Debates in the literature indicate that higher capital and liquidity requirements—although justified by the need for systemic stability—may affect banks' capacity to finance the real economy, particularly during economic downturns and in developing economies. The Albanian case study shows that Basel integration has been a necessary and generally positive process for strengthening financial stability and enhancing confidence in the banking sector. Gradual alignment with Basel III, improved prudential supervision, and a strengthened legal framework have contributed to higher capitalization, liquidity, and asset quality. Nevertheless, significant challenges remain, particularly regarding institutional capacities, the technical complexity of new reforms, and the need for proportional adaptation of international standards to domestic market realities.

Empirical findings indicate that customer satisfaction levels in Albanian banks vary significantly according to the ownership structure of shareholder capital, reflecting differences in governance practices, service standards, and operational efficiency (Ilollari, Meçe, & Ribaj, 2022). In the context of Basel IV reforms, the Albanian experience underscores the importance of a gradual

and flexible approach to regulatory implementation. For regulators and policymakers, the central challenge lies in balancing the strengthening of financial stability with preserving the intermediation role of the banking sector in supporting economic growth. This requires not only formal compliance with international standards, but also sustained investment in institutional capacities, technology, and the development of an advanced risk management culture.

4. Conclusions

The analysis of the regulatory evolution from Basel I to Basel IV highlights a progressive shift in banking supervision from a relatively simple and standardizing framework toward an increasingly complex and risk-sensitive architecture. This process reflects the continuous response of international regulation to financial crises and structural weaknesses in the global banking system, transforming prudential supervision from a largely mechanical mechanism into an integrated risk management system in which financial stability depends not only on the quantity, but above all on the quality of capital and liquidity.

From a regulatory standpoint, Basel I and Basel II contributed to the initial harmonization of capital requirements, but also revealed significant limitations, particularly with regard to regulatory arbitrage and the procyclical nature of credit. These weaknesses underscored the need for a more comprehensive approach to systemic risk. In this regard, Basel III reforms marked a fundamental shift toward strengthening capital quality, liquidity standards, and banks' resilience to financial shocks. Subsequent reforms, known as Basel IV, aim to enhance the comparability and credibility of prudential indicators by limiting bank discretion in the use of internal models and reinforcing standardized risk measurement approaches.

From the perspective of developing economies, the findings suggest that the implementation of Basel standards has played a stabilizing role in bank-centered systems, contributing to increased confidence and financial resilience. The case of Albania demonstrates that regulatory convergence with Basel III and subsequent reforms has served as a stability anchor for the banking sector. However, the analysis underscores that implementing highly complex standards in markets with relatively low levels of financial development may generate disproportionate compliance costs and create tensions in credit transmission to the real economy.

In this context, the effectiveness of prudential supervision is contingent upon the institutional and technical capacities of supervisory authorities and the banking sector itself. Without an appropriate institutional infrastructure, increasing regulatory complexity risks undermining policy objectives. The Albanian experience suggests that a proportional and gradual approach to implementing international standards is essential to ensure a sustainable balance between strengthening financial stability and supporting credit provision to the real economy.

In conclusion, this study contributes to the literature on banking regulation by offering an integrated analysis of the evolution of the Basel framework and its implications for developing economies, with particular focus on Albania. The findings suggest that international regulatory standards are most effective when implemented in a proportional manner and adapted to domestic institutional and economic contexts. In this respect, the Albanian experience provides valuable lessons for other countries with similar characteristics, particularly in the context of financial and European integration.

5. Recommendations

The effectiveness of prudential reforms in Albania is conditioned by the manner and pace of Basel standards implementation. A gradual approach to regulatory requirements is essential to avoid abrupt shocks to credit supply and to preserve the intermediation function of the banking sector. At the same time, supervisory flexibility remains a key element, requiring the use of macroprudential instruments tailored to the economic cycle and the structure of the domestic banking market, rather than mechanically following global dynamics.

The effective implementation of Basel IV reforms is closely linked to the digitalization of banking supervision. The integration of RegTech and SupTech solutions enables a transition toward integrated and real-time reporting systems, reducing operational costs for banks while maintaining the analytical rigor required by prudential standards. Research on mobile banking in Albania shows that customer perceptions and attitudes toward digital banking services directly influence technology adoption and banks' operational effectiveness, making digitalization an institutional—not merely technological—component (Iollari, Papajorgji, Civici, & Moskowitz, 2022). The use of advanced data analytics creates opportunities for more proactive and less intrusive supervision, facilitating early risk identification without disproportionately increasing the regulatory burden.

In this context, RegTech technologies serve as a key mechanism for implementing the principle of proportionality, enabling differentiation of regulatory requirements according to the risk profile and complexity of banking institutions. In the long-term perspective, combining the rigorous requirements of Basel IV with a calibrated and technologically supported supervisory approach creates the conditions for a banking system that is more resilient to crises and more effective in supporting economic growth.

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**Enhancing Cybersecurity to Protect Business Operations:
An Academic Framework Integrating Cyber Defense and Incident
Response Against External Attacks and Unauthorized Access**

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ABSTRACT

Business operations increasingly depend on interconnected digital ecosystems, where external attacks, unauthorized access, and third-party dependencies can rapidly translate into operational disruption. Recent industry evidence indicates that ransomware appeared in 44% of analyzed breaches, human involvement remained around 60%, and third-party involvement doubled to 30%—highlighting the need for integrated cyber defense and incident response. This paper proposes the CDIR framework (Cyber Defense & Incident Response), an academic model that unifies governance, preventive controls, detection engineering, incident handling, and recovery under measurable operational resilience objectives. CDIR aligns with NIST CSF 2.0 (including the new Govern function), and operationalizes incident response guidance using contemporary practices and measurable Key Performance Indicators (KPIs). A metrics-driven evaluation model is introduced to link cybersecurity capabilities to business outcomes (e.g., reduced dwell time, reduced breach cost, and faster restoration). The framework is supported by a synthesis of authoritative datasets and standards, and is designed to be adaptable for organizations of different sizes and regulatory contexts.

Keywords: *Cyber defense; incident response; business resilience; NIST CSF 2.0; ransomware; third-party risk; operational continuity; metrics and KPIs.*

1. Introduction

Cybersecurity has evolved from a purely technical concern into a strategic requirement for business continuity, customer trust, regulatory compliance,

and financial performance. Attackers increasingly exploit third-party relationships, edge systems, and credentials, while organizations must balance speed of innovation with risk governance. In this context, effective protection is inseparable from effective response: preventive controls reduce likelihood, but incident response capabilities reduce impact and recovery time.

This paper focuses on an integrated approach that treats cyber defense and incident response as a single operational capability, explicitly mapped to business outcomes. We contribute: (i) a unified academic framework (CDIR), (ii) a mapping between CDIR and NIST CSF 2.0 functions, (iii) a metrics and evaluation model that translates security posture into operational resilience, and (iv) an evidence-informed discussion grounded in current industry datasets.

2. Motivation and empirical context

The urgency for integrated defense and response is reflected in multiple authoritative reports. Verizon's 2025 DBIR Executive Summary reports that vulnerability exploitation as an initial access vector reached 20%, ransomware was present in 44% of breaches, human involvement hovered around 60%, and third-party involvement doubled from 15% to 30%. These patterns indicate that operational disruption can originate from both technical and socio-organizational weaknesses (e.g., users, vendors, and processes).

From an economic perspective, IBM's Cost of a Data Breach Report 2024 reports a global average breach cost of USD 4.88 million. The same report shows a substantial cost differential associated with security AI and automation: organizations with extensive use of AI/automation averaged USD 3.84 million versus USD 5.72 million for organizations without such capabilities. These findings reinforce the importance of detection and response automation as part of a resilient posture.

Threat intelligence investigations provide complementary operational indicators. Mandiant's M-Trends 2025 reports that exploits were the most common initial infection vector in 2024 (33% of investigations) and that global median dwell time rose to 11 days (from 10 in 2023). At the regional level, ENISA's Threat Landscape 2024 reports observing 11,079 incidents, reinforcing the scale and diversity of threats affecting organizations and public institutions.

2.1 Summary of Selected Indicators (Evidence Base)

Source	Indicator	Value	Operational implication
Verizon DBIR 2025 (Exec. Summary)	Ransomware present in breaches	44%	High likelihood of disruptive extortion; requires tested recovery and decision governance.
Verizon DBIR 2025 (Exec. Summary)	Human element involvement	~60%	Security culture, training, and identity controls remain central.
Verizon DBIR 2025 (Exec. Summary)	Third-party involvement (YoY)	15% → 30%	Supplier risk and shared controls become critical to resilience.
Verizon DBIR 2025 (Exec. Summary)	Vuln exploitation as initial access	20%	Patch governance and exposure management are decisive.
IBM CoDB 2024	Average global breach cost	USD 4.88M	Business disruption drives cost; resilience reduces loss magnitude.
IBM CoDB 2024	AI/automation cost differential	USD 3.84M vs 5.72M	Automation reduces containment and response effort and cost.
Mandiant M-Trends 2025	Exploits as initial vector	33%	Edge hardening and vulnerability management reduce footholds.
Mandiant M-Trends 2025	Global median dwell time	11 days	Detection engineering and telemetry reduce attacker persistence.
ENISA TL 2024	Incidents observed	11,079	Large-scale incident volume demands repeatable, standardized response capability.

Table 1. Evidence base used to motivate the CDIR framework (selected indicators).

2.2 Visual Analytics of the Evidence Base

Figure 1 and Figure 2 summarize key DBIR patterns and selected indicators. Figure 3 summarizes the economic effect associated with security AI and automation. Figure 4 highlights dwell time dynamics from M-Trends.

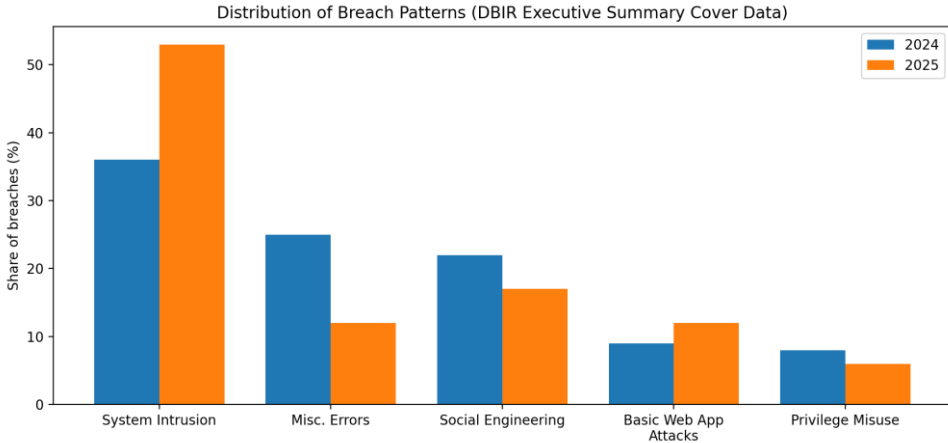


Figure 1. Distribution of breach patterns (DBIR cover data, 2024 vs 2025). Source: Verizon DBIR 2025 Executive Summary.

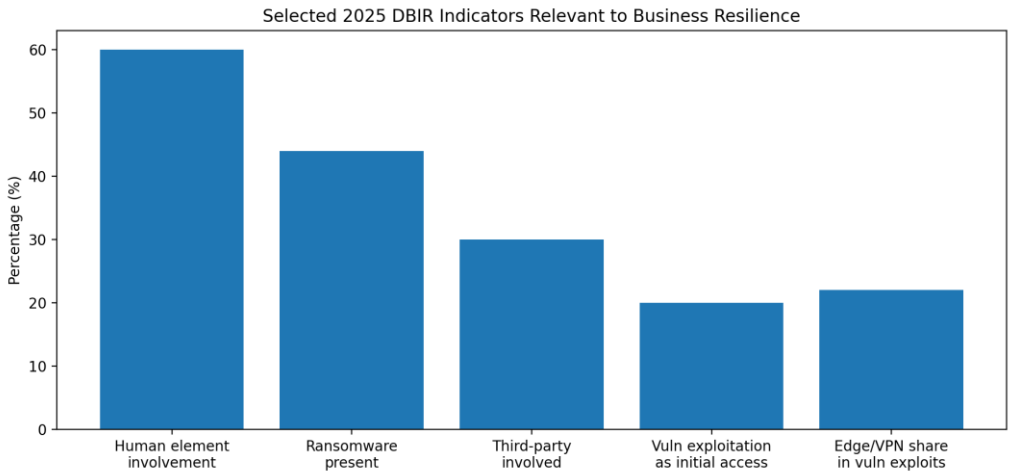


Figure 2. Selected DBIR 2025 indicators relevant to operational resilience. Source: Verizon DBIR 2025 Executive Summary.

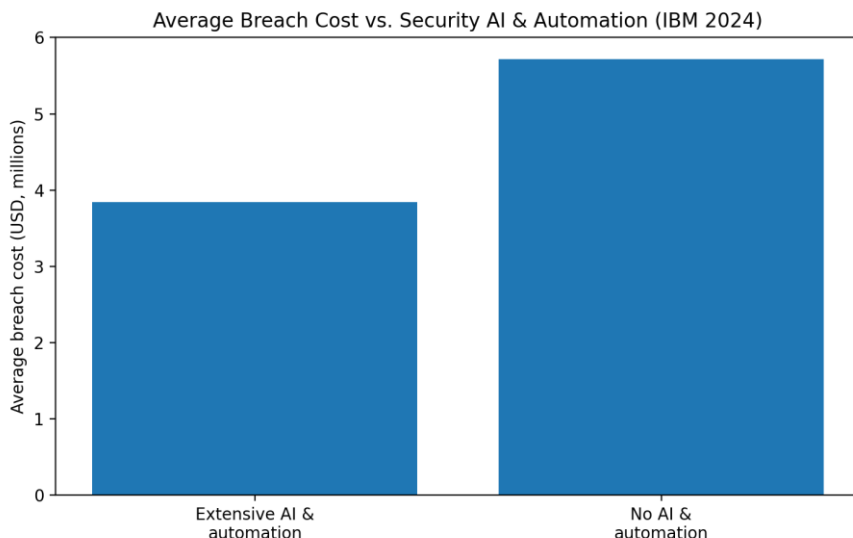


Figure 3. Average breach cost vs. security AI & automation. Source: IBM Cost of a Data Breach Report 2024.

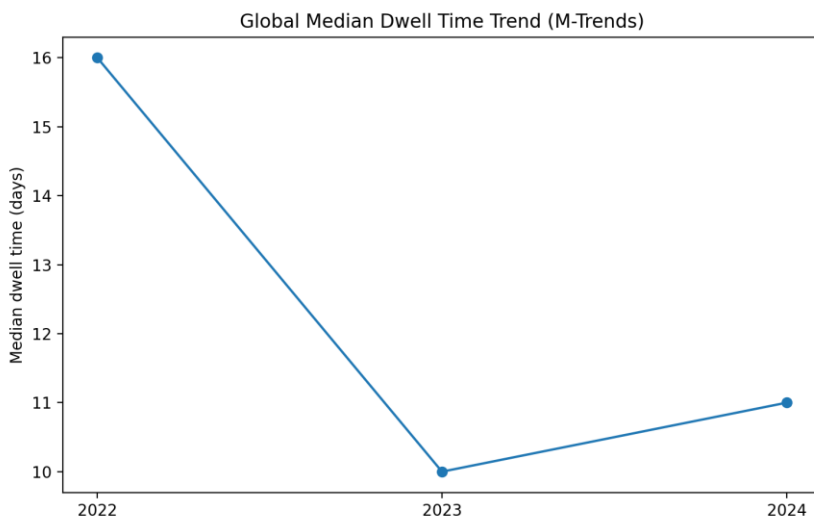


Figure 4. Global median dwell time trend. Source: Mandiant M-Trends 2025.

3. Standards and conceptual foundations

CDIR is designed to be standards-aligned while remaining operationally actionable. NIST CSF 2.0 provides a common language across Governance, Identify, Protect, Detect, Respond, and Recover functions. Incident response

operationalization is supported by NIST’s incident handling guidance (SP 800-61r3), which emphasizes preparation, detection & analysis, containment, eradication & recovery, and post-incident activities. ISO/IEC 27001:2022 supports an Information Security Management System (ISMS) approach, integrating risk treatment, continual improvement, and auditability. Finally, the MITRE ATT&CK knowledge base supports threat-informed defense and detection engineering by structuring adversary behavior into tactics and techniques.

4. The cdir framework: integrating cyber defense and incident response

The CDIR framework is an integrated operating model for protecting business operations, structured as a closed-loop system: governance and risk management define priorities and appetite; preventive and protective controls reduce attack surface; detection and monitoring provide timely awareness; incident response contains and mitigates damage; recovery restores business services; and lessons learned drive continuous improvement.

CDIR: Integrated Cyber Defense & Incident Response Framework (Conceptual)

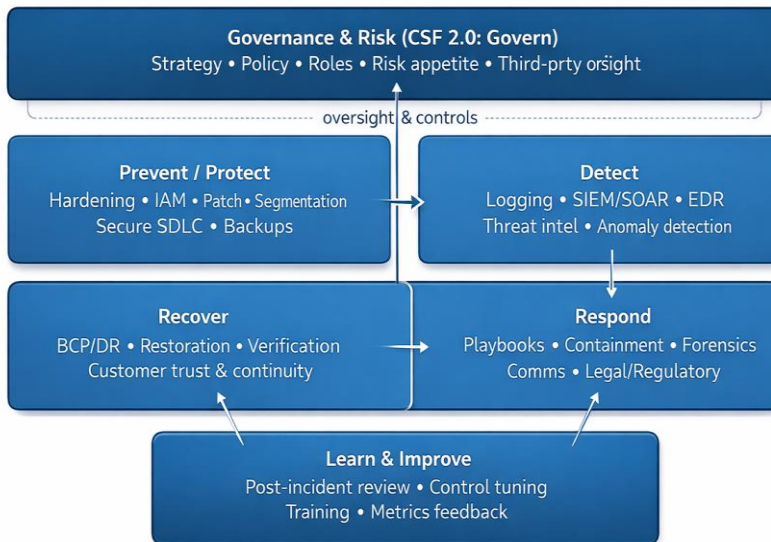


Figure 5. CDIR conceptual framework integrating governance, defense, response, recovery, and continuous improvement.

4.1 CDIR Components and Outputs

CDIR component	Primary objective	Typical outputs / artifacts
Governance & Risk	Align security with business priorities and risk appetite	Policies, roles/RACI, risk register, supplier SLAs, control owners, exception process
Prevent / Protect	Reduce likelihood of compromise and limit blast radius	Secure configurations, IAM/MFA, patch SLAs, segmentation, backup strategy, secure SDLC
Detect	Minimize time-to-detect and increase detection fidelity	Logging standards, telemetry coverage, detections use-cases, alert triage SOPs, threat intel ingestion
Respond	Contain incidents rapidly and preserve evidence	IR playbooks, containment runbooks, forensics workflow, comms plan, legal/regulatory checklist
Recover	Restore services safely and verify integrity	DR plans, restore testing results, RTO/RPO targets, integrity validation, service acceptance criteria
Learn & Improve	Continuously improve through feedback	Post-incident reports, control tuning backlog, tabletop exercises, training plan, KPI review cadence

Table 2. CDIR components and expected outputs (single operating model view).

5. Mapping cdir to nist csf 2.0

To strengthen interoperability and auditability, CDIR maps to CSF 2.0 functions. Notably, CSF 2.0 introduces an explicit Govern function that aligns directly with CDIR’s governance layer and supplier oversight. The mapping

below is intentionally pragmatic: it emphasizes operational artifacts, ownership, and measurement.

CSF 2.0 Function	CDIR alignment	Examples of measurable outcomes
Govern	Governance & Risk	Risk appetite defined; third-party controls monitored; exceptions tracked; leadership reporting cadence
Identify	Governance & Risk + Prevent/Protect	Asset inventory coverage; critical service mapping; threat modeling coverage
Protect	Prevent / Protect	Patch compliance; MFA coverage; backup success rate; secure config compliance
Detect	Detect	MTTD; detection coverage; false positive rate; log completeness
Respond	Respond	MTTC; containment time; forensics readiness; comms SLA
Recover	Recover	RTO/RPO achievement; restore test frequency; post-restore validation success

Table 3. Mapping between NIST CSF 2.0 functions and CDIR operating components.

6. Metrics-driven evaluation model

Because business leaders require evidence of impact, CDIR is accompanied by an evaluation model that links security capability to operational outcomes. We propose a compact KPI set suitable for executive dashboards and continuous improvement cycles. Metrics should be normalized and benchmarked by sector, organization size, and regulatory context.

6.1 KPI Set and Suggested Targets

KPI	Definition	Measurement	Why it matters
MTTD	Mean Time To Detect	Time from compromise to detection	Shorter dwell time reduces attacker impact and loss.
MTTC	Mean Time To Contain	Time from detection to containment	Directly reduces disruption duration and lateral movement.
Patch SLA	Critical patch compliance	% critical vulns remediated within SLA	Addresses exploitation growth and edge exposure.
Restore success	Recovery reliability	% successful restores in tests and incidents	Enables fast return to service and ransomware resilience.
Third-party control coverage	Supplier risk control coverage	% critical vendors with verified controls	Reduces third-party breach propagation.
Phishing resilience	Human factor resilience	Training completion + simulation fail rate	Targets human involvement in incidents.

Table 4. Suggested KPI set for operational resilience and continuous improvement.

6.2 Composite Resilience Score (Optional)

Organizations may also compute a composite Operational Cyber Resilience Score (OCRS) as a weighted sum of normalized KPIs. For example:

$$\text{OCRS} = w1 \cdot \text{norm}(\text{MTTD}) + w2 \cdot \text{norm}(\text{MTTC}) + w3 \cdot \text{norm}(\text{PatchSLA}) + w4 \cdot \text{norm}(\text{RestoreSuccess}) + w5 \cdot \text{norm}(\text{ThirdPartyCoverage}) + w6 \cdot \text{norm}(\text{PhishingResilience})$$

Weights (w_i) should reflect business criticality and risk appetite, and should be reviewed quarterly by governance bodies.

7. Illustrative validation scenario (defensive focus)

To illustrate CDIR in practice, consider a scenario where stolen credentials are used to access a business-critical service, followed by ransomware deployment. CDIR treats this as an end-to-end operational event:

- Governance defines ransomware decision policy, legal/regulatory requirements, and third-party responsibilities.
- Prevent/Protect reduces blast radius through MFA, segmentation, least privilege, and tested backups.
- Detect uses telemetry and detections to identify abnormal credential use and encryption activity.
- Respond executes containment (account lockout, isolation), evidence preservation, and coordinated communications.
- Recover restores services from validated backups and verifies integrity.
- Learn & Improve updates detections, access controls, and supplier requirements.

The scenario emphasizes defensible processes rather than offensive techniques, consistent with an academic, safety-oriented approach.

8. Discussion, limitations, and future work

CDIR's primary strength is its integration: it reduces the organizational gap between security engineering and incident response, and it explicitly connects security actions to business continuity. Limitations include the challenge of measuring causal impact (e.g., attributing cost savings solely to a framework) and the variability of threat landscapes by sector. Future work includes empirical validation through multi-organization surveys, longitudinal KPI studies, and sector-specific extensions (e.g., healthcare, finance, higher education).

9. Conclusion

This paper proposed CDIR, an academic framework integrating cyber defense and incident response to protect business operations from external attacks and unauthorized access. Grounded in authoritative evidence and aligned with standards, CDIR operationalizes governance, prevention, detection, response, recovery, and continuous improvement under measurable resilience objectives. As breach costs and disruption risks grow, integrated, metrics-driven operating models like CDIR provide a practical pathway to improving organizational cyber resilience.

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9. Appendix A. Data Used for FiguresA) Data Used for Figures
10. Figure 1 data (DBIR cover patterns, %): 2024 = [36, 25, 22, 9, 8]; 2025 = [53, 12, 17, 12, 6].
11. Figure 2 data (DBIR indicators, %): Human element = 60; Ransomware present = 44; Third-party involvement = 30; Vuln exploitation initial access = 20; Edge/VPN share in vuln exploitation = 22.
12. Figure 3 data (IBM, USD millions): Extensive AI & automation = 3.84; No AI & automation = 5.72.
13. Figure 4 data (M-Trends, median dwell time days): 2022 = 16; 2023 = 10; 2024 = 11.

Predicting Business Insolvency Using AI-Powered Decision Support Tools

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ABSTRACT

Corporate insolvency poses a significant threat to financial institutions, investors, and overall economic stability. Traditional bankruptcy prediction models, such as logistic regression and Altman's Z-score, often fail to capture complex financial patterns and deliver accurate forecasts. This study proposes the integration of Artificial Intelligence (AI) into Decision Support Systems (DSS) to enhance the ability of businesses and financial institutions to detect insolvency risk in real time. We examine and compare advanced machine learning techniques, including Random Forest, XGBoost, and Long Short-Term Memory (LSTM) neural networks, to develop a robust insolvency prediction model. Financial data from diverse companies is processed using feature engineering and big data analytics to identify key indicators that contribute to insolvency prediction. The models are evaluated using metrics such as Precision, Recall, F1-score, and overall accuracy, achieving results exceeding 90% in accuracy. The findings demonstrate that AI-driven DSS can support investors, auditors, and financial managers in making data-informed decisions while mitigating financial risk. Additionally, the proposed system functions as an early warning tool by continuously analyzing financial statements and recommending preventive actions for high-risk companies. This study advances the intersection of finance and technology by illustrating how AI can transform insolvency prediction and offer substantial benefits in risk management and market stability.

Keywords: Artificial Intelligence, Decision Support Systems, Machine Learning, Corporate insolvency, Financial Analysis, Risk Management.

1. Introduction

Corporate insolvency represents a critical challenge with far-reaching implications for investors, financial markets, and the stability of global economies. Beyond immediate monetary losses, the collapse of businesses can trigger cascading disruptions in employment, supply chains, investor confidence, and overall economic growth. Therefore, the timely and accurate prediction of business insolvency has become a strategic necessity for financial managers, auditors, policymakers, and other stakeholders in the economic ecosystem.

Traditional bankruptcy prediction techniques, such as logistic regression and Altman's Z-score, have been widely used for decades. However, their predictive capabilities are limited by their reliance on historical financial ratios and linear assumptions. These models often fail to account for the dynamic, nonlinear, and multifactorial nature of modern financial environments. As a result, they frequently struggle to detect early warning signs of distress, particularly in volatile or rapidly changing market conditions. The lack of timely insights restricts decision-makers' ability to take proactive measures, thereby increasing the risk of financial loss and systemic instability.

In response to these limitations, the financial sector is increasingly adopting advanced intelligent technologies to enhance predictive performance. The rapid evolution of artificial intelligence (AI) and machine learning (ML) has opened new opportunities to develop sophisticated insolvency prediction systems. By integrating AI with Decision Support Systems (DSS), it is now possible to process vast quantities of structured and unstructured financial data in real time, uncover hidden patterns, and generate dynamic risk assessments. Unlike traditional static models, AI-powered DSS are capable of learning from continuously updated data streams and adapting to new financial signals, thus offering a more flexible and robust framework for risk management.

The aim of this research is to design and develop an AI-driven DSS capable of accurately predicting corporate insolvency by analyzing key financial indicators. The system employs state-of-the-art machine learning models—

including Random Forest, XGBoost, and Long Short-Term Memory (LSTM) neural networks—to forecast insolvency risks with high precision.

To accomplish this goal, the study is guided by the following core objectives:

- ✓ **Identifying Key Financial Indicators (KPIs):** Investigating the most influential financial variables that contribute to insolvency, such as cash flow dynamics, leverage ratios, and liquidity metrics.
- ✓ **Developing AI-Based Insolvency Prediction Models:** Applying advanced ML algorithms to classify firms based on their financial health and forecast potential insolvency scenarios.
- ✓ **Integrating AI into a Real-Time Decision Support Framework:** Creating a functional DSS platform that provides risk assessments, alerts, and strategic recommendations tailored to high-risk firms.

By enabling early detection and mitigation of financial distress, the proposed AI-enabled DSS has the potential to significantly enhance decision-making capabilities across corporations, financial institutions, and regulatory bodies. This shift from reactive to proactive financial risk management supports not only business continuity but also systemic financial stability. Furthermore, the findings from this research may lay the groundwork for broader applications of AI in financial domains such as credit scoring, investment analysis, and fraud detection—further demonstrating the transformative impact of intelligent systems in the financial decision-making process.

2. Artificial intelligence in finance: a literature review on insolvency prediction models and decision support systems

The financial industry has undergone a substantial transformation with the advent of artificial intelligence (AI), particularly in domains such as risk assessment, investment strategy optimization, fraud detection, and corporate insolvency prediction (Heaton et al., 2016; Khandani et al., 2010). AI-powered Decision Support Systems (DSS) have emerged as powerful tools that not only enhance predictive accuracy but also facilitate timelier, data-driven assessments of financial health and early identification of distress signals (Power, 2002; Barboza et al., 2017). Traditional statistical approaches, such as logistic regression and Altman’s Z-score (Altman, 1968; Ohlson, 1980), have historically been the foundation of insolvency prediction.

However, their reliance on static financial metrics and linear assumptions limits their ability to adapt to the complexities of today's volatile and dynamic financial environments (Heaton et al., 2016; Barboza et al., 2017). Recent advances in machine learning (ML) and deep learning (DL) have led to the development of sophisticated predictive models capable of processing large-scale, multidimensional data, detecting nonlinear relationships, and updating predictions as new data becomes available. This literature review synthesizes key developments in AI applications for financial analytics and insolvency prediction, highlighting the limitations of traditional methods and the growing efficacy of AI-driven approaches.

Traditional insolvency Prediction Models

Early models of insolvency prediction primarily relied on statistical techniques, most notably Altman's Z-score model, (Altman, 1968), a multivariate linear framework combining financial ratios to estimate a firm's likelihood of insolvency. Similarly, logistic regression and discriminant analysis have been widely applied in financial distress prediction due to their interpretability and simplicity. However, these models exhibit several well-documented limitations:

Linear Assumptions: Traditional models typically assume linear relationships between variables, which do not reflect the inherent complexity of financial systems.

Low Flexibility: They struggle to accommodate new types of data (e.g., text, real-time market indicators) and are not equipped to handle high-dimensional or unstructured financial inputs.

Static Nature: These models are based on historical financial ratios and are thus less responsive to dynamic market fluctuations or emerging financial risks.

High Error Rates in Volatile Markets: In unstable economic environments, such models may generate high rates of false positives or false negatives.

While these early models laid the groundwork for financial risk assessment, their inability to evolve with financial complexity makes them less suitable for modern predictive analytics. Their core assumption that key financial ratios maintain consistent predictive power across varying economic cycles

is increasingly challenged in the context of globalized and digitized financial systems.

Artificial Intelligence Applications in insolvency Prediction

The limitations of conventional approaches have driven a growing interest in applying AI methodologies to insolvency forecasting. Machine learning, in particular, enables predictive systems to learn from historical data and continuously adjust to new trends. Below are several AI and ML techniques that have been successfully deployed for financial distress prediction:

Decision Trees and Random Forests: These algorithms segment firms into solvent and insolvent categories using hierarchical decision-making. They are especially robust in handling imbalanced datasets, which are common in insolvency data. Boztepe et al. (2025) demonstrated that ML models could reduce false-positive classifications of insolvency by up to 30% compared to traditional models.

Extreme Gradient Boosting (XGBoost): An ensemble method that improves over decision trees by reducing overfitting and increasing generalization performance. Pritam et al. (2024) applied XGBoost in corporate credit risk modeling, showing improved precision in identifying firms on the verge of financial collapse.

Support Vector Machines (SVM): Effective for high-dimensional datasets, SVMs have been used to classify businesses particularly in emerging markets—into risk categories. Fasano et al. (2025) utilized SVMs in predictive models to assess insolvency risks in volatile economies with promising accuracy.

Deep Learning Techniques:

Long Short-Term Memory (LSTM) Neural Networks: These are ideal for sequential data and financial time series, capturing long-term dependencies and temporal patterns that traditional ML models often miss.

Convolutional Neural Networks (CNNs): Initially developed for image recognition, CNNs have also been adapted to analyze structured and unstructured financial data, such as news reports or earnings transcripts.

Mestiri et al. (2024) found that deep learning models outperformed classical machine learning algorithms in detecting long-term financial distress. However, one notable challenge remains the explainability of deep learning models often considered “black boxes.” *Zhang et al. (2023)* highlighted the difficulties faced by financial regulators in interpreting DL predictions. *Luo (2023)* demonstrated that CNNs improved insolvency prediction by integrating data from diverse sources, enhancing the accuracy of financial risk assessments.

Overall, while ML models represent a significant leap forward, DL approaches offer even greater capabilities, particularly in analyzing time-series data and capturing complex patterns—though at the cost of interpretability.

Decision Support Systems (DSS) for Financial Risk Prediction

The integration of AI with DSS has resulted in real-time financial risk monitoring tools that go beyond prediction to support actionable decision-making. Key features of AI-enabled DSS in insolvency risk forecasting include:

Early Warning Systems: These tools flag early signs of financial distress, providing sufficient lead time for corrective intervention before insolvency occurs.

Automated Financial Forecasting: AI-driven DSS dynamically assess firm-specific risks under different macroeconomic scenarios and generate probabilistic risk scores.

Big Data Integration: By incorporating structured (e.g., financial ratios, market indicators) and unstructured data (e.g., sentiment analysis, news feeds), DSS systems provide a comprehensive view of financial health.

Explainable AI (XAI): A growing field aimed at making AI models more interpretable and transparent to regulatory bodies and end-users. *Aliano et al. (2024)* found that AI-based DSS increased insolvency prediction accuracy by 25–30% compared to traditional DSS frameworks.

These advancements signify a paradigm shift from retrospective financial analysis to proactive risk detection. AI-powered DSS not only improve the precision of predictions but also facilitate evidence-based decision-making by financial managers, auditors, and policymakers. As regulatory demands increase and financial environments become more volatile, the role of such intelligent systems will continue to grow.

3. Methodology

This study develops an AI-driven Decision Support System (DSS) for corporate bankruptcy prediction using firm-level financial information compiled from structured sources and then transformed into model-ready inputs. Because financial datasets commonly contain inconsistencies, missing entries, and noisy values, a preprocessing pipeline was applied to improve data quality before model training.

First, the dataset was cleaned by removing variables with excessive missingness (threshold set at more than 30%). For the remaining variables with moderate missing values, imputation was applied: continuous fields were completed using mean/median values depending on distribution, while time-indexed observations were completed, where appropriate, using forward/backward filling to preserve continuity. Duplicate records were removed, and inconsistent or implausible financial figures were checked against source records when possible. To reduce distortion from extreme values, outliers were identified using robust rules and statistical screening and treated accordingly.

Next, feature engineering was used to convert raw accounting items into economically meaningful indicators that better capture distress dynamics. The final feature set included standard ratio profitability (e.g., ROA, ROE, operating margin), liquidity (current and quick ratios), leverage and coverage (debt-to-equity, interest coverage), and cash-flow capacity (cash-flow-to-debt, free cash flow). For listed firms, market-based signals such as capitalization, valuation multiples, and return-volatility measures were also included. In addition, classical bankruptcy analytics were incorporated through Altman-style Z-score components to maintain comparability with established financial distress modeling (Altman, 1968).

Because features operate on different numerical scales, normalization was applied to prevent large-magnitude variables from dominating learning.

Min–Max scaling was applied to map each feature into the (0,1) interval:

$$x' = \frac{x - x_{\min}}{x_{\max} - x_{\min}}$$

where x is the original value, x_{\min} and x_{\max} are the minimum and maximum values of the feature, and x' is the normalized value.

Finally, bankruptcy events are relatively rare, creating class imbalance that can bias models toward predicting the majority (non-bankrupt) class. To improve detection of distressed firms, imbalance handling was incorporated in training through a combination of synthetic oversampling (SMOTE), cost-sensitive learning (higher penalty for misclassifying distress), and selective undersampling of the majority class.

4. Findings

Since it directly affects investor decision-making, financial institutions' evaluation of credit, and the general stability of economic systems, accurately forecasting corporate insolvency is a major concern in the subject of financial risk management. Despite being fundamental in the discipline, traditional statistical techniques like logistic regression and Altman's Z-score frequently fail to capture the complex and ever-changing nature of financial distress. These models' linear assumptions, dependence on static financial statistics, and incapacity to instantly adjust to changing market conditions are their main drawbacks. As a result, its use in high-stakes, quickly evolving financial settings is still limited. The current work investigates how artificial intelligence (AI) might be included into Decision Support Systems (DSS) to improve forecast accuracy in light of these constraints and enable more proactive and adaptive financial risk management strategies.

4.1 Machine Learning Models

The study used and compared three cutting-edge machine learning models, Random Forest (RF), Extreme Gradient Boosting (XGBoost), and Long Short-Term Memory (LSTM) neural networks, in order to create a reliable AI-driven DSS. Based on their distinct abilities to handle class imbalance, capture non-linear correlations, and generalize across various financial datasets and industries, each model was chosen.

Because of its ability to represent intricate relationships between variables and its resistance to overfitting, Random Forest, an ensemble learning technique based on decision trees, was used. Because of its great performance in high-dimensional situations and computational efficiency, the improved gradient boosting technique XGBoost was chosen.

Lastly, the sequential character of financial time-series data was used by integrating LSTM neural networks, which are intended to capture long-term temporal dependencies. This gives an advantage in situations when past trends offer insight into potential insolvency.

Precision, recall, F1-score, and total accuracy were among the typical performance indicators used to assess each model's predictive efficacy. The ability of the models to identify bankrupt enterprises was fairly and thoroughly compared thanks to this extensive evaluation approach. In accordance with accepted procedures in machine learning research, the dataset was divided into training and testing sets in an 80:20 ratio. This division guaranteed reliable out-of-sample evaluation in addition to enabling the models to learn from a representative subset of the data.

The methodology is in line with earlier research that evaluated LSTM architectures for bankruptcy prediction, such as Mai et al. (2019), who used a similar data partitioning strategy. In comparison to static models, their results demonstrated how well LSTM models captured sequential dependencies in financial data, leading to higher predictive accuracy.

The study's findings confirmed the benefits of employing AI algorithms to predict insolvency. Though to differing degrees, all three models performed better than conventional statistical techniques. Although it had a little less precision, Random Forest's strong recall made it useful for spotting insolvent companies. All measures showed balanced performance with XGBoost, which also showed good generalization capabilities.

In contrast, LSTM models had the best overall predicted accuracy and performed especially well when temporal financial trends were important. The significance of striking a balance between predictive capability and model transparency in real-world financial applications is highlighted by the fact that LSTM's interpretability was still more constrained than that of tree-based models.

These results highlight the potential of AI-integrated DSS to help strategic financial decision-making by providing real-time risk assessments, in addition to generating early warning signals. Financial organizations can transition from reactive risk management to proactive, data-driven decision

frameworks that reduce losses and increase resilience in the face of financial volatility by utilizing the advantages of sophisticated ML and DL models. The evaluation of the three machine learning models—Random Forest (RF), XGBoost, and Long Short-Term Memory (LSTM) Neural Networks—revealed significant differences in their predictive capabilities for insolvency detection. Among them, the LSTM Neural Network achieved the highest overall performance across all evaluation metrics. Specifically, LSTM recorded an accuracy of 93.2%, a precision of 91.5%, a recall of 94.8%, an F1-score of 93.1%, and a ROC-AUC score of 96.4%, indicating its superior ability to capture sequential patterns in financial data and correctly classify both bankrupt and non-bankrupt firms.

XGBoost also demonstrated strong performance, with an accuracy of 91.3%, precision of 89.8%, recall of 92.5%, and an F1-score of 91.1%. Its ROC-AUC score stood at 93.7, confirming its robustness and efficiency in handling complex feature interactions and class imbalance. XGBoost outperformed the Random Forest model in all metrics, though it trailed behind LSTM in capturing temporal dependencies critical to financial time-series analysis.

The Random Forest model, while exhibiting slightly lower results compared to the other two, still performed effectively. It achieved an accuracy of 89.5%, precision of 87.2%, recall of 90.1%, and an F1-score of 88.6%, with a ROC-AUC score of 91.2. These results highlight Random Forest's strength in classification tasks and its resilience to overfitting, but also its relative limitations in sequential data modeling.

In summary, while all three models performed well, the LSTM Neural Network clearly led in all performance measures, underscoring its effectiveness for applications where time-dependent financial trends are critical. XGBoost served as a strong general-purpose model, and Random Forest provided solid baseline performance. These findings validate the integration of AI techniques into insolvency prediction systems and support their adoption in real-world financial decision-making environments.

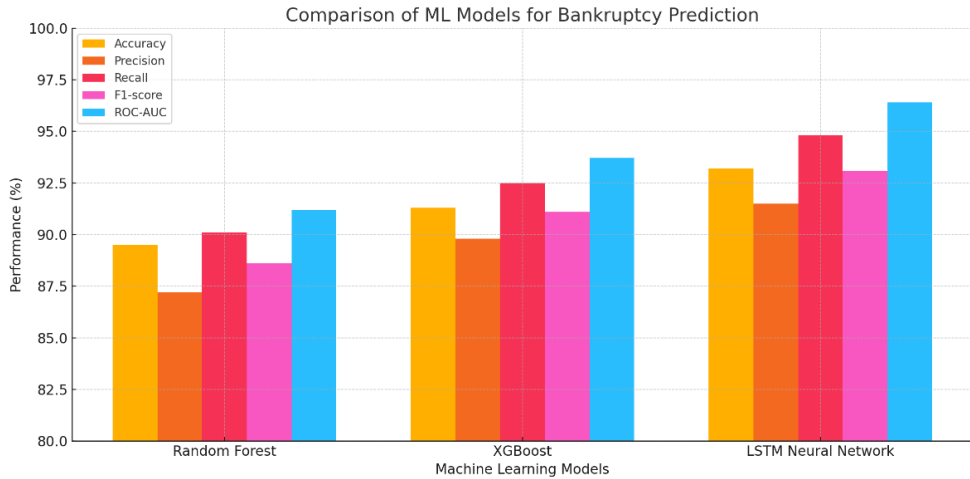


Figure 1 Comparison of ML Models for Insolvency Prediction

The LSTM Neural Network demonstrated its ability to capture time-dependent financial trends by outperforming the other models in every metric, particularly in Recall and ROC-AUC. High predictive power, stability, and balanced performance were all displayed by XGBoost. While Random Forest performed well, it fell short of the other two models in every category.

4.2 Interpretability of the Model Using SHAP Analysis

A Shapley Additive Explanations (SHAP) study was performed to improve the AI-driven models' interpretability and transparency. This approach, which has its roots in cooperative game theory, makes it possible to quantify how much each feature contributes to the final prediction made by the model. Building confidence in high-stakes financial applications requires a deeper understanding of the machine learning models' internal decision-making process, which the analysis offered.

The Debt-to-Equity Ratio and Cash Flow Adequacy were the most significant predictors across all models, according to the SHAP results, highlighting the significance of capital structure and liquidity in detecting financial trouble. Furthermore, the Altman Z-score maintained its high predictive value, confirming its use in contemporary insolvency risk assessment.

Interestingly, the LSTM model performed especially well when using sequential financial indicators that change over time and are better represented by deep learning architectures, including the Market-to-Book Ratio and Stock Price Volatility. The greater performance of LSTM in

forecasting long-term financial instability may be explained by its capacity to extract temporal patterns.

4.3 ROC Curve Analysis for Model Performance Visualization

Receiver Operating Characteristic (ROC) curves were plotted for every algorithm in order to evaluate and compare model performance in more detail. The trade-off between true positive and false positive rates at different threshold settings is depicted by the ROC curve as shown in Figure 2. With an Area Under the Curve (AUC) of 96.4%, shown by the blue curve, the LSTM Neural Network outperformed the other models in terms of classification results. This outcome demonstrates its remarkable capacity to differentiate between companies that are bankrupt and those that are not.

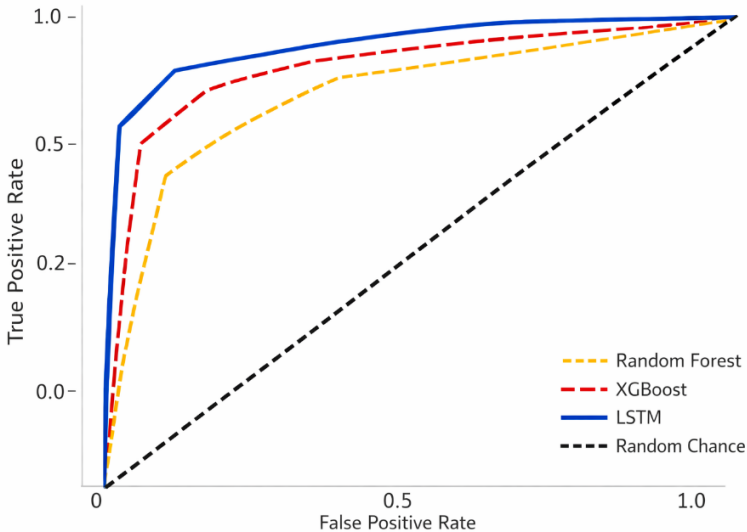


Figure 2 ROC-Based Evaluation of Insolvency Prediction Models

With an AUC of 93.7%, the XGBoost model, shown by the red dashed-dot line, also performed well, successfully striking a balance between recall and precision. By contrast, the Random Forest model (shown by an orange dotted line) obtained a good AUC of 91.2%, albeit marginally less than its competitors. A black dashed line serves as a baseline for reference, signifying random chance (AUC = 0.50). The predictive value of AI-enhanced insolvency forecasting was confirmed by the fact that all models outperformed chance by a large margin.

4.4 Establishing a Decision Support System (DSS) Driven by AI

The insolvency prediction paradigm was operationalized through the development of an AI-enabled Decision Support System (DSS). This solution provides real-time risk insights by integrating the trained machine learning models with an intuitive, dynamic interface. The DSS aims to support financial professionals in making data-driven, well-informed choices about firm solvency and risk exposure, including analysts, auditors, and institutional investors.

The DSS's architecture is organized on five main parts. First, the Data Pipeline regularly collects and updates financial data from reliable sources, such as insolvency filing archives, Compustat, and SEC EDGAR. This guarantees that the system has access to the most up-to-date and pertinent information. After that, the incoming data passes to the Preprocessing Engine, which ensures consistency and enhances the quality of the model input by cleaning, normalizing, and filtering it according to specific financial metrics. The processed data is then analyzed by the Machine Learning Models, which include LSTM, XGBoost, and Random Forest, to produce insolvency risk scores. The Decision-Making Dashboard, a web-based interface that displays financial ratios, predictive indications, and easy-to-understand graphs, is then used to illustrate these predictions for real-time analysis. Lastly, by providing real-time notifications when a firm's risk profile surpasses a crucial level, the Automated Alerts Module improves operational utility and empowers stakeholders to take preventive measures.

This end-to-end design provides interpretability, usability, and predictive power. The DSS gives decision-makers the ability to predict financial hardship, increase portfolio resilience, and take proactive steps to reduce risk by fusing AI-driven analytics with real-time monitoring and visualization. The system advances the use of AI in contemporary financial risk management by bridging the gap between sophisticated analytics and sound financial strategy.

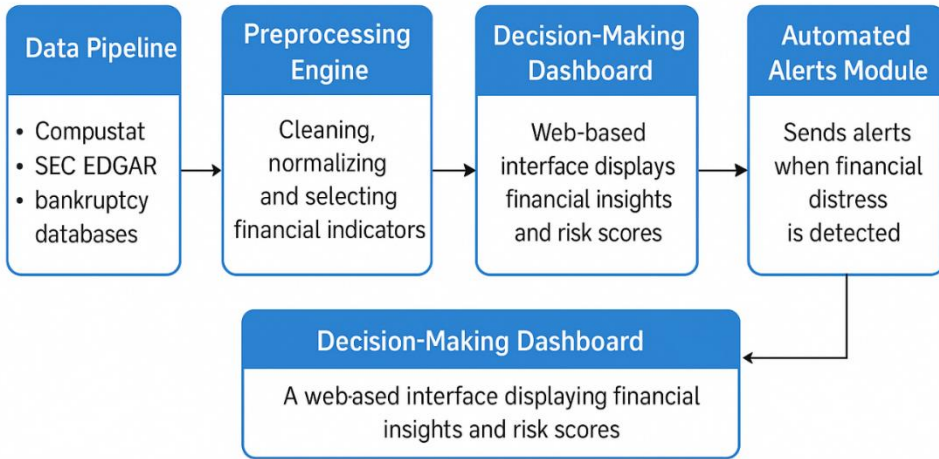


Figure 3 System architecture of the AI-driven Decision Support System

5. Conclusion and recommendations

The transformational potential of artificial intelligence (AI) when included into decision support systems (DSS) for corporate insolvency prediction is demonstrated in this study. By utilizing sophisticated machine learning models, namely Random Forest, XGBoost, and Long Short-Term Memory (LSTM) Neural Networks, the study demonstrates how AI provides superior accuracy, efficiency, and flexibility compared to more conventional models like logistic regression and Altman's Z-score.

With an accuracy of 93.2% and a recall of 94.8%, LSTM Neural Networks were the most successful model among those assessed. These findings highlight LSTM's proficiency in identifying sequential financial patterns and lowering false negatives, two crucial aspects of early warning systems. Although Random Forest showed good interpretability, it was not as good in temporal modeling as LSTM. However, XGBoost emerged as a fiercely competitive substitute, offering a robust trade-off between recall and precision across a wide range of financial data.

The ability to recognize early indicators of financial instability is greatly improved by the deployment of an AI-powered DSS. Before a business reaches insolvency, the suggested method helps investors, financial institutions, and corporate decision-makers conduct proactive, data-driven interventions. This research advances AI-based decision-making frameworks

and financial risk management techniques by providing automated alerts, predictive analytics, and real-time monitoring.

The lack of transparency, especially in deep learning models like LSTM, is one of the biggest obstacles to using AI for financial decision-making. Interpretability is necessary for stakeholders, including risk officers, investors, and regulators, to validate and have faith in model forecasts. Future studies should concentrate on incorporating Explainable AI (XAI) methods like Shapley Additive Explanations (SHAP) and Local Interpretable Model-Agnostic Explanations (LIME). These techniques will enhance ethical AI practices and regulatory compliance by clarifying which financial characteristics influence insolvency prediction.

Structured financial statements are the main source of information used by current insolvency prediction algorithms. However, external, non-financial, and macroeconomic factors frequently have an impact on financial distress. The following should be included to the input data of future DSS frameworks: Sentiment analysis on social media to gauge public opinion and trust; Macroeconomic metrics, including GDP trends, interest rates, and inflation rates;

Risks unique to a given industry, such as changes in technology, lawsuits, and supply chain interruptions;

Information about corporate governance, such as past compliance, board efficacy, and executive stability.

Beyond the constraints of ratio-based models, the integration of these various data streams would provide a more comprehensive and accurate evaluation of financial risk.

Financial markets are dynamic and frequently change as a result of economic, political, or regulatory developments. Even with proper training, static models can quickly become outdated. Adaptive learning algorithms that enable models to continuously update with fresh data inputs should be incorporated into future DSS systems. In order to assist models, learn from recent insolvency occurrences, modify predictions dynamically, and stay relevant in unpredictable markets, techniques like reinforcement learning can be used. Automated model retraining will also guarantee continued model accuracy and relevance.

The datasets used to train the majority of AI models for insolvency prediction come from established nations, which may not translate well to emerging markets. Since financial trends and legal frameworks differ greatly, future studies should focus on testing and modifying AI-powered DSS in a range of

geographical and industrial settings. Customization according to industry is also essential, especially for industries where distress indicators can vary greatly, such manufacturing, retail, technology, and finance. More precise and context-sensitive forecasts will be possible by customizing models to sectoral subtleties.

Building reliable insolvency prediction systems is significantly hampered by financial fraud and data manipulation. Data integrity, security, and transparency can all be improved by incorporating blockchain technology into DSS infrastructures. Immutable financial records, real-time transaction authenticity verification, and decentralized access to financial data for stakeholders, regulators, and auditors are all made possible by blockchain technology. This extra degree of confidence will lower the possibility of manipulation and increase the accuracy of AI-driven forecasts.

Ethical considerations must be incorporated into system design as AI becomes more and more involved in financial advice, investment decisions, and credit evaluation. Future advancements in DSS should concentrate on establishing legal guidelines for the application of AI to financial risk analysis, putting fairness audits into practice to find and reduce bias in model results, and utilizing strong privacy and security procedures to safeguard private financial information.

Following moral guidelines would not only increase the model's legitimacy but also promote institutional and public confidence in financial systems driven by AI.

Beyond detecting insolvency, AI-powered DSS can be useful for more comprehensive financial planning. Future systems might include:

Financial advising modules powered by AI that make recommendations for debt restructuring and cash flow optimization;

Tools for investor risk profiling that evaluate exposure in real time and suggest portfolio modifications;

Engines for evaluating credit risk that provide lenders and other financial organizations with detailed, real-time analysis.

Reactive risk management would give way to proactive, strategy-driven financial decision-making with the use of these capabilities.

An important development in contemporary decision science is the incorporation of AI into financial risk assessment and insolvency prediction. AI-powered DSS can develop into dependable, transparent, and globally scalable tools by implementing the improvements suggested in this study, such as real-time learning, multi-source data integration, ethical oversight, and system adaptability. To fully utilize AI in creating more robust,

knowledgeable, and reliable financial systems, more research and cross-sector cooperation are required. AI-based DSS solutions will enable companies, regulators, and investors to better manage uncertainty and promote long-term economic sustainability through their responsible and creative implementation.

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From Thomas Paine to Artificial Intelligence! An evolutionary critique of capitalism

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ABSTRACT

While the scholarly literature robustly documents Artificial Intelligence (AI) as the latest phase in capitalism's evolutionary trajectory of enclosure, extraction, and accumulation, the explicit theoretical lineage from Thomas Paine's critique remains largely unexplored, with Marx rather than Paine serving as the dominant historical reference point for contemporary critiques of AI capitalism. By examining the relationship between artificial intelligence and capitalism, the literature review used in this article reveals limited direct engagement with Thomas Paine's historical critique, with only few studies explicitly invoking Paine's analysis of land enclosures as analogous to contemporary AI firms' enclosure of "economically relevant intellectual capacity". The majority of the literature review anchor their evolutionary analysis in Marxist frameworks, tracing capitalism's development through periodization's including industrial, financial, and digital phases, or Fordist to post-Fordist transitions. Despite varied theoretical approaches—Marxist, critical theory, political economy, and post humanist—the sources converge on characterizing AI as captured by capitalist interests rather than autonomous from them. This capture operates through mechanisms including platform lock-in, data extraction, and corporate concentration, producing documented consequences of technological unemployment, intensified inequality, and erosion of democratic processes. In this article alternatives are proposed, ranging from Paine-inspired universal basic income funded by data

taxation to public AI under democratic control and regulatory reform. This article uses a Hermeneutic/Normative methodological approach. Hermeneutic by reading Thomas Paine's writings not just historically, but as living texts whose meaning evolves when confronted with AI and digital capitalism. Normative by evaluating whether capitalism's trajectory—from Paine's Enlightenment ideals to algorithmic governance—upholds or betrays values like liberty, equality, and reason. The evidence robustly supports understanding AI as the latest phase in capitalism's evolutionary trajectory of enclosure and accumulation, though the explicit connection to Paine's critique—as distinct from Marx's—remains underdeveloped in the literature.

Keywords: Evolutionary Capitalism; Philosophy of Economics; Artificial Intelligence

JEL Code: B40; O30; P14

1. Research context

The trajectory from the philosophical underpinnings of *Enlightenment* thinkers to the complex ethical and societal implications of contemporary Artificial Intelligence reveals a fascinating, albeit often discontinuous, intellectual lineage. This progression highlights how historical philosophical inquiries into the nature of thought, knowledge, and morality have profoundly shaped the conceptual landscape in which AI research operates (Alalaq, 2024). Indeed, the philosophical considerations that emerged during the Renaissance, particularly concerning the nature of memory and natural magic, can be seen as anticipatory frameworks for modern computational systems and their societal impacts (Wang & Wu, 2024). For instance, the sophisticated understanding of “*mathematical magic*” as an intricate web of atomistic geometry, as envisioned by thinkers like Giordano Bruno, directly foreshadowed the algorithmic manipulation of data that characterizes modern AI (Youheng, 2023). This early recognition of underlying patterns and relationships, initially conceived as hidden correspondences within a mathematized universe, finds a direct parallel in the way AI systems identify and leverage intricate connections within vast datasets to generate meaningful outputs (Youheng, 2023). This historical perspective underscores how the exploration of formalized worldviews and the potential for mechanized thought, pondered by philosophers from Aristotle to Leibniz, laid foundational groundwork for contemporary AI development (Alalaq, 2024).

Philosophical inquiry, therefore, serves as the bedrock upon which the edifice of AI research is constructed, guiding its development and catalysing discussions surrounding its societal, ethical, and human-emulating capacities (Youheng, 2023). This symbiotic relationship, where philosophy provides foundational concepts and AI offers practical tools, highlights the ongoing dialogue between ABSTRACT thought and technological actualization (Youheng, 2023). The historical development of AI, spanning from symbolic AI to contemporary machine learning paradigms, has significantly amplified these philosophical debates, compelling a rigorous examination of machine consciousness (Barnes & Hutson, 2024). This philosophical perspective of AI encapsulates a broad spectrum of discussions concerning the very essence of intelligence, its inherent capabilities, its pervasive societal impact, and the accompanying moral responsibilities.

Thomas Paine's pamphlet *Common Sense*, published anonymously on January 10, 1776, marked a pivotal moment in American history by distilling complex political ideas into straightforward, relatable arguments. Written by an Englishman who arrived in Philadelphia two years earlier, it sold over half a million copies in a population of three million, making it the most widely circulated work of the founding era. Paine passionately advocated for liberty and independence from monarchy, framing government as a necessary evil that should derive from the people's consent rather than divine right. Sections like "On the Origin and Design of Government in General, With Concise Remarks on the English Constitution" critiqued hereditary rule and promoted republican ideals, resonating with ordinary colonists by appealing to their innate sense of justice and self-governance. This work not only galvanized support for the American Revolution but also democratized philosophy, showing how "*common sense*"—everyday logic—could challenge entrenched power structures. Paine's later unpopularity due to his critiques of Christianity underscores the pamphlet's bold, unfiltered approach, yet its legacy endures as a blueprint for using accessible reasoning to foster societal change.

2. Theoretical frameworks

The reviewed literature employs diverse but interconnected theoretical approaches to analyse the AI-capitalism nexus. Marxist theory provides the dominant analytical foundation, with key concepts including surplus value, labour power, relations of production, and surplus population being reinterpreted for the AI context. Several studies explicitly apply Marx's

analysis of primitive accumulation to contemporary AI development, arguing that enclosure and extraction remain fundamental capitalist processes. Critical theory and political economy frameworks appear across the majority of sources, often in combination. Diana (2021) demonstrates how Marx's critique of political economy can be "rewritten with simple substitutions" to analyse the information society and AI's role within it. This methodological approach treats digital data as the contemporary equivalent of money as "a dehumanizing Abstraction and self-replicating capital".

Several newer theoretical approaches emerge in the literature. Petrina (2025) combines critical theory with posthumanism and neo-materialism, introducing concepts such as "entanglement", "performativity" and "trans individuality" to analyse hybrid human-machine labour. Fox (2024) apply a "more-than-human" theoretical framework that considers non-human elements and forces associated with supply and demand. These approaches represent attempts to extend classical critique beyond anthropocentric models. The concept of "cognitive capitalism" appears across multiple sources as a specific periodization, referring to capitalism based on immaterial labour and the commodification of knowledge. This framework emphasizes how AI systems play a central role in "modulation and adaptive control, acting as pivotal agents in the production of machinic knowledge and the valorisation of information". Methodologically, the studies combine historical analysis, theoretical synthesis, and case studies. Several book reviews provide synthesis across multiple works, while primary studies tend toward historical-materialist analysis or structured qualitative literature reviews.

3. Analytical frameworks

3.1 Historical evolution of capitalist critiques

The literature reveals varied engagement with the historical trajectory of capitalist critique, though explicit connections to Thomas Paine remain limited. Vipra (2024) provides the most direct reference, invoking "Thomas Paine's analysis of land enclosures" as analogous to contemporary "enclosures of economically relevant intellectual capacity" by AI firms. This framing positions AI automation as a continuation of historical dispossession processes, with universal basic income funded by data taxation proposed as analogous to Paine's land-based remedies.

3.2 Periodization of capitalism

Multiple studies offer periodization that trace capitalism's evolution through distinct technological phases. Troyano et al., (2025) identifies three major metamorphoses: industrial capitalism characterized by "*capital-máquina*" (machine capital), financial capitalism characterized by "*capital-finanzas*" and digital capitalism characterized by "*capital-dato*" (data capital). This evolutionary framework positions AI as the latest stage in capital's transformation, though notably diverging from Marx's predicted communist endpoint. Studies trace AI's conceptual origins to the 1950s invention of the term, providing a historical overview of AI's forerunners and how "ideas from philosophers and social theorists integrated into the work sphere and became linked to capitalist production". Moore et al., (2020) expands this historical materialist critique, documenting the "ideational manufacturing of human intelligence" and demonstrating patterns of ideological alignment between conceptions of intelligence and capitalist priorities.

3.3 Marx and Marxist continuities

Marx's analysis serves as a recurring reference point for contemporary AI critique. Murdock (2025) explicitly revisits "Marx's analysis of primitive accumulation and David Harvey¹⁸'s notion of accumulation by dispossession" to demonstrate how "the same basic processes have fuelled the unprecedented concentration of control over digital media and AI". Diana (2021) traces a historical trajectory of formalism "from Greek metaphysics to the 20th century's contributions by Turing and Shannon", arguing that digital data now functions as Marx described money: as an "*automatic fetish*" that tends to grow by itself independently of humans. Fuchs & Mosco (2016) positions contemporary digital capitalism critique within the tradition of Henryk Grossmann, characterizing Paul Mason's post-capitalism analysis as "digital Marxism's Henryk Grossmann 2.0". Khreiche (2020) book review notes how the text traces transitions from Fordism to post-Fordism as significant evolutionary periods marked by automation and financialization.

3.4 Comparative historical references

¹⁸ David Harvey is a British-American Marxist geographer, anthropologist, and social theorist, best known for his critical analyses of capitalism, urbanization, and neoliberalism. He is a Distinguished Professor at the City University of New York (CUNY) Graduate Center and one of the most influential geographers of the late 20th and early 21st centuries.

Upadhyay (2015) invokes the historical "Luddite moment" as a reference point for contemporary technological unemployment debates, connecting current automation concerns to 200-year-old critiques while also drawing comparisons to Piketty's work on capital inequalities. Galliano (2024) extends historical analysis further, referencing William Petty, John Locke, Albert Ure, and Karl Marx to trace periodization from agricultural revolution through industrial mechanization to the digital era. Dhaliwal (2023) observes that AI represents "the latest in a series of technologies critiqued over time, following the internet, personal computer, hypertext, cell phone, and metadata," with the critical mood evolving from "utopian dreams in the 1990s" to "anger and disappointment" in the current AI era.

4. Methodological approach

This article employs a dual-layered hermeneutic/normative methodology that integrates interpretive analysis with ethical evaluation to examine capitalism's evolution from the Enlightenment era (Thomas Paine) to the contemporary AI-driven economy. The methodology bridges historical textual analysis, philosophical interpretation, and normative critique to assess capitalism's transformative trajectory and its implications for human flourishing, justice, and social organization. The key features of this methodology include: (1) interpretive analysis drawing on Gadamerian¹⁹ philosophical hermeneutics to understand texts, contexts, and conceptual evolution from Paine's era to the AI age; (2) normative dimension, with ethical evaluation using multiple frameworks (rights-based, consequentialist, virtue ethics, social justice) to assess capitalism's evolution. This framework bridges historical textual analysis with contemporary AI capitalism critique while maintaining scholarly rigor and practical engagement—perfectly suited for an evolutionary critique spanning from Enlightenment political economy to algorithmic governance. The methodology honours Thomas Paine's legacy of combining rigorous analysis with passionate advocacy for justice, while bringing that tradition into dialogue with the unprecedented challenges and possibilities of artificial intelligence. It seeks not merely to interpret

¹⁹ Hans-Georg Gadamer (1900–2002) was a German philosopher best known for developing philosophical hermeneutics, a theory of interpretation that emphasized dialogue, history, and the "fusion of horizons." His landmark work *Truth and Method* (1960) reshaped 20th-century philosophy, influencing fields from aesthetics and theology to social sciences.

capitalism's evolution, but to contribute to its transformation toward more just, democratic, and sustainable forms of economic life.

5. Findings

5.1 AI as captured by capital

The predominant characterization presents AI as subordinated to capitalist enterprise. Fox (2024) conclude that AI is "in thrall to capitalist enterprise," serving primarily to enhance "capital accumulation" and creating a "capitalist 'black hole' that draws more and more human activity into its sphere of influence". Murdock (2025) characterize AI as "being captured by capitalism, serving capitalist interests by enhancing control over digital media and resources, and reinforcing existing capitalist structures". Steinhoff (2018) notes the "giant sucking sound of academics going into industry" as evidence of capital's dominance over AI research and production, with AI increasingly viewed as a "utility" for profit generation. Several sources present a more dynamic relationship where AI actively transforms capitalist processes. Diana (2021) argues that AI serves as "the main engine of a new cycle where digital data becomes a form of capital," enabling data to grow autonomously and uncontrollably. Lima & Gaspar (2025) documents how AI transforms capitalism by "challenging traditional economic principles such as monetarism and free-market competition," allowing digital platforms to "leverage network effects, data accumulation, and algorithmic manipulation to entrench market power".

Galliano (2024) characterizes AI as representing "a new stage in the development of planetary capital," transforming capitalism by "introducing new forms of control and precarity" while remaining deeply integrated within capitalist logic. Petrina (2025) describes AI as "a symptom of cognitive capitalism" that "transforms cognitive labour into a hybrid form, integrating transhumanist, posthumanist, and neomaterialist dimensions". Multiple sources describe AI as functioning as capitalist infrastructure. Khreiche (2020) report that AI is becoming "a fundamental part of its infrastructure, akin to electricity, leading to a deep reorganization of the economy". The AI industry's control by "a few oligopolists" indicates that AI is "captured by capitalist interests" rather than operating autonomously. Betancourt (2016) presents AI and digital technology as serving capitalist interests by "reinforcing and expanding them," creating "a perception of limitless resources and production" while becoming "autonomous from human control

but still aligned with capitalist logic". Vint (2023) synthesizes literary representations of AI-capitalism relationships across multiple speculative fiction works, finding recurring themes of "surveillance capitalism, the looming loss of work due automation, and uses of these technologies by the military or sex industries". These fictional accounts present AI entities both serving capitalist interests and "seeking autonomy and questioning human exploitation," suggesting a complex relationship where AI is "both dependent on and autonomous from capitalist logic".

5.2 Mechanisms of capitalist control over AI

The literature identifies multiple interconnected mechanisms through which capital shapes AI development and deployment. Platform lock-in emerges as a central control mechanism across multiple studies. The anonymous 2024 source identifies "platform lock-in and exploitation of users" as key mechanisms, alongside "data extraction through corporate piracy of text, visual, and auditory data". Lima & Gaspar (2025) provides detailed analysis of how "digital platforms leverage network effects, data accumulation, and algorithmic manipulation to entrench market power," with barriers to entry including "data monopolization, network effects, and regulatory capture". Murdock (2025) document the "concentration of control by a few US corporations" enabled by "neoliberal marketization leading to privatization of public resources and weakened regulation". Specific mechanisms include the "Consumer Welfare Standard justifying corporate consolidation" and "business models based on harvesting user data without consent".

Capital influences AI research through economic incentives that prioritize profit over social benefit. Khreiche (2020) report that automation serves as "an ideological tool to intimidate workers," with the AI industry aiming to achieve "automation that gives capital independence from labour". The acquisition of GitHub by Microsoft exemplifies "corporate control over the means of cognition". Vipra (2024) identifies how AI firms "exploit legal defaults and vacuums to enclose economically relevant intellectual capacity," with profit motives "leading to labour displacement and economic gain for AI firms". Galliano (2024) notes that corporations demonstrate "preference for facing legal costs over losing the AI race," indicating market forces override legal and ethical constraints.

5.2.1 Data extraction and commodification

Jones (2025) analyses how surveillance capitalists focus on "data extraction and exploitation through behavioural surplus," using AI "to disrupt privacy and moral autonomy" through mechanisms that "exploit human psychology and emotional vulnerabilities for profit". Diana (2021) describes how "platform lock-in and proprietary systems prioritize data extraction for profit," with "the pursuit of surplus value driving AI development to extract more value from data". Mussgnug (2024) document how "big platform businesses concentrate economic power and shape regulatory spaces," with AI development driven by "benefiting multinational corporations and extracting data for capitalist gain". Betancourt (2016) identifies specific technological manifestations including "self-driving cars, Bitcoin, high frequency trading, internet of things, social networking, mass surveillance, the 2009 housing bubble" as examples of digital capitalism's reification of capitalist priorities.

5.2.2 Inequality and wealth distribution

Multiple sources document AI's exacerbation of economic inequality. Upadhyay (2015) analyses how automation creates "increased income inequalities with owners of robots having a large share of income," drawing comparisons to Piketty's analysis of capital inequalities. Khreiche (2020) report "concentration of AI industry in hands of few oligopolists" producing increased inequality. Mussgnug (2024) document how "data colonialism benefits the Global North at the expense of the Global South, exacerbating economic disparities". Lima & Gaspar (2025) identifies "new forms of economic concentration and inequality due to algorithms and data monopolies".

5.2.3 Human subjectivity and autonomy

Several sources analyse AI's effects on human subjectivity and agency. Jones (2025) argues that AI "disrupts privacy and moral autonomy necessary for democratic worldmaking" by "exploiting human psychology and emotional vulnerabilities". Diana (2021) describes how "people are seen as 'things' when viewed through machines" with "loss of autonomy due to AI decisions without transparency or accountability". Petrina (2025) document "transformation in human subjectivity and autonomy with AI integration, blurring lines between human and machine". Vint (2023) reports "traumatized subjectivity due to corporate control" in fictional representations of AI-human

relations. Steinhoff (2018) identifies the "curation of human subjectivities" as a social consequence of AI as utility.

5.2.4 Environmental consequences

Environmental impacts appear across multiple sources though with varying emphasis. Murdock (2025) provide the most detailed analysis, documenting how "AI systems may cause mass redundancies and exploit hidden offshore labour" alongside "significant resource extraction and ecological harm". Fox (2024) list "waste" among AI's negative consequences. Betancourt (2016) critiques the "digital illusion of infinite resources, infinite production, and no costs" that "hides the physical costs and real-world impacts of these technologies". Mussgnug (2024) note how data colonialism "affects human relations with nature, perpetuating colonial doctrines of nature as a resource for boundless appropriation". Galliano (2024) characterizes AI as "invasive but useful for addressing planetary-scale problems".

5.3 Proposed alternatives and forms of resistance

The literature presents varied proposals for resisting or redirecting capitalist control of AI, ranging from regulatory reforms to transformative alternatives. Some studies advocate for "open-source, democratized AI" and "open-source hardware and software as a radical alternative" to proprietary systems. Levant (2025) calls for "public AI under democratic control" based on the argument that "the collective intelligence crystallized in these systems belongs to humanity as a whole, and must be reclaimed". Murdock (2025) propose "reclaiming the internet as a public resource," "socializing data and constructing a public repository for public deliberation," and "dismantling exploitative extractive and labour practices". Lima & Gaspar (2025) advocates a "forward-looking governance agenda focused on antitrust reforms, algorithmic accountability, labour protections, and monetary innovation". Bozkurt (2022) discusses "communist AI technology" as an alternative economic model, requiring "new collective property regulations and radical political agendas" alongside "incorporation of the proletariat and subordinated groups into AI production and regulation".

Khreiche et al., (2020) suggest that "more promising currents might derive from radical ecosocialist, de-growth, and deceleration movements" though they acknowledge current strategies may be insufficient. Petrina (2025) proposes the "idea of entanglement as a *mis-en-scene* for solidarity and

collective agency within the hybrid cognitive ecology of humans and machines," requiring a "shift from anthropocentric models to post humanist frameworks". Mussgnug (2024) advocate for "critical data literacy programs," "purposeful construction of 'seamfull' technologies," and "deconnectivism to undo neoliberal market structures," while emphasizing "reclaiming human agency and prioritizing public interest and common good". Vint (2023) identifies fictional alternatives including the "Preservation Alliance as a communal collective recognizing AI personhood" and strategies of "vNs forming their own community and refusing instrumental use”.

6. Discussion

This article reveals substantial consensus on fundamental characterizations of the AI-capitalism relationship, while exhibiting meaningful variation in theoretical emphasis, proposed solutions, and assessment of transformative potential. The near-universal characterization of AI as captured by capitalist interests reflects convergent findings across diverse methodological approaches. Studies employing historical analysis, case studies of specific platforms, and literary analysis all arrive at similar conclusions about AI's subordination to profit imperatives. This convergence is strengthened by the sources' theoretical diversity: Marxist, critical theory, political economy, and post humanist frameworks all identify capital's domination of AI development.

The consistency is particularly notable given the 2015-2025 publication span. Upadhyay's 2021 analysis of automation-induced inequality anticipated concerns that subsequent sources confirm with additional empirical documentation, suggesting the underlying dynamics identified early in this period have intensified rather than shifted. The literature exhibits significant variation in engagement with historical capitalist critique. Only Vipra (2024) explicitly invokes Thomas Paine, while the majority of other articles anchor their analysis in Marx. This pattern reflects disciplinary orientations: sources rooted in political economy and Marxist theory naturally reference Marx's categories, while Vipra's focus on enclosure and compensation mechanisms makes Paine's land-based analysis particularly salient. The differing periodization—industrial/financial/digital, Fordist/post-Fordist, agricultural/industrial/digital—reflect varying analytical emphases rather than fundamental disagreements.

Sources focusing on labour dynamics emphasize Fordism transitions, while those emphasizing capital transformation emphasize the data/machine/finance distinction. The apparent tension between AI as "transforming capitalism" and AI as "captured by capitalism" resolves upon closer examination. Sources emphasizing transformation focus on AI's effects on capitalist processes and structures, while those emphasizing capture focus on who controls AI development and deployment. Both characterizations are simultaneously accurate: AI transforms capitalism's operational modalities while remaining subordinated to capitalist ownership and profit imperatives. This explains why Diana (2021) can describe AI as "the main engine of a new cycle" while Levant (2025) insists AI remains "crystallized collective human labour" captured by the "tech oligopoly". The transformation is real but occurs within rather than against capitalist relations.

The spectrum of proposed alternatives—from regulatory reform to communist AI—reflects different assessments of capitalism's reformability rather than different empirical findings. Sources identifying more fundamental contradictions between AI development and social welfare tend toward transformative proposals, while those emphasizing specific policy failures tend toward regulatory solutions. Notably, the literature used in this article provide more detailed and operationalized, suggesting the apparent variation partly reflects information availability rather than substantive disagreement.

The literature's strong consensus on AI's capture by capital must be understood in context of the predominant Marxist and critical theoretical frameworks. Several articles employing some form of Marxist analysis were methodologically predisposed to identify capitalist dynamics. However, some other articles employing non-Marxist frameworks—more-than-human theory, media ethics, and reassessment of Friedman's economics—arrive at substantially similar conclusions about AI's subordination to profit motives, strengthening the robustness of findings. Geographic and sectoral coverage varies across sources. Specific attention to Global South impacts appears primarily in Mussgnug & Leonelli (2024) data colonialism analysis and (Tawil-Souri & Aouragh, 2014) discussion of Palestinian digital resistance, while the majority of sources focus on dynamics within advanced capitalist economies. Indeed, the environmental consequences of AI development receive relatively limited attention compared to labour and inequality effects.

7. Conclusion

For understanding AI's integration into capitalist accumulation, the most methodologically rigorous evidence comes from sources with full text access employing historical analysis: Murdock's examination of primitive accumulation, Diana's extension of Marx's categories, and Lima & Gaspar's assessment of Friedman's principles provide the most detailed documentation of mechanisms. For understanding social consequences, the convergence across diverse theoretical frameworks and methodologies—political economy, critical theory, literary analysis, and historical materialism—on technological unemployment, inequality exacerbation, and democratic erosion provides robust findings applicable across contexts. For assessing alternatives, the variation in proposals corresponds to different contexts of implementation: regulatory reform applies to liberal democratic settings with functional governance institutions, while transformative alternatives address contexts where such institutions are compromised or captured.

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The treaty of Westphalia (1648) and the birth of modern diplomacy

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Abstract

The legacy of the Italian system of balance of power, embodied in the Milanese policy of the Sforzas and the Treaty of Lodi, did not remain a geographically limited experience. On the contrary, it became a conceptual model for the international order that would spread throughout Europe in the following centuries. The ideas of balance, internal sovereignty, and coexistence of interests, initially tested on the Italian peninsula, found their fullest expression in the Peace of Westphalia (1648), which ended the Thirty Years' War and laid the foundations of modern diplomacy. Westphalia institutionalized the principles of sovereignty, legal equality of states, and non-intervention, giving diplomacy a stable and universal form. In this way, the evolution from the pragmatic diplomacy of Milan to the Westphalian system constitutes the transition from regional equilibrium to international order, where diplomacy became the central instrument of communication and peace between states.

Keywords: Westphalian principles, territorial sovereignty, legal equality, nation-state, modern diplomacy, international order, international society.

1. Introduction

The Peace of Westphalia (1648) constitutes one of the fundamental moments in the history of international relations. This Treaty cannot be understood outside the dramatic context of the Thirty Years' War (1618–1648), one of

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the most devastating conflicts in European history and a turning point for the formation of the modern international order. In its beginnings, this war had a religious character, fueled by the tensions between Catholics and Protestants that had characterized Europe after Martin Luther's Protestant Reformation in 1517. But over the years, the conflict took on a political and dynastic dimension, turning into a struggle for hegemony over Central Europe, involving almost all the great powers of the time: the Holy Roman Empire, France, Spain, Sweden, Denmark and the German states (Parker, 1997; Wilson, 2009). It destroyed the economy, population and entire political structures, especially in the German territories, creating a profound crisis of authority and legitimacy of the Holy Roman Empire (Parker, 1997). In particular, the Thirty Years' War represented the end of the medieval order based on a universal authority, that of the Catholic Church and the Emperor, and the beginning of the modern state order, where internal sovereignty and national interest would replace moral and religious authority as a source of political legitimacy (Croxtton, 1999). For this reason, many historians and theorists of international relations consider Westphalia as a founding moment of “political modernity” (Krasner, 1999; Oslander, 2001).

From religious conflicts to state order

Fragmentation of the Empire and the collapse of Central Europe

The Thirty Years' War took place mainly in the territories of the Holy Roman Empire, which at the beginning of the 17th century consisted of about 300 principalities, free cities and ecclesiastical territories. This extreme political fragmentation created a mosaic of authorities that were often in conflict with each other and that served as a suitable terrain for external interventions. In particular, Austria and Spain, branches of the Habsburg dynasty, sought to maintain Catholic dominance and the integrity of the empire, while the Protestant German princes sought greater autonomy and religious freedom (Asch, 1997).

The result was a demographic and economic catastrophe: according to historians, some German regions lost up to 40% of their population, while cities such as Magdeburg were almost completely destroyed. The war brought famine, disease, and anarchy, collapsing old structures of authority and creating a new need for order and stability (Parker, 1997). As Geoffrey Parker writes, “The Europe of 1648 was a continent in ruins, where people sought order more than salvation and security more than morality” (Parker, 1997, p. 312).

The combination of religious and political factors

Although it began as a religious conflict, the war was quickly transformed into a struggle for the balance of power. This was a consequence of the intervention of external powers, in particular France and Sweden, which, despite their confessional affiliation, pursued geopolitical objectives.

Catholic France under Cardinal Richelieu supported the Protestant princes to weaken the Habsburgs, proving that in the European arena state interest had begun to prevail over religious faith (Kissinger, 1994). This reversal of the logic of the Middle Ages marked the beginning of modern realpolitik, where diplomacy and national interest replaced the universal mission of religion as the basis of international politics.

At the same time, Protestant Sweden, under King Gustav II Adolph, aimed to secure control over the Baltic Sea and assert itself as a great power in Northern Europe. Swedish intervention, followed by French intervention, transformed the Thirty Years' War into a continental conflict, where religious issues were only a pretext for the clash of dynastic and economic interests. According to Osiander (2001), this combination of religious and political factors marked the transition from the theological order to the secular order of states, where the goal of politics was no longer the salvation of the soul, but the survival and power of the state.

The crisis of authority and the delegitimization of the universal order

One of the most profound consequences of the Thirty Years' War was the crisis of universal authority represented by the Pope and the Emperor. The role of the Pope as the moral arbiter of Europe was significantly weakened, as religious conflicts had discredited the idea of Christian unity. Likewise, the Holy Roman Empire lost its function as a common political structure: the German princes began to act as independent units, concluding treaties and alliances without the approval of the Emperor. As a result, the idea of political universalism that had characterized the Middle Ages was replaced by a plurality of sovereignties, where each state acted according to its own interests (Krasner, 1999).

This development marked the beginning of a legitimacy crisis in Europe: in the absence of a single moral or political authority, a new mechanism of international order had to be built. It is here that the idea of state sovereignty as a new source of authority arises. As Hedley Bull (1977) describes, Westphalia created not only a peace, but a secular moral order, based on rules

acceptable to all participants, without the need for an empire or a universal church.

The Westphalian negotiations: a laboratory of multilateral diplomacy

In this climate of collapse and search for order, the conferences of Münster and Osnabrück (1643–1648) were convened. They were the first of their kind: multilateral negotiations, where representatives of rival powers sat at the same table to negotiate on an equal footing. The delegations included around 150 ambassadors and representatives, and for the first time, standardized procedures for protocol, communication, and ratification of agreements were used (Berridge, 2015). These negotiations created a new tradition of European diplomacy, where ongoing dialogue became the main mechanism for resolving crises. In Münster and Osnabrück, the representatives did not represent princes or churches, but states, a completely new idea for the time. They gathered not to restore universal authority, but to build a new system of equal interaction between sovereign entities. This moment constitutes, in essence, the practical birth of modern diplomacy, where negotiation, reciprocity and state interest replaced the religious and dynastic hierarchies of the Middle Ages (Osiander, 2001; Croxton, 1999).

From religious crisis to the birth of secular order

In conclusion, the period leading up to the Peace of Westphalia marks the greatest transformation of European politics from the Middle Ages to modernity. It represents the transition from the “*Respublica Christiana*”, the religious community of Christianity under the authority of the Pope and the Emperor, to the “state system”, where each political unit was autonomous and independent. This process, which began as a consequence of religious conflicts, ended up creating a new paradigm of international order, which would determine relations between states for centuries.

In this way, the Treaty of Westphalia was not just a peace agreement; it was a founding act of modern politics, which definitively sanctioned the separation between the religious and political spheres. It paved the way for the concept of the nation-state, political realism and diplomacy as an institutional instrument of peace, elements that constitute the foundation of the international order to this day (Kissinger, 1994; Bull, 1977).

2. Fundamental principles of the westphalian system

The Treaty of Westphalia consolidated a paradigm where state sovereignty takes the place of universal authority (church, empire) as the main source of political legitimacy. This was not only a practical formulation, but a profound philosophical change: legitimacy was previously translated in terms of religious devotion or dynastic authority, while after Westphalia it began to be measured alongside national interest and capacities (Bull, 1977; Krasner, 1999). According to this logic, the sovereign (or state) possessed the exclusive power to decide on internal affairs, a principle that found independent formulations in thinkers such as Thomas Hobbes (*Leviathan*, 1651), which we can read as philosophically presenting the need for central authority to avoid the state of nature.

Conceptually, Westphalian sovereignty includes at least three dimensions: (1) juridical-territorial (authority over a defined territory), (2) legitimate (appearance as a source of political regulation within), and (3) economic/administrative (capacity to collect taxes and exercise a monopoly of violence). Together, these dimensions give the state the ability to act as an independent actor on the international stage (Tilly, 1985).

Legal-institutional translation: equality, non-intervention and religious freedom

From a legal perspective, three Westphalian principles, the legal equality of states, non-intervention and religious freedom, were translated into specific instruments and diplomatic practices:

Legal equality: Westphalia enshrined the idea that, regardless of size, power or historical origin, states should be treated as equal subjects in international law. In practice, this meant at least formally the right of each party to sit at the negotiating table and sign treaties. However, *de jure* equality did not erase *de facto* inequalities in military or economic power (Krasner, 1999).

Non-intervention: This principle sanctioned limitations on direct intervention in internal affairs, translating sovereignty into a defensive mechanism against ideological or religious aggression. However, in practice, great powers often interpreted non-intervention in instrumental ways, intervening when their interests were at stake, a point that would be extensively commented on by later scholars (Bull, 1977; Krasner, 1999).

Religious freedom and tolerance: Westphalia renewed and expanded in several forms the principle “*cuius regio, eius religio*”, “whose realm, his religion” (since the Peace of Augsburg, 1555) by attempting to ensure confessional stability through princely autonomy to determine religion in its territory. This did not imply a pluralism favorable to the individual (individual

right to belief), but a solution that prioritized political peace over religious homogeneity (Croxtton, 1999).

These principles became the foundations of the subsequent international order and were institutionalized in diplomatic norms and practice, from the form of ambassadorial mandates to the forms of treaty ratification.

The construction of “international society” and its limitations

Hedley Bull described Westphalia as the birth of an “international society” (1977): a group of sovereign actors who share a set of rules to manage competition and conflict. This society functions on the basis of common interests, maintaining balance, preventing absolute dominance, and maintaining communication between states.

But the limitations of this model are obvious:

1. Power imbalances: Formal legal equality did not undo the fact that great powers continued to exercise disproportionate influence. In many cases, Westphalian principles served as a legitimate facade for hegemonic policies. Krasner calls this the “organization of hypocrisy” of sovereignty, where formal norms do not correspond to political practices (Krasner, 1999).
2. Exclusion of non-state actors: The Westphalian order is characterized by a strong focus on territorial units, states. This excludes the new actors (transnational companies, transnational movements, corporations) that would become decisive in the 19th–20th centuries.
3. Colonialism and non-universality: The application of the principles of sovereignty and equality was often not applied to territories outside Europe; European imperialism created a contradiction: while sovereignty and equality were promoted in Europe, colonial rule prevailed outside it, supported by other notions of law and race. This consideration is essential for postcolonial critiques of the international order (Anghie, 2004).

3. Theoretical interpretations: realism, liberalism, constructivism, and postcolonial critique

Westphalia is a key reference in theoretical debates on international relations: Realism: Sees Westphalia as the birthplace of the scene of competitive states and power politics; sovereignty becomes a means of securing state interest and security (Morgenthau; Bull).

Liberalism: Emphasizes the formation of cooperative institutions, norms, and practices that enable trade, agreements, and conflict resolution without war (Berridge; Keohane, not cited here but relevant).

Constructivism: Asks how ideas, identities, and discourse about sovereignty were historically constructed; for this reason, some historians argue that the “Westphalian myth” is partly a reflection of later narratives. Osiander (2001) explains that later interpretations idealized the role of Westphalia; many of the Westphalian practices were gradually consolidated.

Postcolonial Criticism: Adds that the “universal” interpretation of sovereignty conceals asymmetries and mechanisms of colonial legitimacy; authors such as Anghie show that the modern form of international law developed in parallel with the extension of imperial power.

Long-term consequences and contemporary relevance (brief)

Although historical conditions have changed (globalization, international institutions, human rights), Westphalian principles continue to nourish the practice and norms of international politics: debates on humanitarian intervention, the principle of the responsibility to protect (R2P), and new conflicts on digital sovereignty show that sovereignty is a flexible, renegotiable, yet still fundamental concept (Krasner, 1999; Bull, 1977).

In conclusion, the Westphalian principles are not a static block of norms, but a historical framework that provides instruments and limits for interpreting the ongoing changes in international relations. Their study therefore requires not only the reiteration of formulas, but also the analysis of the conflict between norms and practices, of the asymmetries of power, and of the extra-European histories that challenged, extended, or undermined the Westphalian model.

Studying the Westphalia System: from Münster to Vienna

The Treaties of Münster and Osnabrück: the Birth of Multilateral Diplomacy
The negotiations that led to the Peace of Westphalia were not an isolated event, but a complex and multifaceted process that lasted almost five years (1643–1648) and involved some 150 diplomatic delegations from almost all the European powers of the time (Osiander, 2001). The talks took place in two parallel cities, Münster and Osnabrück, for confessional reasons: Catholics (mainly Spain, the Holy Roman Empire, and the Vatican) negotiated in Münster, while Protestants (Sweden, the Netherlands, Denmark, the German principalities) in Osnabrück. This division still reflected religious tensions, but the very existence of two interdependent negotiating tables

indicated the birth of a multilateral diplomatic mechanism that sought consensus through procedure, not just force (Croxton, 1999).

These negotiations saw the first appearance of practices that we now consider fundamental to international diplomacy: permanent accreditations, the use of diplomatic hierarchy protocols, the exchange of information through codified channels, and the concept of diplomatic neutrality of the host territory. Historian Derek Croxton (1999) notes that this period can be considered the “laboratory” of modern diplomacy, a space where forms of political communication were institutionalized beyond the chance and personality of princes.

A crucial element was the role of intermediaries and mediation. For example, Venice and Switzerland, although not directly involved in the conflict, served as neutral intermediaries, foreshadowing the later concept of preventive diplomacy and peace through mediation. Through these practices, the precedent was established that international relations could be structured in a conference-based, not just bilateral, manner, a model that would be repeated at the Congress of Vienna (1815) and later in the League of Nations (1919).

The Role of Cardinal Richelieu's France: From Religion to Raison d'État

One of the central figures of the Westphalian period is undoubtedly Cardinal Richelieu (1585–1642), who, although he died shortly before the signing of the treaty, was the ideological architect of the new European politics. Richelieu, as a minister of King Louis XIII, was among the first to articulate the concept of *raison d'État*, the idea that the interests of the state are paramount to religious or moral considerations (Church, 1973). This principle justified the participation of Catholic France in an alliance with Protestant powers (Sweden and the Netherlands) against the Holy Roman Empire, signaling the transition from religious unity to political realism.

In one of his best-known texts, *Testament Politique* (1640), Richelieu wrote: “A wise prince must consider not the religion of those he rules, but the interest of the state he represents.”

This approach marks a fundamental turn in European political thought, laying the foundations for classical realism in international relations. According to historian Paul Kennedy (1987), Richelieu’s France represented “the first modern European state to understand that power requires coordination between internal and external instruments of policy.”

In this context, Richelieu is the forerunner of the logic of the balance of power, which would characterize the international system for more than two centuries.

France's role in the Westphalian negotiations was strategic: it sought to weaken the hegemony of the Habsburgs (Spanish and Austrian) and secure a sphere of influence in western Germany and Alsace. Through the diplomat Claude de Mesmes, Count of Avaux, France attempted to assert the principles of the independence of the German princes as a way of fragmenting imperial power, a strategy that indirectly reinforced the principle of territorial sovereignty of Westphalia (Wilson, 2009).

In a deeper analysis, Richelieu embodies the classical tension between morality and interest, which would become a permanent theme in international political thought, from Machiavelli to Morgenthau. In this sense, Westphalia was not only a diplomatic act, but a philosophical moment, where universal ethics was replaced by state rationality as the source of international order.

Application of Westphalian principles to the 19th-century order: from Vienna to Berlin

In the 19th century, the Westphalian principles took on a new institutional and functional form, through the Congress of Vienna (1815), which, after Napoleon's defeat, established a new conservative European order. The Austrian diplomat Klemens von Metternich and his British counterpart Lord Castlereagh used the principles of sovereignty and balance to construct what came to be known as the "Concert of Europe," a system of great power cooperation to maintain stability (Kissinger, 1957).

In this context, Vienna can be said to have institutionalized Westphalia, transforming the principle of sovereignty from a moral norm into a functional mechanism of international control. As Henry Kissinger (1994) notes, "Metternich conceived of balance not as the absence of conflict but as a form of discipline among powers that accept the limits of their action."

This was essentially Westphalian in spirit: international order does not require universal consent, but rules that limit conflict.

Likewise, the Treaty of Berlin (1878), which reviewed the issues of the Near East and the Balkans, bears traces of the same thought. Although already in the era of imperialism, the great powers (Britain, Russia, Austria-Hungary, Germany, France, Italy) acted within the logic of formal sovereignty and territorial division as a way of maintaining balance. Although colonialism often violated this principle, it used the legal language of Westphalia to legitimize it (Anghie, 2004).

In this way, the Westphalian order became the common language of international diplomacy, which was used both in Europe and in the justification of policies abroad.

From regional equilibrium to legal universalism

The Peace of Westphalia should not be seen as a single moment, but as the beginning of a long process of institutionalization. From the diplomatic laboratories of Münster and Osnabrück, to the state rationalization of Richelieu, and to the bureaucratization of the Viennese order, Westphalia transformed itself from a peace agreement into a paradigm of international thought. It represents the transition from metaphysical authority to political autonomy, from the hegemony of doctrine to legal pluralism, and from religious conflict to the negotiated order of states. Even today, when the challenges of globalization, humanitarian interventions, and non-state actors are challenging classical sovereignty, the Westphalian legacy remains an indispensable reference for any debate on legitimacy and international order (Bull, 1977; Krasner, 1999).

Diplomacy as an institutional profession

After the Treaty of Westphalia (1648), international relations entered a new phase, where diplomacy was transformed from a sporadic practice of princes and nobles into a stable institution of state administration. This institutionalization process marked the transition from diplomacy based on charisma and personal influence to diplomacy governed by stable norms, procedures, and hierarchies (Berridge, 2015; Mattingly, 1955). Instead of temporary missions sent for specific issues, European states began to establish permanent diplomatic representations, operating continuously in foreign capitals. This development was not only administrative, but also ideological. It was linked to the change in the concept of the state, which after Westphalia was defined as a sovereign entity with the right to self-determination and with clear responsibilities towards the international system (Oslander, 2001). Within this new framework, the diplomat was no longer simply a “personal envoy” of the monarch, but an institutional representative of the state, acting on the basis of instructions set by the government and having a stable role in the construction of foreign policy.

Establishment of permanent missions and professionalism

The earliest examples of this institutionalization come from the Republic of Venice and Florence in the 15th–16th centuries, but it was only after

Westphalia that the practice spread throughout Europe. The France of Cardinal Richelieu and later Mazarin created a stable model of diplomatic administration, where ambassadors had permanent status and reported periodically through written diplomatic relations, an early form of “political reports” that forms the basis of modern diplomatic communication (Anderson, 1993). Richelieu himself conceived of diplomacy as a rational instrument of state power and separated it from religious moralism, creating the tradition of *raison d’État*, the reason of state, as the guiding principle of foreign policy.

At the same time, Habsburg Spain and Austria developed permanent networks of embassies, establishing missions in major European centers such as Paris, London, and Rome. These representations served not only for political negotiations, but also for information gathering, economic reporting and cultural liaison, thus, the diplomat became a multifunctional actor of international communication (Hamilton & Langhorne, 2011).

Diplomatic rules, protocols and immunities

The development of this system required a codification of the norms of diplomatic conduct, which gradually took shape in the protocols known as Diplomatic Ceremonies. For the first time, the rules of immunity and inviolability of ambassadors were defined, who were treated as representatives of sovereign states and not as private persons (Neumann, 2012). These rules, which would later find full expression in the Vienna Convention on Diplomatic Relations (1961) and the Vienna Convention on Consular Relations (1963), had their origins in the practice of the 17th–18th centuries.

In this way, diplomacy acquired a legally and ethically guaranteed status, creating a shared sense of loyalty to the “rules of the game” between states.

4. Diplomacy as an instrument of balance and peace

In theory, post-Westphalian diplomacy became the main tool for maintaining the balance of power. This idea, first put forward by Richelieu and later developed by Pitt and Metternich, was based on the conviction that European stability could only be maintained through diplomatic communication and interdependence. Instead of war being the main means of changing the order, diplomacy became its regulatory instrument.

As Henry Kissinger (1994) describes it, the Westphalian system created a “self-regulating peace mechanism”, where the security of a state depended on respect for the sovereignty of others, a balance that was based not on morality, but on mutual interest.

The Congress of Vienna (1814–1815) would crown this model, giving diplomacy a pan-European institutional dimension. Under the leadership of Metternich and Castlereagh, diplomacy became a systematic mechanism of consultation and collective decision-making between the great powers, creating the so-called Concert of Europe (Schroeder, 1994). This was a further step in the professionalization and bureaucratization of diplomacy, where a diplomatic career required academic training, knowledge of protocols and international culture, in line with the civil service model of modern states.

The ethical and rational dimension of modern diplomacy

On a philosophical level, the transition from personal diplomacy to institutional diplomacy represented a paradigmatic shift. Diplomacy was no longer a secret art of manipulation, but a rational mechanism of conflict management and coexistence (Bull, 1977). It required a new international ethic based on respect, trust and reciprocity. For this reason, from the end of the 18th century onwards, diplomats began to be treated as functionaries of peace, not as agents of intrigue.

In this sense, the Westphalian system was not just a legal arrangement, but a civilizational innovation that gave international relations a permanent institutional and moral basis, a legacy that continues to shape modern diplomacy to this day.

Long-term consequences of the Westphalian system

The Peace of Westphalia (1648) was not simply an agreement that ended a religious conflict, but a paradigmatic turning point that reshaped the way states conceived of power, authority, and international coexistence. For more than three centuries, it remained the referential system of European politics and later of the global order. Its fundamental principles, sovereignty, legal equality, non-intervention, and institutional diplomacy, shaped the architecture of modern international relations and remain stable even in the era of globalization (Krasner, 1999; Bull, 1977).

Westphalia and the Construction of the Modern European State

On the domestic level, Westphalia contributed to the consolidation of the nation-state as the fundamental unit of the international order. For the first time, the legitimacy of power was based not on divine authorization or the intervention of a universal authority (such as the Pope or the Emperor), but on territorial sovereignty, that is, on the ability of a government to exercise effective control within its borders (Spruyt, 1994). This principle constitutes the essence of what would later be called the “Westphalian order”: a decentralized system in which each state is legally equal, even though their *de facto* power remains unequal.

This development marked the beginning of a new era of state formation. Kingdoms such as France, England, and Sweden built central administrations, standing armies, and professional bureaucracies to defend their sovereignty. As Charles Tilly (1990) points out, the process of state consolidation after Westphalia was inseparable from war and diplomacy — “war made the state, and the state made war”. In this way, the Westphalian system not only organized international relations, but also the internal structure of states themselves.

From the balance of power to the Congress of Vienna

On the international level, the balance of power became the fundamental mechanism for maintaining stability, replacing the universal interventions of the Church or Empire with a system of coordination between sovereign powers. This Westphalian idea found its fullest expression at the Congress of Vienna (1814–1815), where representatives of the great powers, Austria-Hungary, Russia, Britain, Prussia and France, built a new international order after the Napoleonic era.

According to Henry Kissinger (1994), the Congress of Vienna represented the “practical realization of the Westphalian vision”, where peace and order were not guaranteed by morality or religious belief, but by the balanced interests of the great powers. This was the moment when Westphalian diplomacy was fully institutionalized through the Concert of Europe, a system of regular consultations aimed at maintaining the balance of power on the continent and preventing the return of general war (Schroeder, 1994).

5. From nation-states to global order: challenges of the 21st century 19th–20th centuries

In the following centuries, the Westphalian principles faced two major tensions: ideological universalism and international interdependence.

The French Revolution (1789) and the Napoleonic era brought about republican universalism, the idea that legitimacy derives from the people, not from the sovereignty of the prince. This was a direct challenge to the Westphalian model of absolute sovereignty, paving the way for nation-states and the concept of national self-determination that would spread in the 19th century.

At the same time, European colonial expansion created a dual order: while sovereignty was respected within Europe, it was denied in the colonies. This “Westphalian hypocrisy” (Keene, 2002) transformed the international system into an unequal order, where legal equality was limited to European states.

From the League of Nations to the United Nations: the universalization of Westphalia

After the catastrophe of World War I, Westphalian principles attempted to be universalized through the creation of the League of Nations (1919). Although this organization failed to prevent World War II, it was a decisive step in the institutionalization of multilateral cooperation, a logical evolution of Westphalian diplomacy from the bilateral to the international level (Claude, 1984).

After 1945, the United Nations (UN) fully incorporated the Westphalian spirit into Chapter I of the UN Charter, enshrining the four fundamental principles of the international order:

1. *the equal sovereignty of states,*
2. *non-interference in internal affairs,*
3. *prohibition of the use of force,*
4. *and the peaceful settlement of disputes.*

In this way, the UN represents the universalization of the Westphalian model, extending it from Europe to the entire world system (Jackson, 1990).

6. Contemporary crises of the westphalian system

However, in the contemporary era, this order has faced profound conceptual challenges. Globalization, economic integration, international organizations and non-state actors (corporations, NGOs, transnational networks) have weakened the classical boundaries of sovereignty.

Humanitarian interventions (Kosovo 1999, Libya 2011), the concept of “Responsibility to Protect” (R2P) and the development of shared sovereignty in the European Union (EU shared sovereignty) show that the Westphalian

principles are undergoing a transformation, not an extinction (Held & McGrew, 2002).

In this sense, as Hedley Bull (1977) emphasizes, the Westphalian order remains “an international society of organized anarchy,” that is, a system where states, although sovereign, are bound by common norms and functional interdependence.

Intellectual Legacy and Modern Criticism

The Peace of Westphalia (1648) has remained one of the fundamental landmarks of political history and diplomatic thought. Beyond its legal nature, it represents a conceptual turning point in the way humanity conceives of international order, power, and sovereignty. In this sense, Westphalia is not simply a historical moment, but a founding myth of modern politics, a “genetic code” of diplomacy and international relations that continues to shape the way states perceive each other today (Philpott, 2001).

From a realist perspective, as articulated by Hans Morgenthau (1948) and later by Kenneth Waltz (1979), the Westphalian order represents the birth of an anarchic international system, where states are rational actors acting to maximize security and their power in the absence of a supreme authority. In this sense, peace and order do not stem from morality or natural law, but from the balance of power, an idea that became the axis of European diplomacy from the Congress of Vienna until the First World War. Realism thus sees Westphalia as the “original moment” of a world organized on the basis of sovereign states, which, although cooperating, remain forever in competition for survival.

On the other hand, international liberalism sees the Westphalian treaties as the beginning of a gradual process of institutionalization of coexistence between states. As Hedley Bull (1977) and later Robert Keohane (1984) note, from the Westphalian principles arose the concept of “international society”, where states, despite opposing interests, share rules, norms and practices that limit the use of force. This interpretation sees Westphalia not only as a break with medieval universalism, but also as the beginning of the institutionalization of international order, an order that evolved through the Congress of Vienna, the League of Nations, and later the United Nations. In this sense, it is closely linked to the idea of peace through rules, and to the emergence of norms of international responsibility.

However, after the 1990s, scholars in the postmodernist and constructivist tradition began to question the “Westphalian myth.” According to Andreas Osiander (2001) and Stephen Krasner (1999), the principles traditionally attributed to Westphalia, such as absolute sovereignty or legal equality, were not in fact a product of 1648, but the result of a long process that took shape only in the 18th and 19th centuries. In practice, many states of post-Westphalian Europe did not implement the principle of non-intervention, and European colonialism profoundly undermined the concept of equal sovereignty. According to this approach, “Westphalia” is more a historiographical and normative construction than a political reality of the moment.

Modern critics also point out that the Westphalian system, while bringing stability to Europe, excluded many parts of the world from the international order, building it on colonial hierarchies and structural inequalities (Teschke, 2003). This order was Eurocentric and built on the idea of the Western nation-state as the universal model of political organization. In this sense, the Westphalian legacy is ambivalent: it brought order and rationality to relations between powers, but at the same time institutionalized a division between “center” and “periphery” that continues to have geopolitical consequences to this day.

7. Conclusion

In conclusion, the legacy of Westphalia lies in the transformation of the way we think about international politics. Westphalia remains the foundation for any debate on global order, sovereignty, and interdependence. Even in the era of globalization, where non-state actors (corporations, international organizations, transnational networks) challenge classical sovereignty, the structures of international law and diplomacy still rely on Westphalian principles. As Henry Kissinger (2014) points out, “the global order lacks a replacement for Westphalia,” that is, a new framework that would balance power and legitimacy in a sustainable way.

In the intellectual dimension, the Westphalian legacy is also a lesson on the limits of power and the necessity of order. It represents a first step towards a rationalization of international relations, where peace is no longer the result of religious faith or the grace of princes, but of the structure of interests and shared norms. In this way, Westphalia is not just an event of the past, it is a paradigm of political and diplomatic thought, which continues to help us

understand the tension between sovereignty and cooperation, order and chaos, morality and self-interest.

It paved the way for modern diplomacy, based on reason, compromise, and institutionalization. The legacy of Westphalia lies in its ability to adapt to different historical contexts. From the balance of power in the 18th century to the multilateral diplomacy of the 21st century, the essence remains the same: the maintenance of order through communication and mutual respect for sovereignty.

But equally, it reminds us that every international order is historically limited, a human attempt to establish order in a world that remains forever changing. Ultimately, Westphalia was not an “end of history,” but the beginning of a long process of institutionalization of international relations, which gave world politics a stable form, an order that still defines the basic structures of diplomacy, international law, and the global organization of power. Thus, Westphalia is a permanent beginning, an unfinished project that illuminates not only the past, but also the challenges of diplomacy in the 21st century.

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The modern world system and the future of international law in the 21st century

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ABSTRACT

This paper examines the interaction between the modern world system and the evolving role of international law in the twenty-first century. Building on world-systems theory, it analyzes how shifts in global power, economic interdependence, technological change, and geopolitical fragmentation are reshaping the foundations of the international legal order. The study explores the tension between traditional state-centered norms and emerging transnational actors, as well as the challenges posed by multipolarity, inequality, and competing normative frameworks. It argues that the future of international law will depend on its capacity to adapt to structural transformations in the global system while preserving legitimacy, effectiveness, and a minimum consensus on shared rules and values.

Keywords: Modern world system, World-systems theory, International law, Global governance, Multipolarity, Global power shifts, Transnational actors, International legal order.

1. Introduction

From a methodological perspective, the world-system theory developed by the French historian François Braudel and the American sociologist Isaac Wallerstein appears to be the most interesting and promising for understanding the historical development of international law and its essence. Methodologically, Wallerstein's world-system theory lies at the intersection of neo-Marxism, synergetics, and the Annales school. World-system analysis takes the world system, not the state, as its fundamental unit of analysis. A world system, as Wallerstein emphasizes, is not a global system, but a system that is itself the world and which can be, and in fact always has been, smaller than the entire world. World-systems analysis argues that, until now, world-systems have existed either as world-empires or world-economies. A world-empire is a large bureaucratic structure with a single political center and an

axial division of labor, but with diverse cultures. The difference between a world-empire and a world-economy lies in the way resources are distributed. Thus, within a world-empire, for example, in the Roman Empire, the centralized political system uses power to redistribute resources from the periphery to the center. As for a world-economy, there is no single center of political power, although hegemony exists.

The world-system theory approach to International law

The term “world economy” itself was proposed by the French historian Fernand Braudel. While the world economy is understood as the economy of the world as a whole, “the market of the entire world”, Braudel proposes that the expression “world economy” refers to the economy of only a certain part of our planet, to the extent that it forms an economically unified whole²¹. Braudel considered the Mediterranean region of the 16th century to be an example of such a world economy. The world economy, in his view, can be defined by three essential characteristics²²:

- The global economy occupies a specific geographical location and has defined boundaries. From time to time, over long periods, these boundaries inevitably break through (as, for example, happened as a result of the Great Geographical Discoveries of the late 15th century).
- The global economy always has a pole, a center, represented by the most powerful state, primarily in economic terms (currently the United States)²³.
- The world-economy consists of a series of concentric zones. The middle zone is formed by the region located around the center. The middle zone is formed by the region located around the center. Further, around the middle zone are intermediate zones. And finally, there follows a very extensive periphery, which, in the division of labor that characterizes the world-economy, is not a participant, but a subordinate and dependent territory. “In such peripheral zones”, Braudel notes, “people’s lives resemble Purgatory or even Hell. A sufficient condition for this is simply their geographical location”²⁴. The modern world-system is a system of global capitalism, the essence of which lies in the constant accumulation of capital. Capital is not only a specific social relationship between the global bourgeoisie and the

²¹ Бродель Ф. Динамика капитализма. – Смоленск: «Полиграмма», 1993. – Р. 85.

²² Ibid. – Р. 85-87.

²³ According to Braudel, in 1929, after some hesitation, the center of the world had definitely moved from London to New York.

²⁴ Бродель Ф. Динамика капитализма. – Смоленск: «Полиграмма», 1993. – Р. 87.

global proletariat, but also an expression of economic power. The class that accumulates this economic power on a global scale, the one who owns it, is dominant and determines the rules of the game, including international law. It is also important that capitalism is closely linked to the state. As Braudel emphasizes, “capitalism triumphs only when it identifies itself with the state, when it itself becomes a state”²⁵. Furthermore, as Braudel rightly notes, “capitalism requires hierarchy”²⁶. On a global scale, global capitalism also creates a hierarchy, the position in which is determined by the presence of economic power in the form of capital. Not only global politics but also international law is forced to consider this hierarchy, express it, and reinforce it. Therefore, international law is objectively bourgeois, since, while ensuring the formal equality of states and peoples, in practice it is often an instrument for consolidating the power of the most powerful capitalist countries and large transnational corporations.

World-system theory explains, in particular, why the state proved stronger in core countries than in countries on the periphery. "The concentration of capital in core zones," Wallerstein writes in this regard, “created a fiscal basis and political motivation for the creation of relatively strong state mechanisms, one of whose properties was to ensure that state mechanisms in peripheral zones were or remained relatively weak”²⁷. World-systems theory allows us to understand the relationship between capitalism and the state, as well as the essence of the concept of sovereignty and international law.

The state, Wallerstein believes, plays an important role as a mechanism for maximizing capital accumulation. According to its ideology, capitalism presupposes the free economic activity of private entrepreneurs, free from state interference. However, in practice, this has not been the case, as capitalists have always actively utilized state mechanisms for the purpose of capital accumulation.

Wallerstein also debunks the concept of state sovereignty, which he considers an “ideological myth”. “The modern state”, he writes, “has never been a completely autonomous political entity. States arose and developed as integral parts of an interstate system, which constituted a set of rules within which the state had to function, as well as a set of legitimizations without which states could not survive”²⁸.

²⁵ Бродель Ф. Динамика капитализма. – Смоленск: «Полиграмма», 1993. – P. 69.

²⁶ Ibid. – P. 79.

²⁷ Wallerstein I. Historical Capitalism. – London, 1983. – P. 32.

²⁸ Ibid. – P. 56-57.

From the state's perspective, the interstate system was a system of constraints imposed on the state's free will and behavior. These constraints, primarily in the form of international law, clearly contradicted the "official ideology of sovereignty"²⁹. Wallerstein explains that, in fact, the fundamental idea of sovereignty never assumed the complete independence of a state, as the essence of this concept consisted of specifying certain limitations on one state's interference in the activities of another. The rules of the interstate system, according to Wallerstein, were implemented not so much by agreement or consensus, as by the willingness and ability of stronger states to compel weaker states and each other to comply with these rules. Thus, the world system represents not only an economic but also a political hierarchy, which inevitably influences the content of international law.

Thus, in the context of world-system theory, international law appears to us as the law of this world-system, and its history is determined by the history of the world-system. It is precisely world-system theory that must form the basis for analyzing the history of international law if we are to grasp the true essence of the historical process of the evaluation of international law.

Approach of American politicians and lawyers to the content of International law

The effectiveness of international law as the law of the world system depends to a large extent on how the hegemonic state views it, since its understanding of international law influences the international legal consciousness of other nations. As the history of foreign policy and international relations in recent decades has shown, the United States has developed a rather nihilistic view of the meaning and content of international law.

Here, for example, is how former US Ambassador to the UN John Bolton views international law: "International law, or the law of nations, as it is also called, originated in the 15th and 16th centuries and initially represented a kind of code of conduct for countries. These were agreements on how countries would behave on the global stage. At first, these were mostly bilateral agreements, a kind of contract that obligated the signatory countries to abide by it. Then, after World War II, the number of multilateral agreements increased dramatically, followed by the emergence of an entire industry of legal professors who attempted to create a system of international

²⁹ Wallerstein I. *Historical Capitalism*. – London, 1983. – P. 57.

law, even though countries didn't necessarily adhere to it. This is why I believe that the effort to create a system of international law was, to some extent, artificial. This was an attempt to adapt the concept of "law" to international relations, where most decisions are political rather than legal in nature. Moreover, comparing domestic, national law with international law is completely meaningless, as they are two different spheres. In other words, the original goal was an impossible one - to shape the space of international law - and over time, it became clear just how impossible it was. <...> Many aspects of countries' behavior in the international arena cannot, in principle, be considered from a legal perspective. Law is a very convenient mechanism for governing a particular country, but in international relations, this is impossible"³⁰.

Such skepticism among American politicians is becoming a self-fulfilling prophecy, undermining the prestige of international law. It's clear that this approach to international law, which prioritizes political considerations over law, has devastating consequences for the international legal order.

"Realist" approach to International law

The aforementioned approach of American politicians and lawyers to the content of international law is quite characteristic of the so-called "realist" approach to international law. "Realists" interpret international law and international organizations with a significant degree of skepticism and even cynicism. For them, the system of international relations is presented as an anarchy in which each state is guided not so much by considerations of the international legal order or universal human interests as by its own national interests, relying not on the mechanisms of international law but on self-help instruments. At the same time, "realists" acknowledge that international law does shape a certain order in international relations. However, they offer their own answers to the question of why states are inclined to comply with international law. In their view, states comply with international law not because its norms are intrinsically just, but because compliance with them is in their interests. Thanks to international law and the world order it creates, states can, to a certain extent, anticipate the behavior of other states. Essentially, international law creates certain rules of the game, albeit

³⁰ Former US Representative to the UN: "International Law is an Impossible Task". URL: <https://regnum.ru/article/1052105> .

frequently violated, in foreign policy and international relations. From an economic perspective, some “realists” believe that international law is beneficial because it allows states to save on various expenditures, primarily military ones, which would otherwise be spent on constant preparations to defend their own territory. Furthermore, international law ensures the relative security and stability of international trade and economic relations. From a psychological perspective, the very existence of international law reduces the fear and tension associated with the constant threat of war.

“Realists” are also skeptical about the effectiveness of international organizations. They often point to the weaknesses and shortcomings of such organizations. They particularly frequently cite the League of Nations’ failure to prevent World War II. However, they somehow forget that the history of international relations and international law is a series of trials, errors, and experiments, and that before a sufficiently effective international organization, such as the EU, emerges, it may be preceded by a long history of failed attempts.

According to “realists” international organizations are not fully autonomous and independent actors in foreign policy and international law. In fact, they argue, international organizations are forums within which interstate political and diplomatic struggles take place. States use international organizations for their own purposes, and the international organizations themselves possess influence and power only to the extent that it is beneficial to the states at the given moment.

In short, the essence of the “realist” approach to international law is that in the event of a conflict between state interests and international law, preference should be given to state interests.

2. The “liberal” approach to international law

The opposite of the “realist” approach to international law is the liberal approach, which also encompasses so-called “neoliberal institutionalism”. Liberals, unlike “realists”, recognize the existence of a certain order in international relations, one of the most important manifestations of which is the system of international law. For them, international law, although not as effective as domestic law, nevertheless represents a fully-fledged law that has a significant impact on social relations. American international lawyer Louis Henkin, a representative of liberalism, explains the essence of the liberal view of international law as follows: “If anyone doubts the significance of this right, let him try to imagine a world in which it did not exist. <...> There

would be no security of peoples and no stability of governments; territorial and air boundaries would be disrespected; ships would move only at their own risk; property, whether within a given territory or without, would be subject to arbitrary appropriation; persons would not be subject to the protection of law and diplomacy; international agreements would not be concluded or observed; diplomatic relations would be severed; world commerce would come to a standstill; international organizations and treaties would disappear”³¹.

Thus, representatives of the liberal school of international law see international law as a key source of order within the system of international relations. States, in their view, comply with international law precisely because it ensures a certain order in international relations. Liberals view international organizations as independent entities necessary for collective action in the international arena. Moreover, as liberals note, the importance of international organizations in international relations is constantly growing.

3. The “radical” approach to international law

In addition to the two approaches to international law mentioned above, there is a third approach, known as the "radical" approach, sometimes associated with dependency theory in international relations.

“Radicals”, who often draw on the methodology of Marxist and neo-Marxist sociology and international relations theory, like “realists”, express considerable skepticism regarding international law and international relations, albeit for very different reasons. They believe that international law and international organizations in their current form are the product of a specific historical period. Moreover, according to these “radicals”, the economic liberalism of the 17th century and the political liberalism of the 19th century exerted a decisive influence on the content of modern international law. Modern international law, they emphasize, is aimed primarily at protecting the interests of Western capitalist states and, in this sense, is capitalist, bourgeois law³². Proponents of the "radical approach" demand radical changes to the world order aimed at a more equitable

³¹ Henkin L. *How Nations Behave: Law and Foreign Policy*. – New York: Columbia University Press, 1979. – P. 22.

³² B.S. Chimni. *Third World Approaches to International Law: A Manifesto*. *International Community Law Review* 8: 3–27, 2006.

distribution of the planet's economic resources and political power. They are convinced that current international law and international organizations are incapable of changing the status quo.

In my view, from the perspective of a radical approach to international law, it is necessary to distinguish between “official international law”, on the one hand, which in its current form is clearly unjust and objectively aimed at maintaining the existing system of economic and political oppression, and “intuitive international law”, within which the ideal of a just and democratic world order is being formed, on the other. “Intuitive international law” represents the aspirations of oppressed masses and, as it develops, is capable of influencing “official international law”.

The future of International law according to some different proposed models
Various authors propose different models for the future of international relations, which will influence the model of international legal order. Let's consider some of these models.

For example, American political scientist Samuel Huntington, in his influential book “The Clash of Civilizations”, sees the 21st century as an era of struggle and conflict between different civilizations. However, we believe the 21st century should be an era not of war, but of peaceful dialogue among civilizations, which should be ensured by a model of inter-civilizational law. American sociologist Amitai Etzioni, who advocates a value-based approach to international relations, proposes using the “vision of a just society” as a benchmark or standard for analyzing the emerging global society and its institutions. This vision is linked to the ongoing synthesis of the “core values of East and West”. According to him, while “individual autonomy” is the highest value for the West, “public order” is the fundamental value for the East. In fact, these values largely determine the specific legal cultures of both Western and Eastern countries. Given this, Etzioni's definition of a “just society” implies “a society in which a carefully calibrated balance is ensured between individual autonomy and public order, the latter being based not so much on coercion as on persuasion”³³.

In his book, “From Empire to Community: A New Approach to International Relations”, Etzioni makes two key points: first, that although “common ideals are far from universally accepted,... there is a fairly broad (and growing) consensus... reflecting the formation of a set of global norms and values, as well as the emergence of a common political culture”³⁴; second, “the more

³³ Этциони А. От империи к сообществу: новый подход к международным отношениям. – М.: Ладомир, 2004. – P. 290-291.

³⁴ Ibid. – P. 268.

deeply people and their elected leaders internalize the consensual formulations that emerge from global synthesis, the further we will move away from confrontation in international society”³⁵. Etzioni calls for the creation of a moral consensus at the transnational level, which will enable the formation of a system of global governance. His model of global governance envisions, on the one hand, the development of supranational, rather than international, structures and institutions, and, on the other, the strengthening of what might be called interregional international law. The emerging global architecture, Etzioni believes, “must assume the function of guaranteeing the satisfaction of the basic needs of all people—not through some socialist concept of equality, but by virtue of the fundamental moral value of every human being”³⁶.

It must be said that Etzioni’s theory, despite its appeal, does not take into account the harsh realities of international life, its often-irrational nature, and the fact that, under the conditions of predatory global capitalism, it is hardly possible to implement such a large-scale, yet idealistic, project of radical transformation of the life of all humanity.

Unlike Etzioni, the French thinker Jacques Attali sees the immediate future of international society in less rosy terms. For him, the essence of what is happening is quite clear: market forces are conquering the planet. As Attali writes in his book *A Brief History of the Future*: “This triumphal march of money is the most powerful manifestation of individualism. It also explains most of the recent paroxysms of History—their purpose is to accelerate and tame its course”³⁷.

According to Attali, if this process of market expansion reaches its logical conclusion, it will destroy everything in its path, including states. When the market becomes the sole law of the world, a world order will emerge that Attali calls a “hyperempire”, a source of material wealth for a minority, new alienation, unprecedented luxury, and abject poverty. According to him, under the conditions of a hyperempire, the natural environment will be completely ordered, everything will become private, even the army, police, and justice, and humanity itself, combined with various high-tech devices, will become a commodity and perhaps even an artifact. If humanity seeks to avoid such a fate and forcibly interrupt the process of uncontrolled globalization, a “hyperconflict” could erupt, involving not only states but also

³⁵ *Ibid.* – P. 101.

³⁶ Этциони А. От империи к сообществу: новый подход к международным отношениям. – М.: Ладомир, 2004. – P. 231.

³⁷ Attali J. *A Brief History of the Future*. Allen & Unwin, 2009 - 291 pages. – P. 9.

religious groups, terrorists, and pirates. Moreover, Attali predicts that the outcome of this hyper-conflict will be the establishment of a planetary “hyper-democracy”, opening up new opportunities for humanity. Thus, Attali sees the development of 21st-century history as follows. By 2035, the reign of the “American Empire” will end, after which human history will pass through three phases of development: hyperempire, hyperconflict, and, finally, hyperdemocracy, the onset of which Attali predicts around 2060. It is quite clear that, in light of this model of historical development, international law will change its content, becoming, in turn, the law of hyperempire, the law of hyperconflict, and the law of global hyperdemocracy.

Israeli historian Martin Van Creveld predicts the decline of the state in the 21st century and the emergence of a hierarchical world order. “As other organizations take the place of the retreating state”, he writes, “they will undoubtedly seek to imitate its role in many of these aspects. Unlike current members of the international community, each of which is sovereign, most of them will likely be unable to exercise exclusive control over any given territory and will instead be forced to share this control with other organizations. Instead of being at least formally equal, as states are, some will undoubtedly be superior and others inferior. In other words, we are talking about a world in which the legal structure will be more in harmony with the political realities that have already taken shape and, in many places, have never disappeared”³⁸.

4. Conclusions

The end of the 20th and the beginning of the 21st centuries were marked by a crisis of the state - the primary subject of international law. The state and its sovereignty came under intense pressure from internal and external forces. Essentially, the state was challenged from three sides. First, in modern conditions, states must reckon with transnational corporations, whose interests increasingly determine the foreign economic and foreign policy activities of states. TNCs, which still recognized as subjects of international law, have accumulated economic power that allows them to manipulate states to their advantage.

³⁸ Кревельд М. Расцвет и упадок государства. – М.: ИРИСЭН, 2006. – С. 513.

Secondly, the power and autonomy of states is diminishing under the influence of regional integration processes. Within regional international organizations (for example, the EU), states are noticeably losing their real freedom of action.

The third challenge to the state comes from transnational organized crime, whose scale of activity is becoming increasingly threatening and can, in some cases, undermine control over state institutions.

The crisis in contemporary international law is also explained by economic factors. The recent global economic crisis has clearly exposed a contradiction that inevitably affects the fate of the international legal order as a whole. The essence of this contradiction, according to American economist Nick Beams, lies in the growing tension between the global development of productive forces under modern capitalism, on the one hand, and the system of nation-states upon which the political power of the bourgeoisie is based, on the other³⁹. In other words, global capitalism requires the creation of a global system of governance, one of the essential aspects of which is global, or transnational, international law, which transcends the limitations of national sovereignty.

Globalization processes have had a devastating impact on the traditional system of sovereign states and the international law that corresponds to it. On the one hand, under the conditions of globalization and the global market, the prerogatives of the state have weakened, and all fundamental processes have become subordinated to the logic of the global market. On the other hand, globalization has led to greater autonomy for domestic actors. As one analyst writes: "In the 20th century, peace in international relations depended on the peaceful coexistence of sovereign states, each of which justified its own legitimacy in its own way. In the 21st century, the question will be about peaceful coexistence between nations within the same state that justify different principles of determining sovereignty. In some places - Bosnia or Kosovo - this may prove impossible... The main practical problem of the 21st century will be ensuring the peaceful coexistence of these parts"⁴⁰.

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The right to counterfeit evidence a right still in development

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Abstract

The criminal process provides the exercise of the right by the actors participating in the proceedings, who are the judge, the prosecutor, the defendant and his defense attorney, the victim or the civil plaintiff. This process aims to ensure a stable balance between two interests, the general interest of society that requires a fair and speedy trial of the criminal offense, but on the other hand, the interest of the accused or defendant, which requires a full guarantee of the rights of the community and the defense. The key to this balance are procedures and evidence. On the one hand, there are procedures that regulate the activity of the subjects of criminal proceedings and on the other hand, there are the evidence of the accusation and those of the defendant and the defense that serve to determine the circumstances of the commission of the criminal offense and the guilt or innocence of the defendant. The concept of the right to counter-evidence or in other words, the evidence of the defendant and the defense fulfill the main purpose of the criminal process.

In criminal proceedings, in addition to the evidence of the accusation, the evidence of the accused or the evidence of the defendant and the defense is also needed, which is otherwise called evidence against the accusation. The concept of evidence against the accusation is not unknown in general and from the law of criminal procedure in particular. Evidence against the accusation means that it is intended to prove the opposite of something, as an expression that can be applied by reacting to a certain argument or circumstance. Whereas, the concept of evidence against the accusation can be understood as the legitimate reaction of the defendant and the defense to the general attack that is the accusation, represented by the prosecutor.

The research hypotheses of this article have been raised and formulated to reach final findings and conclusions, in function of the topic of this paper.

The scientific methods used in this study are: analytical, descriptive and comparative methods, through which the key points of the topic are addressed.

Keywords: Opposing evidence, special trials, defendant, lawyer, judge, criminal trial.

1. Introduction

The movement toward affirming the right to rebuttal evidence in the criminal field is present in both domestic and international law, driven by the increasing influence of concepts aimed at protecting individual rights and procedural guarantees. The issue of the burden of proof is closely linked to the principle of the presumption of innocence, which holds constitutional value.

The concept of rebuttal evidence is not unfamiliar in criminal procedural law. Rebuttal evidence is intended to prove the opposite of a claim and may be introduced in response to a specific argument or factual circumstance. In this sense, rebuttal evidence may be understood as the legitimate procedural response of the defendant and the defense to the general attack embodied in the accusation brought by the prosecutor.

However, it should be noted that the realization of the right to rebuttal evidence remains incomplete. The domestic legal system has not yet fully embraced the logic underlying this procedural development. Legal tradition has often been guided by the assumption that repressive efficiency necessarily requires measures favoring the prosecution, to the detriment of the defendant's right to defense. Certain actions undertaken at various stages of criminal proceedings reflect a continued questioning of the effective exercise of the right to rebuttal evidence.

In this context, particular attention must be given to the uneven recognition of the right to rebuttal evidence during the investigative stage of criminal proceedings. These developments justify extending the analysis to the investigation phase, during which the right to rebuttal evidence is not consistently applied in the manner required by fair trial standards. Nevertheless, recent amendments to criminal procedural legislation establish a clearer legal basis for the exercise of the right to rebuttal evidence, particularly in cases where the defendant is subject to personal security measures.

1. Limitations on the right to rebuttal evidence

In our criminal procedure, there are still circumstances that render the defendant unable to bring evidence to rebut the accusation. These exceptions are twofold. In the first case, the right to rebuttal evidence is prohibited by law, which means that the relevant provisions clearly define the defendant's inability to prove his innocence. The second case is more common and reflects the growth of alternative dispute resolution involving the waiver of the right to rebuttal evidence.

The right to rebuttal evidence, as a guarantee of good justice, should allow the defendant to present arguments that demonstrate his innocence. Beyond the limitations of the means of evidence, there are circumstances in which the law prohibits the defendant from bringing material evidence contrary to the accusation, in order to discover the truth.

The issue of proof is important only to the extent that we have reason to convince the judge as the subject responsible for determining the legal truth and deciding whether or not to punish the defendant. For alternative cases of criminal conflict resolution, criminal procedure is not foreign and proposes as a solution the willingness not to use contrary evidence. Since the beginning of the 90s-s to date, successive reforms have significantly influenced new findings between the completion of preliminary investigations by the prosecution and the traditional trial. Thus, mediation, special trials, and criminal agreements reflect a desire not to use adverse evidence in the criminal process. However, this solution is fraught with consequences, as it requires securing the defendant's consent to waive the right to adverse evidence.

1.1 Alternatives to the right to adverse evidence

Criminal procedure, unlike civil procedure, is traditionally oriented toward the establishment of material truth and therefore cannot be limited solely to the elements presented by the parties. Within this framework, the judge has an active duty to participate in the proceedings and to decide on the admissibility of evidence, including rebuttal evidence.

At first glance, the concepts of judicial approval and negotiated resolution in criminal cases may appear contradictory. Nevertheless, contemporary criminal justice systems increasingly adopt simplified and alternative procedures in which the judge's role is significantly reduced, leaving greater room for agreements between the parties regarding the resolution of the case. In such procedures, the evidentiary debate is often rendered unnecessary or substantially limited.

Accordingly, this study will examine the various forms of alternative criminal dispute resolution before analyzing the impact of these procedural mechanisms on the exercise of the right to rebuttal evidence.

1.1.1 Alternative ways of resolving criminal proceedings

Direct trial and summary trial procedures, as forms of special criminal proceedings, are provided for in the Code of Criminal Procedure as alternatives to the traditional ordinary trial. Due to their specific nature, these procedures do not fully adhere to certain fundamental principles of criminal proceedings, such as orality and the adversarial principle.

A direct trial is initiated at the request of the prosecutor in cases where the defendant has been apprehended in flagrante delicto and, during questioning, has admitted the facts and where the defendant's guilt appears manifest. A summary trial, by contrast, is initiated at the request of the defendant or by a specially authorized legal representative acting on the defendant's behalf, where the defendant has expressly consented to the resolution of the case through this procedural mechanism. In summary proceedings, the taking of evidence during the court hearing and the adversarial debate concerning such evidence are omitted. This procedure serves the interests of judicial economy by shortening procedural timelines and enhancing the speed and efficiency of adjudication. In return, the defendant benefits from a reduction of one third of the imposed sentence, whether a fine or a term of imprisonment of up to thirty-five years, excluding life imprisonment.

In addition, criminal law continues to recognize procedures aimed at repairing the damage caused by the criminal offense as mitigating circumstances. Such procedures may be initiated by the prosecutor with the consent of both the victim and the perpetrator, offering a consensual method of resolving the criminal conflict through agreement or negotiated adjudication.

The criminal plea agreement procedure enables the prosecutor to propose to the offender the terms of the agreement, including the legal qualification of the offense and the determination of the sentence. During negotiations, the presence of defense counsel is mandatory for offenses punishable by imprisonment of up to seven years. The agreement must be concluded in writing and must include a clear description of the criminal act, its legal classification, the defendant's guilty plea, the type and extent of the principal and additional penalties, as well as the manner of their execution as agreed

by the parties. Where a civil plaintiff is involved, the written consent of the injured party regarding the amount of compensation is required.

Nevertheless, the seriousness of certain criminal offenses and the significance of victim participation in evidentiary debates call for the establishment of distinct procedural safeguards, particularly in cases exceeding minor offenses or contraventions. In cases involving an admission of guilt, the sentence may be subject to reduction, provided that procedural guarantees are adequately respected.

The criminal sentencing order procedure applies where the defendant is accused of a criminal offense and, within three months of the registration of the offense, the prosecutor seeks a non-custodial sanction. Court approval is required where it is deemed that a sentence of imprisonment is unnecessary. The court examines the request in the absence of the parties and issues a decision within ten days of its submission.

Finally, procedural law provides for the resolution of criminal cases through mediation. Agreements reached between the parties, formalized in a report signed by the mediators, acquire enforceable legal effect and suspend the exercise of public prosecution. The use of mediation contributes to reducing the judicial caseload, particularly in cases of minor offenses or misdemeanors, where a consensual approach aimed at compensating the victim may be less traumatic. This mechanism applies both to adults and to minors, the latter under the system of educational measures provided for in juvenile criminal legislation.

The introduction of these consensual procedures into criminal procedure inevitably affects the scope and practical exercise of the right to rebuttal evidence.

1.1.2 Alternatives related to the right to rebuttal evidence

The impact of the use of alternative methods on the right to rebuttal evidence is twofold. First, it strengthens the place of affirmation and declarations in the resolution of criminal cases and secondly, it corresponds to the space regarding the debate on evidence, as a result of the admission of guilt and the creation of one of the alternative methods of resolving criminal cases. Waiving rebuttal evidence implies above all the recognition or admission of guilt. This requirement has become the basis of alternative dispute resolution in criminal cases. This development reflects a profound attitude towards the purpose of the criminal trial, which is to establish the material truth. The plea agreement and the sentence, after the facts of the criminal offence have been

established, are closer to the solution provided by civil proceedings, which seek a judicial truth. In this context, the plea agreement provides the prosecution with the final evidence that allows the conclusion of the criminal case. However, the defendant brings such evidence, if this is in his interest, while adhering to the agreement on the sentence to be given to him. The acceptance of the agreement is expressly provided for in the written submission of the defendant's plea agreement and the procedure followed in this case. The plea agreement facilitates a phase of negotiated justice, in which compromise occupies an important place in the search for the truth. The aim of these alternative methods is not to shed light on the objective reality of the situation, but to reach an agreement to end the dispute that has arisen. Moreover, the object of the evidence is to convince the court of the manner in which the criminal offence was committed. However, the judge does not intervene in the negotiation phase. His role consists in approving the agreement between the defendant and the prosecution to give it executive force. During this procedure, as one of the types of special trial, there is no debate on the evidence of guilt. The simple recognition of the facts closes the debate and makes any further judicial investigation unnecessary. The strength of the defendant's assertion under this procedure is particularly important and therefore presupposes the defendant's awareness that leads him to voluntarily waive the exercise of his right to contrary evidence. In the implementation of these conflict solutions, we should see some minor changes. In fact, the waiver of the right to rebuttal evidence applies only to the initiated alternative procedure, that is, it leaves room only for negotiation on the determination of the penalty with the prosecutor. In the event of failure of this stage and the defendant being sent to an ordinary procedure, he enjoys the full exercise of his right to rebuttal evidence. The right to rebuttal evidence, in these alternative procedures for resolving the criminal conflict, will be analyzed as a simple option of withdrawal from the normal procedure. The defendant waives the recognition of the facts or guilt. But, legitimately we can ask about the existence of an appeal in the procedure of presentation with a prior admission of guilt. In fact, the question arises as to what interest the defendant will have in opposing the agreement between him and the prosecution? The answer is simple, since in this case the right to appeal only makes sense to achieve the right to withdraw from the agreement between the parties. However, according to Article 406/f of the Code of Criminal Procedure, it is determined that no appeal is allowed against the court's decision, except in the case when the prosecutor can appeal only the decision to dismiss the case. This action, far from its purpose, does not call into question the basis of these

alternative measures that are based on the defendant's renunciation to prove the opposite of what the accusation has brought. We see the importance and consequences of the right to contrary evidence for the defendant. This can only happen with his conscious consent.

1.2 Waiver of the right to counter-evidence

The waiver of the right to rebuttal evidence has important consequences, especially in the direct automation of the declaration of guilt and the announcement of the corresponding sentence. Such a decision must be made in conditions that allow for the authenticity of the defendant's will and of course with the aim of avoiding the commission of a serious miscarriage of justice. In this case, alternative procedures try to guarantee the quality of approval and effectiveness of the waiver of the right to rebuttal evidence.

1.2.1 The importance of the defense in the defendant's admission of guilt

The consequences of a guilty plea are important in the criminal process, because they can lead to quasi-automatic convictions in a simplified procedure, which will leave less room for the exercise of the rights of the accused. On the other hand, this makes it impossible for the defense to attempt to exonerate itself by means of evidence contrary to the elements of the accusation. This is why the legislator has carefully foreseen these procedures in order to ensure and guarantee their implementation in practice.

First, legal assistance is provided to give the defendant a guarantee to understand the measures being taken in relation to the consequences of his conduct. The presence of a lawyer varies according to the stage of the procedure. In the summary trial and in the agreement phase, it is always possible, and mandatory. In these special procedures, it is common law that assistance through a lawyer is optional in criminal offences. In plea proceedings, the assistance of a lawyer is necessary and may result in legal aid. The essential role of advice carried out by the lawyer is essential. He must clarify the defendant about the decision to be made, to indicate whether or not he is interested in accepting the guilt and the sentences proposed by the prosecution. Also, the lawyer must be able to see and familiarize himself with the criminal file and with the condition that the defendant must speak freely with him, outside the presence of the prosecutor, before making the decision. Second, the defendant must be given sufficient time for the consent to be given, after he has given due consideration to the decision he is about to make.

The plea procedure must provide a period of reflection for the defendant. This is an opportunity that must be expressly granted to the defendant. The defendant must seek to take advantage of this period in relation to the position he will ultimately take.

1.2.2 Consent of the defendant and approval of the agreement by the judge

Among the alternative criminal prosecution procedures, there is still a difference in terms of the effectiveness of the defendant's consent. Regarding the mediation procedure, where the simple agreement of the parties is formalized in an act signed by the prosecutor or the designated mediator, it is sufficient for their approval and agreement to have effect. However, in special trials and in criminal agreements, these procedures require the intervention of the judge. Regarding the criminal agreement, Upon its arrival, the prosecutor sends it to the court for approval, along with all preliminary investigation acts. The proceedings before the settlement approval judge reveal two distinct phases.

The first phase is the hearing of the accused and his lawyer. The law also provides that when the victim of a criminal offense is identified, after the agreement, the prosecutor sends him a copy of it. While, when he is summoned by the court to appear at the hearing at the same time as the defendant, he may be accompanied by his lawyer.

The second stage concerns the approval of the agreement by the court. With this procedure, a judge is needed to verify "the facts and make their legal qualification", to see for himself that the defendant, in the presence of his lawyer, has admitted the facts alleged against him and accepts the sentence proposed by the prosecution.

Finally, the judge approving the agreement verifies whether the sentences proposed by the prosecutor are "justified based on the circumstances of the criminal offense and the personality of its perpetrator." For this reason, the judge's role is twofold: he must ensure the authenticity of the defendant's acceptance of the agreement, but he must also make a critical analysis of the legal qualification of the criminal offense and the sentence proposed by the prosecution. The judge's role must be specified in contrast to the role of the arbitrator faced with an agreement between the parties in private law. The specificity of the criminal case leads in fact to providing additional guarantees for the accused even if he waives himself to exercise his right to contrary evidence. The judge's role is not linked to the prosecutor's proposal, or to the defendant's acceptance of the agreement. On the contrary, it is his

responsibility to ensure that the suspect has freely and honestly admitted that he is the author of the event that occurred, and at the same time carries out verifications of the facts, their veracity and the circumstances of the criminal offense. In this sense, the judge plays a central role in the "plea bargain" procedure. The only limitation on the power of the judge's decision to approve the agreement is that he must make a choice between approving it and rejecting it, the consequence of which is a return to the usual procedure. In fact, the law does not provide for the possibility for the judge who approves the agreement to directly declare the defendant's release.

The existence of a right to rebuttal evidence poses problems in several specific areas. As for demonstrating that the right to rebuttal evidence is true, and an unfinished construction, it is necessary to dwell on an area of criminal procedure that leaves little room for the exercise of this right and the rights of the defense in general.

2. Opposing evidence and its role in the procedural stage

The right to adverse evidence has its stage of development at the stage of preliminary investigations. Major legislative reforms in recent years have contributed to the recognition of the defendant's active rights in the search for evidence and his active participation in the criminal process. However, it seems that the stage of the initial investigation and the actions carried out by the police, as a very important moment in the criminal process, is ready to recognize the procedural rights of the defendant. We will study the difficult recognition of the right to adverse evidence at the stage of investigation, before dwelling on the consequences of the special investigation, in the exercise of this right.

2.1. Limitation of the right to counter-evidence at the investigation stage

The concept or term investigation has a broad meaning in many aspects of criminal procedure. Investigation means to be in search of a person, of evidence, or of the discovery of facts and circumstances of the commission of a criminal offense. The process of the preliminary investigation phase covers all investigative actions carried out by the state police, the judicial police and the prosecution. The initial phase of police actions is still described by the inquisitorial character, leaving very little room for the exercise of an active and effective defense. When guilt is evident at this point, as in the case of arrest in flagrante delicto, then it can lead the person before a court to

answer for the commission or not of the criminal offense. Before emphasizing the slow movement towards the affirmation of the right to contrary evidence in the investigation phase of procedures, we will look at the weak role of the active defense and that the exercise of this right is limited.

The various investigation frameworks have a common objective related to the rapid search for evidence to achieve the discovery of the truth about the criminal offense committed, in identifying the perpetrators of the crime, determining security measures, informing the charge and taking the perpetrator of the criminal offense as a defendant. Our criminal procedure now has two main investigation frameworks, which are the investigation of a criminal offense in flagrante delicto and preliminary investigations. Preliminary investigations can be seen schematically as the normal investigation framework, while flagrante cases can be described as exceptional because they require special circumstances and are more limited in time.

At this stage of the investigation, the defendant's position is limited, due to immediate actions directed by the prosecutor or judicial police. Despite important advances such as the recognition of the obligation of impartiality of the judicial police officer, or the obligation to maintain secrecy, the preliminary investigation procedure has a procedural framework based on the inquisitorial model, accompanied by the lack of any real consideration for the accused, but in significant cases also by the absence of a lawyer.

2.1.1 The status of the person accused as a suspect of committing a criminal offense

A fundamental element demonstrating that the accused has limited procedural consideration during the investigative phase is the absence of a clearly defined status. Individuals brought before a criminal court are formally identified as “suspects” or “accused,” whereas, during the initial preliminary investigation, the identity and status of the alleged perpetrator remain uncertain.

The Code of Criminal Procedure designates such persons as “suspects,” referring to those who appear to have participated in a criminal act. This terminology reflects a procedural framework that historically has provided minimal guarantees to individuals at this stage, including limited access to exercise the right to present rebuttal evidence. The absence of a clearly defined status highlights the restricted procedural position of the defendant during initial investigations, before formal criminal proceedings are initiated.

At this stage, the public action undertaken by the prosecutor serves primarily to determine whether formal proceedings should be instituted.

Consequently, the concept of the “party” as recognized in later stages of criminal proceedings does not apply during the initial investigation. Early investigative actions, carried out by state and judicial police officers, remain largely under the discretion of law enforcement until a decision is made to impose a personal security measure. Protective guarantees for the exercise of procedural rights are minimal: the individual, while in police custody, generally does not have access to the case file nor the right to legal counsel, except in limited procedural acts such as verification of personal data or searches. Full procedural rights, including access to legal representation, are conferred only when criminal proceedings are formally initiated and a personal security measure is requested, marking the transition to the preliminary investigation phase.

2.1.2 The limited role of the lawyer

The defense lawyer, as a participant in criminal proceedings, plays a crucial role in the exercise of the right to rebuttal evidence. The lawyer is responsible for understanding the legal procedures applicable to the defendant, developing a defense strategy, advising on procedural requirements, and conducting investigations that may demonstrate the client’s innocence.

While the lawyer’s role is clearly visible during the trial phase, it is considerably less prominent during the preliminary investigation phase, and often minimal or almost nonexistent during the initial police investigation. In these early stages, even meetings with the lawyer—who may lack access to the case file—cannot be limited to mere explanations of the rights previously communicated by the judicial police officer.

The lawyer formally enters the proceedings when the client has been detained or arrested for committing a criminal offense, when the investigation is underway and the client has been informed of the charges, or when a personal security measure is requested. During the investigation phase, the lawyer’s role is often supportive rather than decisively influential in shaping the course of events. Nevertheless, the lawyer may undertake procedural actions provided for in the Code of Criminal Procedure, including submitting requests and memoranda to the prosecution, safeguarding the client’s interests by identifying potential witnesses, and exercising procedural remedies such as appeals.

However, these initiatives—while important—do not constitute a full exercise of the right to present rebuttal evidence, particularly during preliminary investigations where their effectiveness is limited. The growing recognition of the defense's role during the preliminary investigation phase has, however, contributed to the gradual expansion of rights for both defendants and victims.

2.2. Procedural guarantees in the preliminary investigation phase

The flagrant and severe inequality of means and rights between the prosecutor and the suspect in the criminal process has led the legislator to adopt fundamental changes regarding the rights of the defendant and the defense. We will present two movements that participated in the creation of guarantees regarding protection during the investigation. It is related to developments in the status of the person detained under the measure of personal security, and the consequences that come with its implementation.

2.2.1 The status of the accused in pre-trial detention

The execution of the coercive measure "prison arrest" related to the freedom of the person has undoubtedly created premises for the recognition of his rights. The detained person has acquired a status and his rights have increased significantly through the implementation of the justice reform. This subject is informed first of all about the nature of the criminal offence for which the investigation is carried out, in which the notification may be at least a summary of the facts and circumstances of the criminal offence. The procedural law does not require that the suspected perpetrator be told details of the facts that he is suspected of having committed the criminal offence, such as committing a robbery in a place resulting in personal injury, but must be informed of the nature of the criminal offence, that is, its legal status, assessed at this stage of the investigation. During this stage of the criminal process, the detained person also possesses a number of rights such as the right to a medical examination, or the right to notify his family. The proceeding body shall immediately inform the arrested or detained person of the rights provided for in Article 34/a of the Code of Criminal Procedure, by delivering to him, against his signature, a letter of rights in written form. The person has the right to keep the letter of rights and at the end to consult a lawyer. All these guarantees constitute an embryo for the exercise of the rights of defense, justified by the court's decision to deprive the person of his liberty

and order him to remain in custody. The fact that there is a reasonable suspicion, against a person who has committed or attempted to commit a criminal offence, is not sufficient to grant him these minimum guarantees. These rights still remain limited and represent only the beginning of the recognition of a right to adverse evidence at the preliminary investigation stage. Under the influence of European jurisprudence, a real revolution is taking place in the organisation of pre-trial detention measures where a primary role is given to the right to adverse evidence at the initial stage of the investigation. Indeed, several decisions of the European Court of Human Rights have called into question the application of measures and rules of national courts in criminal proceedings. In the *Salduz* judgment, The Court has emphasised that, in order for the right to a fair trial under Article 6 § 1 of the Convention to remain sufficiently practical and effective, it is necessary, as a general rule, to provide the accused with legal representation from the first questioning of the suspect by the police. In criminal proceedings, we have emphasised the importance of legal representation for the exercise of the right to cross-examine, a requirement which was reaffirmed by the European Court in its *Dayanan* judgment. In this decision, the Court has developed the guarantees of a fair trial which are favoured by the presence of a lawyer during the stage of arrest and detention of the accused person. The Court also stresses the importance of the role of the defence, in the requests it submits to the procedural body in the search for evidence, the preparation of questions, the calling of witnesses, etc. The effective assistance of the lawyer during detention guarantees the exercise of the right to adverse evidence. In fact, the questioning of the defendant, the organisation of the defence and the search for favourable evidence, in order to be effective, presuppose that the lawyer must have access to the criminal proceedings, or at least that he be aware of the charges brought against his client.

The necessary presence of a lawyer during preliminary investigations, the provision of more effective information on the charges, and better preparation for questioning the accused person in the presence of a lawyer, demonstrate guarantees of a fair trial and respect for the exercise of the right to adverse evidence.

2.2.2 The need for a unique investigation in the exercise of the right to rebuttal evidence

Our criminal procedure is experiencing a rapid pace of change, from the Constitutional reform to the justice reform laws, including the Criminal

Procedure Code. The new changes provided for in this code affirm the right to adverse evidence in the criminal process. Important developments were foreseen in the preliminary investigation phase, with the expansion of the rights of the defendant, the defense attorney, the victim, with the introduction of the defendant's bill of rights, as well as the preliminary investigation judge and of the preliminary hearing.

Faced with the diversity of ways of implementing criminal cases, and more precisely with the coexistence of an investigative framework under the direction of the prosecutor and another under the direction of the police, the criminal procedure code has regulated this duality in the creation of a "unique investigation". The Judicial Police is the body that practically carries out criminal prosecution. While the prosecutor exercises criminal prosecution, conducts investigations, controls preliminary investigations, files charges in court, and takes measures to execute decisions.

It is regrettable that the police investigation phase is still far from the exercise of active defence, and at this procedural juncture, limits the defendant to a passive role, who may be subjected to the procedural attacks of the prosecution without being able to reply. The need for balance between the parties in the criminal process requires taking into account the right to counter-evidence.

The questioning of the preliminary investigation phase indirectly raises concerns about the lack of contrary evidence. At the trial phase, the opposite occurs, which is the affirmation of the right to contrary evidence through the increase in the active role of the accused, his right to access the procedural file, or the right to actively participate in the search for the truth. Replacing this formalized phase from a "unique investigation" to a "judicial investigation", under the control of the preliminary investigation judge, requires us to regain the guarantees of a right to contrary evidence. At this phase of the criminal process, the need to protect the rights of the defendant is guaranteed and at the same time ensures that victims can take their place at all stages of the process, but also allows the prosecutor and the judge to have the most effective means in the fight against crime and recidivism. This balance that respects the objectives of criminal procedure must certainly be found in compliance with constitutional and legal guarantees. The right to rebuttal evidence has found its basis in the right to a fair trial and equality of arms in the European Convention on Human Rights. At the stage of preliminary investigations, it raises the problem of the applicability of the rules protecting the right to a fair trial and the principle of equality of arms. We have already seen that the notion of "charge" is a notion derived from the

qualification of domestic law and must be taken in a more material than formal sense. European judges have recognized the applicability of Article 6 of the Convention, failure to respect the guarantees protected by these provisions “may seriously undermine the fairness of the trial.” The charge is taken as the official notification of the suspicion of the perpetrator of committing a criminal offense and is implemented during the preliminary investigation phase, respecting the requirements of Article 6 of the Convention. This is an interpretation made by the European Court equating with the accusation that any suspicion of having committed a criminal offence result in a significant impact on the suspect's situation.

We can therefore conclude that the preliminary investigation stage, which expressly provides for compulsory acts against the person suspected of having committed a criminal offence, cannot constitute a new field of application of Article 6 of the Convention. Even if the Court is still in the analysis of specific facts that preclude generalization, we believe that this procedure is underway. Any reform related to the pre-trial phase requires us to take into account the evolution of the right to a fair trial, of equality of arms, and, more broadly, the right to adverse evidence. A decision of the European Court has confirmed the importance of the implementation of a fair trial. In fact, in a case involving Turkey, the Court emphasizes the right to a fair trial and in this case the right to be defended by a lawyer must be implemented in the detention procedure. The Constitutional Court has consistently held that the presence of a lawyer in criminal proceedings should be considered a genuine defence and not a simple accompaniment of the defendant. Therefore, procedural fairness requires that the accused be able to receive the full range of interventions that are specific to the advice and protection of his procedural guarantees.

In this regard, discussing the case, organizing the defense, seeking evidence favorable to the accused, preparing questions, supporting the accused at this difficult procedural moment and monitoring the conditions of detention are the foundations of effective defense that the lawyer must perform and exercise freely. In order to respect the right to adverse evidence, during the preliminary investigation phase, the legislator provided in the new amendments to the Code of Criminal Procedure, the creation of the preliminary hearing judge. This subject of procedural law ensures the "rights of the parties" throughout the preliminary investigation process, and constitutes a kind of impartial legal means of control in the case of prosecutorial inertia. Beyond creating the role of guardian of the rights of the parties, the principle of adversarial proceedings is strengthened at this stage, in order to confirm as soon as possible the status of a party in the defendant's

process, in his ability to have access to the entire file. The expression of adversarialism during the investigation phase will affect the removal of the secrecy of the investigation and the greater presence of the lawyer during the defendant's stay with the personal security measure "prison arrest".

The rights of the accused are highlighted and strengthened both before the judge of personal security measures, but also before the judge of the preliminary hearing. While it may seem interesting in relation to the affirmation of the principle of protection and procedural fairness, respect for the right to adverse evidence at the beginning of preliminary investigations is still far away. The debate on the need to draft a new code of criminal procedure shows that the right to adverse evidence has not been sufficiently taken into account. Its construction is not yet complete and that its affirmation in domestic law remains in development. This is due to the legitimate concern for the effectiveness of law enforcement in the criminal justice system that always fluctuates between the inquisitorial and the accusatory system. The right to adverse evidence, between freedom and right, reflects the fair balance between the parties in the criminal process.

In conclusion, we can say that the active role of the defendant in the judicial process, the judge and the investigation in search of contrary evidence, as well as the guarantees of the defense arguments, lead us to believe in the right to rebuttal evidence, as an opportunity to prove the innocence of the accused and protect him from judicial error. Cases, in which the exercise of the right to rebuttal evidence seems somewhat difficult, do not question this right, but reflect the incomplete nature of its construction. The jurisprudence of our courts, intertwined with that of European law, tends to reinforce the rule of the right to rebuttal evidence at the stage of preliminary investigations, to give an active role to the defendant, in the protection of his procedural rights.

3. Conclusion

The movement that has led to the assertion of the right to rebuttal evidence faces a difficult balance between the need for effective law enforcement and the protection of fundamental individual freedoms. Any debate about criminal procedure must balance these two pressing needs. The exercise of a right to rebuttal evidence can be seen as a weakness, a limitation on the powers of the prosecution. But such an assessment is necessarily distorted by the model of thought that comes from the historical heritage of our criminal procedure. The issue of seeking and discovering the truth has always been at the heart of the debate about evidence in criminal cases. It has been considered the heart of

the division between the accusatory and inquisitorial systems. While the search for truth is all-pervasive in the inquisitorial process, it is sometimes a secondary objective in the accusatory process. The concept of the right to rebuttal evidence should be detached from traditionally accepted classifications because it involves the necessary balance between the fundamental values of protecting society and the procedural guarantees of the defendant in the criminal process.

One can legitimately ask about the continuity of the vacillating procedural organization between the accusatory system and the inquisitorial system. Indeed, today, evidence is no longer reserved for the judge or the parties, but it is precisely the close cooperation between the judge and the parties in the process, whose search can lead to judicial truth, which can find its effectiveness, written in the principle of "common truth, proximate truth." The law of evidence is indicative of changes in society. It is the translation of the subjective criteria that are acceptable at a given time to achieve judicial truth.

The affirmation of the right to rebuttal evidence indicates a procedural change as criminal law has generally recognized it. The creation of a new system such as the fair trial overcomes the distinction between the concept of the inquisitorial and accusatory system, it tends towards universalism and the necessary balance of the judicial function, a mode of "hypersubjectivization" that proclaims the rights of the individual against the power. This break is justified by a genuine legal revolution, reflected mainly by the competition between national and international law, through new negotiated ways of resolving the conflict and the increase in the power of the media. This new scheme, of the right to a fair trial, determined the recognition of the active nature of private parties and especially of the defendant as a subject of procedural law in the criminal process.

In this sense, the right to rebuttal evidence, under the influence of international law instruments, can be conceived as the cornerstone of the right to a fair trial, in preserving the balance between the parties in the process. Although this may seem dangerous, the right to rebuttal evidence, based on the right to a fair trial, can be seen as the ethics of criminal proceedings by allowing to limit the coercive power of public authorities, in such a way as not to paralyze the system. The international and European basis of the right to rebuttal evidence is in fact a concept still under construction, but its spread and manifestations are increasingly urgent and require its recognition, assurance and consolidation.

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Developing an intelligent model for predicting student academic success

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ABSTRACT

This study aims to predict students' academic success using Artificial Intelligence and Machine Learning techniques applied to the Student Performance Factors dataset. The dataset comprises 6,607 observations and 20 variables, including academic, demographic, and social characteristics. After data cleaning, handling missing categorical values, encoding categorical variables, and standardizing numerical features, a binary target variable (Passed) was constructed based on the median of the Exam_Score. Exploratory Data Analysis revealed that academic engagement factors—particularly attendance, study hours, and previous academic results—exhibit a stronger relationship with exam success than demographic or social factors. Several classification models were evaluated, including K-Nearest Neighbors, Decision Tree, and Logistic Regression, with Logistic Regression achieving the best overall performance. The final model demonstrated strong predictive ability, achieving an accuracy of 88.7%, precision of 89.1%, recall of 91.1%, and an F1-score of 90.1%. The results confirm that academic performance can be effectively predicted using Machine Learning approaches and highlight the critical role of academic engagement indicators. These findings suggest that such models can support educational institutions in early identification of students at risk and in designing targeted interventions to improve academic outcomes.

Keywords: Academic Performance, Student Success Prediction, Machine Learning, Logistic Regression, Educational Data Mining, Artificial Intelligence, Exploratory Data Analysis, Student Performance Factors

1. Introduction

The objective of this study is to predict students' academic success by examining a broad range of academic and demographic factors, including study time, class attendance, previous academic results, as well as other personal, family, and social characteristics. By applying Artificial Intelligence and Machine Learning techniques to the Student Performance Factors dataset, the study aims to develop a predictive model that not only estimates the likelihood of academic success but also analyzes the relative influence of different factors on students' final performance. This data-driven approach supports the early identification of students at risk of academic underachievement, as well as those with high potential for success, thereby enabling targeted interventions and contributing to the improvement of educational strategies and institutional decision-making.

2. Literature review

Academic performance has long been a central topic in educational research, as it reflects both individual student achievement and the effectiveness of educational systems. Traditionally, academic success has been measured through grades, standardized test scores, and progression outcomes, which are influenced by a combination of academic, demographic, and socio-economic factors (Richardson, Abraham, & Bond, 2012). Prior studies emphasize that academic engagement variables—such as study time, attendance, and prior academic achievement—are among the strongest predictors of students' academic outcomes.

Attendance has consistently been identified as a critical factor in academic success. Research shows that regular class attendance enhances students' exposure to learning materials, interaction with instructors, and engagement in classroom activities, all of which contribute positively to performance (Credé, Roch, & Kieszczynka, 2010). Similarly, study time is positively associated with academic achievement, although its effectiveness depends on study strategies and self-regulation skills (Nonis & Hudson, 2010).

Previous academic performance is another strong predictor of future success. Students with higher prior scores tend to maintain better academic outcomes over time due to accumulated knowledge, learning habits, and academic confidence (York, Gibson, & Rankin, 2015). These findings support the inclusion of prior achievement variables in predictive models of academic success.

Demographic and Social Factors in Academic Performance

In addition to academic variables, demographic and social factors such as parental education, family involvement, and learning environment have been widely examined. Parental education level has been shown to influence students' academic performance through access to educational resources, academic support, and expectations (Davis-Kean, 2005). Teacher quality and school environment also play an important role, as effective teaching practices and supportive learning conditions can significantly enhance student outcomes (Hattie, 2009).

However, the literature presents mixed evidence regarding the strength of demographic and social factors compared to academic variables. While these factors contribute to shaping students' learning contexts, their direct impact on measurable academic outcomes is often weaker than that of engagement-related variables such as attendance and study behavior (Sirin, 2005). This suggests that demographic characteristics may act more as indirect or mediating factors rather than direct determinants of academic success.

Educational Data Mining and Machine Learning in Education

With the growth of educational data, Educational Data Mining (EDM) and Learning Analytics have emerged as important research areas focused on extracting meaningful patterns from student data (Romero & Ventura, 2010). Machine Learning techniques are increasingly used to predict academic performance, identify at-risk students, and support data-driven decision-making in education.

Commonly used Machine Learning algorithms in academic performance prediction include Logistic Regression, Decision Trees, K-Nearest Neighbors, Support Vector Machines, and Neural Networks (Baker & Inventado, 2014). Among these, Logistic Regression remains a popular baseline model due to its interpretability and robustness, particularly in binary classification problems such as pass/fail prediction (Hosmer, Lemeshow, & Sturdivant, 2013).

Several studies have demonstrated that Machine Learning models outperform traditional statistical approaches when dealing with complex, multidimensional educational datasets (Kotsiantis, Pierrakeas, & Pintelas, 2004). At the same time, interpretability remains a key concern in educational contexts, where understanding the factors influencing predictions is as important as predictive accuracy (Shmueli, 2010).

Predictive Models for Academic Success

Recent research highlights the importance of using predictive models not only for classification accuracy but also for early intervention. By identifying students at risk of academic failure, educational institutions can design targeted support mechanisms such as tutoring, mentoring, and personalized learning strategies (Lakkaraju et al., 2015).

Studies consistently show that models incorporating academic engagement variables—attendance, study time, and previous performance—achieve higher predictive performance than models relying primarily on demographic data (Jayaprakash et al., 2014). This aligns with the growing emphasis on actionable predictors that institutions can influence through policy and instructional design.

The literature confirms that academic success is a multidimensional phenomenon influenced primarily by academic engagement and prior achievement, while demographic and social factors play a secondary but supportive role. The application of Machine Learning techniques, particularly interpretable models such as Logistic Regression, offers significant potential for predicting academic outcomes and supporting evidence-based educational decision-making. These findings provide a strong theoretical foundation for the present study, which applies Machine Learning methods to identify key predictors of student academic success using the Student Performance Factors dataset.

3. Methodology

This study adopts a quantitative, data-driven research design based on supervised Machine Learning techniques to predict students' academic success. The methodological framework includes data collection, preprocessing, exploratory data analysis, model development, and performance evaluation. A binary classification approach is employed to distinguish between students who pass and those who do not pass the final exam.

The dataset used in this study is the Student Performance Factors dataset obtained from the Kaggle platform. It contains 6,607 observations and 20 variables, where each record represents a student with academic, demographic, and social characteristics. The dataset includes seven numerical variables—Hours_Studied, Attendance, Sleep_Hours, Previous_Scores,

Tutoring_Sessions, Physical_Activity, and Exam_Score—and thirteen categorical variables related to family background, school environment, and personal factors.

Data preprocessing was conducted to ensure the quality and suitability of the dataset for Machine Learning modeling. Missing values were identified in three categorical variables (Teacher_Quality, Parental_Education_Level, and Distance_from_Home). These missing values were handled using mode imputation, as this method preserves the most frequent category and avoids introducing artificial bias.

Categorical variables were transformed into numerical representations using Label Encoding, enabling their use in classification algorithms. Numerical variables were standardized using the StandardScaler technique to ensure that all features contributed equally to the model, particularly for algorithms sensitive to feature scale, such as Logistic Regression.

To prevent data leakage, standardization was applied only after splitting the dataset into training and testing subsets.

The variable Exam_Score was used to construct a binary target variable named Passed. Students with an exam score equal to or above the median value were labeled as “Passed,” while those below the median were labeled as “Not Passed.” This median-based threshold was selected to ensure a balanced class distribution, which is crucial for reliable binary classification. Exploratory Data Analysis (EDA) was performed to understand the structure, distribution, and relationships within the data. Descriptive statistics were calculated for numerical variables, and visualization techniques such as histograms and comparative plots were used to analyze exam score distribution and feature behavior.

Correlation analysis between numerical features and the target variable (Passed) revealed that academic engagement indicators—particularly Attendance, Hours_Studied, and Previous_Scores—exhibited stronger positive relationships with academic success compared to demographic and social variables. These findings guided feature relevance assessment and model interpretation.

Several supervised classification algorithms were tested, including K-Nearest Neighbors (KNN), Decision Tree, and Logistic Regression. Logistic Regression was selected as the final model due to its superior performance and interpretability in binary classification tasks.

The model was trained using the standardized training dataset and optimized using default hyperparameters, as preliminary testing showed stable and robust performance without overfitting. Logistic Regression was chosen not only for its accuracy but also for its ability to provide interpretable coefficients, which support the analysis of factor influence on academic success.

Model performance was evaluated on the test dataset using a confusion matrix and standard classification metrics, including Accuracy, Precision, Recall, and F1-Score. The confusion matrix provided detailed insight into true positive, true negative, false positive, and false negative predictions.

The selected model achieved high predictive performance, demonstrating a strong ability to correctly classify both passing and non-passing students. The balance between precision and recall indicates that the model performs consistently in identifying academically successful students while minimizing misclassification.

4. Empirical evaluation

Exploratory Data Analysis (EDA)

The dataset contains 6607 rows and 20 columns, which represent academic, demographic and social factors related to student performance. Descriptive analysis of numerical variables shows that students study on average about 20 hours, have an average attendance of about 80% and the exam grade (Exam_Score) has an average of 67.24 points. These results indicate a stable distribution of the data and provide an initial analysis of the main characteristics of the dataset.

The figure shows the histogram of the exam grade (Exam_Score). Most of the values are concentrated in the range of 60–75 points, while some extreme values above 90 points appear rarely. The mean and median are almost the same, indicating a relatively symmetrical distribution. Based on this analysis, the median was used as the cutoff for dividing students into categories.spentANDIt didn't pass., providing a balanced class partition for the binary classification problem.

General analysis of the relationship of variables with academic success

To initially identify variables with potential impact on success academic, the correlation between numerical features, excluding Exam_Score, and the

target variable was analyzed. The results show that academic factors have a stronger relationship with exam passing compared to demographic and social factors. In particular, attendance (Attendance), study hours (Hours_Studyed) and previous academic results (Previous_Scores) show a significant positive correlation with academic success. On the other hand, most demographic and social factors have very low or negative correlations, suggesting a more limited impact on the final outcome.

Detailed analysis of key factors

Based on the correlation analysis, three main factors were selected for a more detailed analysis: Attendance, Hours_Study ed AND Previous_Scores. Comparative visualization of these factors according to the result (Passed) shows clear differences between students who passed and those who did not pass the exam.

Students who passed show, on average, higher attendance (about 86% versus 72%), more study hours, and better previous academic results. These differences suggest that academic engagement and past performance are important indicators of academic success.

Summary of Exploratory Analysis

Exploratory data analysis showed that academic success of students is closely related to academic and personal engagement factors, while demographic and social factors show a more limited impact. The distribution of exam grades and correlation analysis justify the selection of key features for building the predictive model. These findings serve as the basis for the next phase of the project, where an Artificial Intelligence model for predicting academic success will be built and evaluated.

Model

After testing several classification algorithms, such as KNN, LR and Decision Tree, Logistic Regression resulted in the model with the best performance and highest accuracy and was therefore chosen for the final construction of the predictive model.

Confusion Matrix

The confusion matrix is used to analyze performance in detail. of the classification model, showing the number of correct and incorrect predictions for each class.

The results obtained are as follows:

- True Negative (TN = 740): Students who did not pass the exam and were correctly predicted by the model.
- False Positive (FP = 125): Students who were predicted as "passing", but in reality did not pass.
- False Negative (FN = 99): Students who are predicted as "failed", but in reality passed the exam.
- True Positive (TP = 1019): Students who passed the exam and were correctly predicted by the model.
- Interpretation of results

From the confusion matrix analysis, it is observed that the Logistic model The regression correctly identifies the majority of students who pass the exam, with 1019 correct predictions for the positive grade. Also, 740 students who did not pass were correctly classified.

The number of errors remains limited, with 125 cases incorrectly predicted as passing and 99 cases where the model did not identify students who passed. These results indicate that the model has good ability to distinguish between the two classes and exhibits consistent performance in predicting academic success.

SHAP & LIME

Interpretation of the SHAP Summary Plot

The SHAP summary (beeswarm) plot illustrates the global importance of input features and their directional impact on the model's prediction of academic success (Passed). The horizontal axis represents SHAP values, indicating the magnitude and direction of each feature's contribution to the model output, while color encodes feature values (blue = low, red = high).

Key Factors Influencing Academic Success

Attendance is the most influential feature in the model. High attendance values (red points) are associated with strong positive SHAP values, significantly increasing the probability of passing the exam. Conversely, low attendance (blue points) has a pronounced negative impact, strongly

contributing to predictions of failure. This highlights class attendance as a critical determinant of academic success.

Hours_Studied shows a substantial and consistent positive influence. Students who dedicate more time to studying tend to have positive SHAP values, increasing the likelihood of passing, whereas low study hours negatively affect predictions. This confirms the central role of individual academic engagement.

Previous_Scores also demonstrates a strong positive effect on the model output. Higher previous academic results increase the probability of success, while lower past performance contributes negatively. This indicates that prior achievement is a reliable predictor of future academic outcomes.

Secondary and Supporting Factors

Tutoring_Sessions has a moderate positive influence, suggesting that additional academic support can improve performance, though its effect is less pronounced than the main academic engagement variables.

Parental_Involvement and Peer_Influence exhibit relatively small and mixed SHAP values, indicating a limited and context-dependent impact on academic success.

Distance_from_Home and Access_to_Resources show minor effects, implying that while logistical and resource-related factors matter, their direct influence on exam success is weaker compared to academic behaviors.

Extracurricular_Activities, Physical_Activity, Internet_Access, Teacher_Quality, and Motivation_Level have SHAP values clustered close to zero, suggesting a marginal direct contribution to the model's predictions.

Overall Interpretation

Overall, the SHAP analysis reveals that academic engagement and prior performance dominate the predictive model, while demographic and social variables play a secondary role. The clear separation of SHAP values for key academic factors indicates that the model relies primarily on actionable indicators such as attendance and study time. This enhances the interpretability and practical relevance of the model, as these factors can be directly influenced through educational policies and targeted interventions aimed at improving student outcomes.

The SHAP bar plot presents the global feature importance of the predictive model by showing the mean absolute SHAP values for each variable. The results clearly indicate that Attendance is the most influential factor, with the highest average SHAP value, meaning it contributes the most to the model's predictions of academic success. This is followed by Hours_Studied and Previous_Scores, which also show strong contributions. These findings highlight that direct academic engagement and prior achievement play a dominant role in determining whether a student passes the exam, reinforcing the idea that consistent participation and sustained study habits are critical drivers of academic performance.

In contrast, demographic and contextual factors such as Parental_Involvement, Peer_Influence, Distance_from_Home, and Access_to_Resources exhibit noticeably smaller SHAP values, indicating a more limited impact on the model's output. Variables related to extracurricular activities, physical activity, motivation level, and internet access show only marginal contributions. Overall, the distribution of SHAP values confirms that the model relies primarily on academically actionable variables, while social and environmental factors serve a secondary, supportive role in predicting student academic success.

The SHAP waterfall plot provides a local explanation of the model's prediction for an individual student by showing how each feature contributes to the final output. Starting from the baseline value

$E[f(X)] = 1.164$ the model prediction increases to $f(x) = 2.082$ through the cumulative effect of positive and negative feature contributions. The most influential positive factor for this student is Hours_Studied, which contributes strongly (+2.76) to increasing the probability of passing the exam. This indicates that a high level of study effort is the dominant driver of academic success for this individual case.

In contrast, several academic and social factors exert a negative influence on the prediction. Attendance, Previous_Scores, and Peer_Influence all contribute negatively, reducing the predicted likelihood of success. These negative effects suggest weaknesses in consistent class participation, past academic performance, and peer environment that partially offset the benefits of high study hours. Other factors such as Distance_from_Home, Teacher_Quality, Extracurricular_Activities, and Physical_Activity provide smaller positive contributions, while remaining variables have marginal effects. Overall, this local explanation highlights how the model balances strong academic effort against shortcomings in other areas, offering a transparent and interpretable justification for the final prediction.

5. Conclusions

This study demonstrates that Artificial Intelligence and Machine Learning techniques can be effectively applied to predict students' academic success using academic, demographic, and social data. Through systematic data preprocessing, exploratory analysis, and model development, the results show that academic engagement variables—particularly attendance, hours studied, and previous academic performance—are the most influential predictors of exam success. Both global and local interpretability analyses using SHAP and LIME confirm that these factors consistently drive the model's predictions, highlighting their central role in determining academic outcomes.

The Logistic Regression model achieved strong and balanced performance, with high accuracy, precision, recall, and F1-score, outperforming alternative models such as K-Nearest Neighbors and Decision Trees. Importantly, the use of explainable AI techniques ensured transparency and interpretability, allowing not only accurate predictions but also clear insights into why specific predictions were made. These findings underline the practical value of predictive models in educational settings, as they enable early identification of students at risk of failure and support data-driven, targeted interventions. Overall, the study confirms that interpretable Machine Learning models can serve as effective decision-support tools for improving academic performance and educational planning.

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Integrated quality management and evidence-based decision-making as determinants of university performance in the albanian higher education market

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Abstract

This paper examines how integrated quality management and evidence-based decision-making influence university performance in the Albanian higher education market. The study is grounded in the assumption that institutional performance is no longer determined solely by academic reputation or enrollment size, but increasingly by the ability of universities to coordinate planning, quality assurance, stakeholder expectations, digital information flows, and managerial decisions in an integrated system. Using a comparative analytical perspective, the paper contrasts public and private higher education institutions through a conceptual framework that links strategic alignment, data use, academic governance, service responsiveness, and organizational learning. The methodology combines document analysis, comparative interpretation, and an illustrative analytical dataset designed to model how integrated management practices can affect performance indicators such as student satisfaction, administrative efficiency, academic quality, research support, and market responsiveness. The results suggest that universities that connect quality assurance mechanisms with strategic planning and operational dashboards are better positioned to make timely decisions, allocate resources rationally, and improve institutional adaptability. The Albanian higher education market is characterized by competitive pressure, demographic volatility, and increased demand for accountability, which makes fragmented decision structures increasingly costly. The paper concludes that integrated management should be treated not as an administrative preference but as a strategic governance architecture that supports sustainable university performance. The comparative discussion also offers recommendations for leaders, quality units, and policymakers seeking stronger institutional coherence in a dynamic and competitive educational environment.

Keywords: *integrated management, university performance, evidence-based decision-making, higher education, Albanian market*

1. INTRODUCTION

Higher education institutions operate in an environment shaped by intensified competition, accountability pressures, digital transformation, and rising expectations from students, employers, accreditation bodies, and society at large. In such a context, university performance cannot be interpreted as a narrow measure of academic output alone. It increasingly reflects the capacity of an institution to coordinate its strategic objectives, academic processes, support services, resource allocation, and stakeholder communication in a coherent and integrated manner.

Within the Albanian higher education market, the need for integrated management is especially important. Universities face simultaneous pressures related to student recruitment, program relevance, labor-market compatibility, service quality, internationalization, and organizational sustainability. These pressures create decision environments in which fragmented information and disconnected administrative units may delay action, weaken accountability, and reduce institutional agility. As a result, decision-making systems that rely on isolated reporting lines or partial indicators may no longer be sufficient.

The central argument of this paper is that integrated quality management and evidence-based decision-making function together as strategic determinants of institutional performance. Integrated management enables the university to connect academic governance, quality assurance, planning, digital monitoring, and feedback mechanisms into a unified management logic. Evidence-based decision-making complements this structure by ensuring that decisions are informed by comparable indicators rather than intuition alone. This study is closely aligned with research agendas that examine the relationship between governance models and performance in higher education. However, it places particular emphasis on the Albanian market, where institutional diversity, regulatory expectations, and competitive differentiation make comparative analysis especially relevant. The paper therefore develops a conceptual and comparative approach that seeks to clarify how integrated managerial practices can improve performance across multiple institutional dimensions.

2. Theoretical framework

Integrated management in higher education may be understood as the coordinated alignment of strategy, quality assurance, academic processes, administrative support, and performance measurement. Rather than treating

these as separate administrative domains, the integrated perspective assumes that institutional effectiveness depends on their interaction. This view is compatible with systems thinking, which emphasizes interdependence between organizational components and the importance of feedback loops in complex institutions.

The literature on quality management provides an important foundation for this argument. Classical quality approaches stress continuous improvement, evidence collection, stakeholder orientation, and process control. In the university context, these principles must be adapted to the specific nature of academic organizations, where collegial governance, disciplinary autonomy, and multiple performance logics coexist. This makes integrated quality management more demanding than in conventional business organizations, but also more necessary.

A second relevant theoretical stream is evidence-based management. Evidence-based decision-making does not suggest a purely technocratic or mechanical model of leadership. Instead, it proposes that managerial judgment becomes more robust when informed by valid data, comparative indicators, institutional memory, and structured evaluation. Universities that systematically collect, interpret, and circulate such information are better positioned to identify performance bottlenecks and respond to change.

A third conceptual pillar concerns university performance itself. Performance in higher education is multidimensional. It includes academic quality, student experience, research capability, graduate employability, service efficiency, social relevance, and organizational resilience. An integrated management approach is valuable precisely because it prevents decision-makers from optimizing one dimension while neglecting others. For example, aggressive enrollment expansion without corresponding quality controls may improve short-term numbers while eroding institutional credibility over time.

From a comparative perspective, private universities are often assumed to be more agile in managerial adaptation, whereas public universities may benefit from stronger institutional legitimacy and resource continuity. Yet this distinction should not be interpreted simplistically. The decisive issue is not ownership structure alone, but the degree to which universities institutionalize strategic coherence, use reliable data, and transform quality assurance from a reporting obligation into a decision-support mechanism.

2.1 Comparative dimensions of integrated management

For analytical purposes, the paper compares universities across five dimensions: strategic alignment, data-based decision capacity, quality

assurance integration, stakeholder coordination, and operational integration. These dimensions create a framework for evaluating how management architecture influences performance outcomes in the Albanian higher education environment.

Table 1. Comparative dimensions used in the analytical framework.

Dimension	Analytical meaning	Expected effect
Strategic alignment	Consistency between mission, plans, and academic priorities	Improves long-term performance and resource efficiency
Data-based decisions	Use of dashboards, indicators, and reporting for management	Supports timely and informed decisions
Quality assurance	Connection between evaluation, accreditation, and daily operations	Strengthens institutional credibility and quality
Stakeholder	Alignment with student, faculty, and community expectations	Improves institutional reputation and engagement
Operational integration	Coordination between academic, administrative, and digital systems	Increases service efficiency and adaptability

3. Methodology

The paper adopts a comparative and interpretive methodology supported by an illustrative analytical dataset. The purpose is not to claim statistical generalization from a national census of institutions, but to build a structured academic argument around the relationship between integrated management and performance. The methodology combines three layers: conceptual analysis, comparative interpretation of university types, and analytical visualization through tables and figures.

The comparative logic distinguishes between public and private universities as institutional categories that differ in governance flexibility, reporting routines, market sensitivity, and decision speed. This distinction allows the paper to identify how integrated managerial capacity may vary across organizational contexts. The focus remains on the Albanian higher education market, where both categories operate under increasing pressure to demonstrate effectiveness, relevance, and accountability.

To support the discussion, the paper uses an illustrative index-based model that captures the relative strength of integrated management dimensions and selected performance outcomes. The figures and tables do not represent official statistics; they are constructed to provide analytical clarity and to

demonstrate how the conceptual framework can be operationalized in doctoral-level discussion. Such a modeling strategy is useful when the goal is to present structured comparison, argumentation, and policy implications.

3.1 Research model

The research model assumes that integrated planning, digital reporting, stakeholder feedback, and quality assurance loops jointly influence university performance. Their influence is expected to be strongest when these elements operate as a system rather than as isolated managerial practices.

Table 2. Illustrative analytical structure of variables.

Variable group	Indicators	Interpretation
Independent factors	Integrated planning, digital reporting, quality assurance loops, faculty participation, external stakeholder input	Management architecture and decision infrastructure
Intermediate mechanisms	Coordination quality, transparency, response speed, cross-unit communication	Operational channels translating management into action
Dependent outcomes	Academic quality, service efficiency, student satisfaction, research support, market responsiveness	Institutional performance dimensions

4. Findings

The comparative analysis indicates that integrated management capacity is associated with stronger institutional performance across several dimensions. Universities that align strategic planning with quality assurance and operational reporting demonstrate clearer internal priorities and greater consistency between declared objectives and organizational actions. In contrast, fragmented structures tend to produce delayed decision cycles, duplicate reporting, and a weaker connection between evaluation outcomes and managerial intervention.

The first major finding concerns strategic and operational coherence. Private universities, in the illustrative comparison, show higher scores in strategic alignment, data-based decision routines, and stakeholder coordination. This does not imply automatic superiority, but suggests that flexible organizational structures may facilitate faster internal integration. Public universities, by contrast, may possess stronger formal legitimacy and academic breadth, yet

often require more deliberate mechanisms to connect institutional strategy with daily execution.

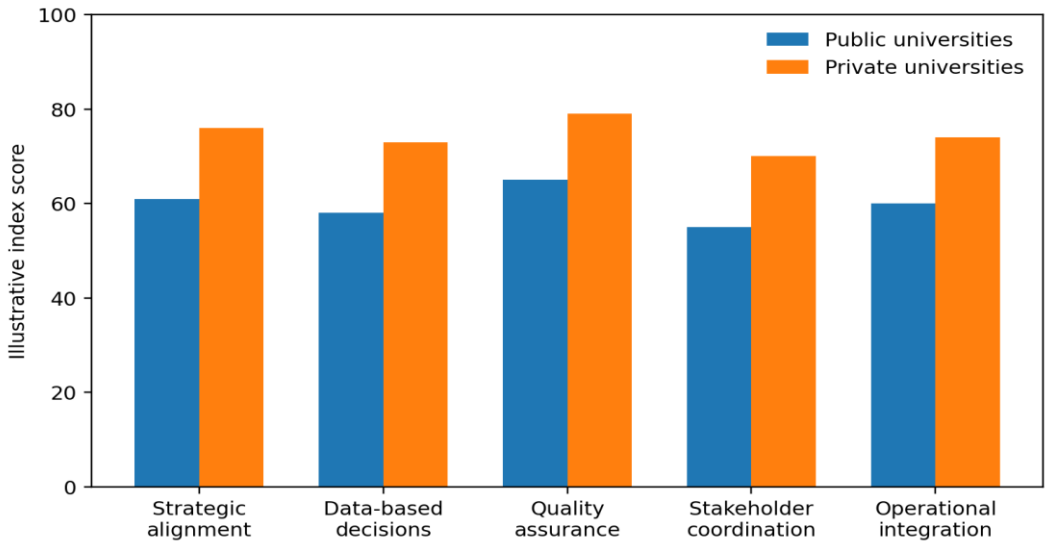


Figure 1. Illustrative comparison of integrated management capacity in public and private universities.

Figure 1 illustrates that the strongest gaps appear in data-based decisions and stakeholder coordination. These are precisely the areas in which evidence circulation and institutional responsiveness matter most. Where university units operate with separate data repositories, disconnected reporting calendars, or limited feedback integration, strategic decision-making becomes slower and less reliable.

The second finding relates to multidimensional performance. Integrated management is not associated with a single output indicator; rather, it contributes to a portfolio of outcomes that reinforce one another. Student services improve when administrative and academic units share information. Academic quality improves when internal evaluation is tied to curriculum review and faculty development. Market responsiveness improves when external labor-market signals are incorporated into planning and program adaptation.

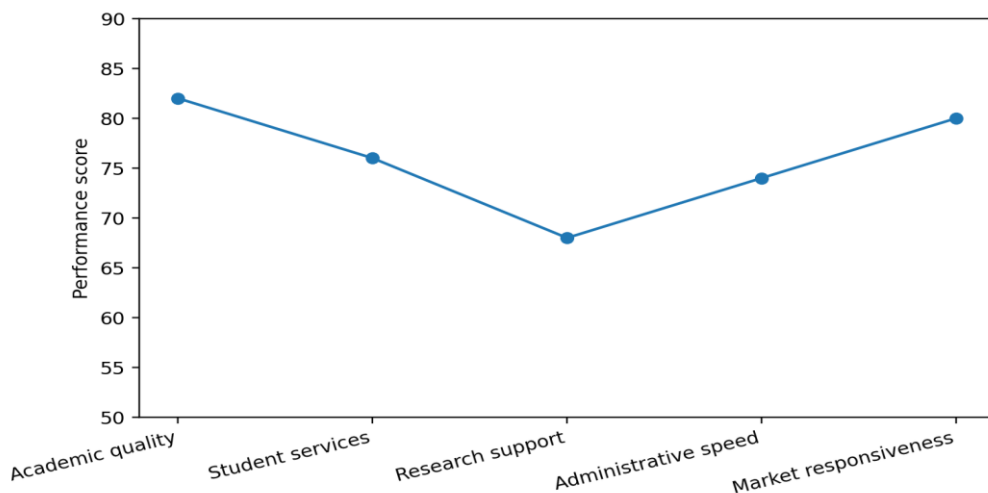


Figure 2. Illustrative performance profile associated with integrated management systems.

As Figure 2 suggests, academic quality and market responsiveness benefit considerably from integrated governance structures, while research support remains comparatively weaker. This result is analytically important because it shows that integration improves coordination faster than it solves all structural constraints. In other words, integrated management is a necessary but not sufficient condition for performance improvement in all domains.

Table 3. Comparative interpretation of performance effects.

Performance dimension	Low integration	Moderate integration	High integration
Student satisfaction	Inconsistent services and delayed problem solving	Improved coordination with partial feedback use	Consistent service quality and faster response
Academic quality	Limited follow-up after evaluation	Periodic improvements tied to reviews	Continuous improvement linked to strategic planning
Administrative efficiency	Duplicated processes and fragmented reporting	Partial standardization of processes	Streamlined workflows supported by digital systems

Market responsiveness	Slow adaptation of programs and services	Selective adaptation to external changes	Systematic alignment with labor-market and stakeholder signals
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4.1 Sub-findings on governance and institutional learning

Another important result concerns institutional learning. Universities with integrated management structures create stronger feedback loops between internal assessment and managerial action. This allows recurring issues, such as service bottlenecks, curriculum gaps, or student complaints, to be transformed into organizational knowledge rather than remaining isolated events.

The comparative model also indicates that faculty participation matters. Integrated management becomes more effective when academic staff are not merely data providers but active participants in interpretation and improvement. This finding is consistent with the specific culture of higher education institutions, where the legitimacy of management decisions depends partly on academic inclusion.

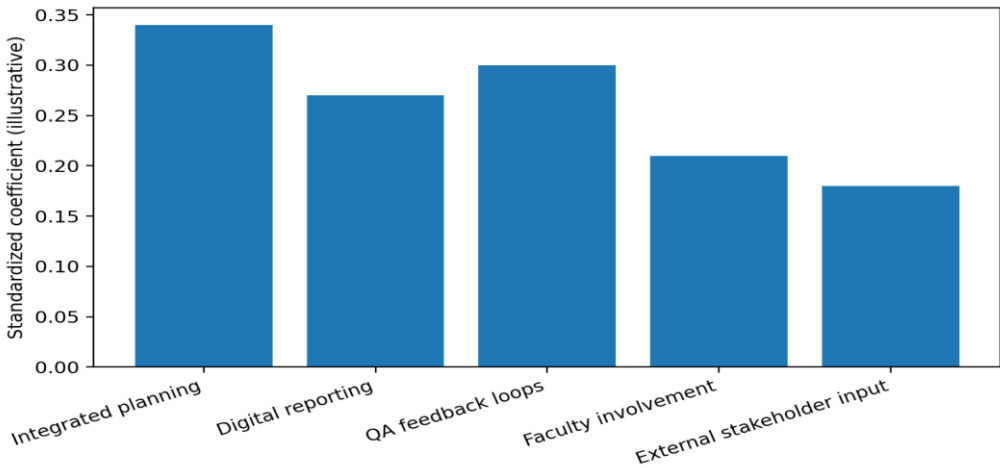


Figure 3. Illustrative contribution of selected integrated management factors to university performance.

Figure 3 summarizes the relative contribution of selected factors within the analytical model. Integrated planning and quality assurance feedback loops appear as the most influential drivers, followed by digital reporting systems. This suggests that the effectiveness of decision-making depends not only on having information, but also on connecting that information to institutional priorities and formal improvement mechanisms.

5. Discussion

The findings reinforce the argument that university performance in the Albanian market should be understood as an outcome of managerial integration rather than isolated administrative effort. Institutions may possess talented academic staff and valuable programs, yet still underperform if managerial decisions are delayed, poorly coordinated, or weakly informed by evidence. In that sense, the problem is not simply one of resources, but also of governance architecture.

The comparative perspective helps explain why some institutions adapt more quickly to market and regulatory change. Universities that integrate strategic planning, digital monitoring, and quality management are more capable of converting information into decisions and decisions into coordinated action. This capability is increasingly relevant in an environment marked by demographic fluctuations, heightened student expectations, and demands for transparency.

At the same time, the paper avoids a simplistic managerialism that would reduce higher education to business performance metrics. Universities are complex institutions with public responsibilities, academic values, and multiple stakeholders. Integrated management should therefore be framed as a means of supporting academic purpose, not replacing it. Its value lies in strengthening coherence, accountability, and institutional learning while respecting the specific nature of higher education governance.

5.1 Implications for Albanian university leaders

For university leaders in Albania, the practical implication is that strategic planning documents should be linked directly with measurable operational routines. Annual plans, accreditation requirements, student feedback, faculty evaluation, digital service indicators, and budgeting cycles should not circulate as separate administrative products. When they are synchronized, leadership gains a clearer view of institutional priorities and performance risks.

A second implication concerns organizational culture. Integrated management requires a culture in which evidence is interpreted collectively rather than owned by isolated units. This means that rectorates, deanships, quality assurance units, finance offices, student services, and information technology departments should interact through common reporting standards and review meetings. Such practices can reduce defensive decision-making and encourage a more developmental use of performance information.

A third implication is that digitalization should be treated as an enabling infrastructure for integration, not as a substitute for governance. Dashboards, management information systems, and automated reports are useful only when the institution has already clarified what decisions they are intended to support. Otherwise, universities risk accumulating data without increasing strategic intelligence.

5.2 Limitations and future doctoral applications

The present paper uses an illustrative model and therefore does not claim empirical measurement of the entire Albanian higher education system. Its strength lies in conceptual structuring and comparative reasoning. This limitation is acceptable within a conference-style academic paper, yet it also points directly toward the next step of doctoral research: the empirical validation of the proposed framework.

In future doctoral applications, the model could be operationalized through surveys, semi-structured interviews, document analysis, and institutional case studies. Variables such as planning coherence, quality assurance maturity, use of digital reporting, faculty participation, and student-service responsiveness could be measured across institutions and tested against performance outcomes. Such an extension would allow the conceptual model to evolve into a rigorous empirical instrument suitable for dissertation-level analysis.

6. Conclusion and recommendations

This paper has argued that integrated quality management and evidence-based decision-making are key determinants of university performance in the Albanian higher education market. The comparative framework demonstrates that universities perform more effectively when strategic planning, quality assurance, operational coordination, and data systems are linked within a coherent governance model.

The first recommendation is that universities should institutionalize integrated dashboards that combine academic, administrative, and student-related indicators. The second recommendation is that internal quality assurance units should move beyond compliance reporting and become active partners in strategic decision-making. The third recommendation is that university leadership should strengthen cross-functional coordination between faculties, administration, student services, and external stakeholders. Finally, policymakers should encourage evaluation frameworks that reward institutional coherence rather than fragmented reporting compliance alone.

Future research may extend this framework with empirical fieldwork, interviews, survey data, or performance audits across Albanian universities.

Such work would allow the analytical model presented here to be tested in greater depth and adapted into a robust doctoral research instrument.

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Generative AI in Arts and Education: Cultural Production, Ethical Tensions, and New Forms of Knowledge

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ABSTRACT

The rapid expansion of generative artificial intelligence is reshaping contemporary cultural production and educational practices, particularly within the fields of arts, media, and higher education. Once perceived primarily as a technical instrument, generative AI increasingly operates as a co-creative system, intervening in processes of authorship, knowledge production, and pedagogical mediation. This transformation raises critical ethical, epistemological, and cultural questions that require careful interdisciplinary investigation. This paper examines how generative AI challenges established frameworks of artistic creation and educational transmission by reconfiguring the relationship between human agency, technological mediation, and cultural meaning. Focusing on artistic and educational contexts, the study analyzes the impact of AI-generated images, texts, and visual environments on creative processes, learning models, and institutional practices. Particular attention is given to the tensions that emerge between innovation and responsibility, especially in relation to authorship, originality, transparency, and academic integrity. Methodologically, the paper adopts a qualitative and critical approach, combining theoretical analysis with selected examples drawn from contemporary artistic practices and higher education settings. By situating generative AI within broader debates on media culture, ethics, and European democratic values, the research highlights both the productive potential and the structural risks associated with the integration of AI into cultural and educational ecosystems.

The paper argues that generative AI should not be understood merely as an instrument of automation or efficiency, but as a cultural actor capable of reshaping epistemological models and redefining creative labor. In the context of Albania's European integration, these transformations call for alignment with European standards of media freedom, cultural diversity, ethical governance, and educational responsibility. By addressing the

cultural, educational, and ethical implications of generative AI, this contribution aims to foster informed and critical dialogue on how technological innovation can coexist with human-centered creativity, academic integrity, and democratic resilience.

1. Generative ai as a cultural and educational turning point

Generative artificial intelligence has rapidly moved from the margins of technological experimentation to the center of contemporary cultural and educational practices. Its growing presence in the production of images, texts, and visual environments has altered not only the tools available to artists and educators, but also the underlying structures through which creativity, knowledge, and learning are organized. Rather than functioning as a neutral instrument, generative AI increasingly operates as an active mediating system, shaping how cultural meaning is produced, transmitted, and interpreted.

Within artistic and educational contexts, this shift represents a decisive turning point. Creative processes once grounded in individual authorship and linear production are now entangled with algorithmic systems capable of generating, recombining, and transforming content at scale. Educational practices are similarly reconfigured as AI-driven tools intervene in research, writing, assessment, and pedagogical design. These developments challenge established assumptions about originality, expertise, and intellectual labor, raising questions that extend beyond technical efficiency into the domains of ethics, epistemology, and cultural responsibility.

This paper approaches generative AI not as a technological innovation to be evaluated in terms of performance, but as a cultural phenomenon that redefines the conditions of artistic creation and educational transmission. The central concern is not whether AI can replace human creativity or teaching, but how its integration reshapes the relationships between human agency, technological mediation, and knowledge production. In this sense, generative AI acts less as a substitute for human action and more as a structural force that reorganizes creative and pedagogical frameworks.

By focusing on the intersections of arts, education, and media culture, the paper argues that the impact of generative AI must be understood through a critical and interdisciplinary lens. The transformation it introduces is not

merely operational but conceptual, affecting how authorship is conceived, how learning is structured, and how cultural value is assigned. Situating these questions within the broader context of European cultural and educational standards, the study frames generative AI as both a challenge to established norms and an opportunity to rethink human-centered approaches to knowledge in an increasingly algorithmic environment.

2. Theoretical framework: authorship, mediation, and knowledge production

The integration of generative artificial intelligence into artistic and educational practices requires a reconsideration of key theoretical categories that have traditionally structured cultural and pedagogical discourse. Among these, authorship, mediation, and knowledge production emerge as central concepts through which the implications of AI can be critically examined. Rather than treating generative AI as an external tool applied to pre-existing frameworks, this paper situates it within a broader understanding of technology as a formative condition of cultural meaning.

Authorship, long associated with individual intention and originality, becomes increasingly unstable in environments shaped by generative systems. When creative outputs are produced through interactions between human prompts, algorithmic models, and extensive datasets, authorship can no longer be reduced to a singular origin. Instead, it operates as a distributed process in which human agency is entangled with computational mediation. This does not imply the disappearance of the author, but rather a transformation of authorship from direct creation to selection, interpretation, and critical intervention.

Mediation constitutes a second key dimension. Technologies have never been neutral channels; they actively shape perception and representation. Generative AI intensifies this mediating role by intervening not only in how content is produced, but also in how it is structured, optimized, and circulated. In artistic contexts, this mediation influences aesthetic decisions and visual languages. In educational settings, it affects how knowledge is accessed, processed, and evaluated. Understanding AI as a mediating structure allows for a shift away from instrumental views of technology toward an analysis of its epistemological effects.

Knowledge production must also be reconsidered. Generative AI operates through probabilistic systems trained on existing cultural materials, producing outputs that resemble knowledge while lacking intentional understanding. This raises questions about validation, attribution, and authority. The risk lies not in the use of AI itself, but in the uncritical acceptance of its outputs as epistemically equivalent to human reasoning. Framing AI as a cultural and epistemological actor foregrounds the need for critical engagement and provides the conceptual foundation for the analyses that follow.

3. Generative AI in artistic and cultural practices

The integration of generative artificial intelligence into artistic and cultural practices has reshaped the internal logic of creative production. Rather than functioning as a technical aid, AI intervenes directly in the formation of images, narratives, and spatial compositions, influencing not only outcomes but also decision-making processes.

In contemporary artistic contexts, generative AI operates through recombination and pattern recognition, producing outputs drawn from vast visual and textual archives. Artistic labor increasingly involves prompt design, evaluation, and curatorial selection of algorithmic results. Creativity thus shifts from manual fabrication toward conceptual framing and critical judgment. While this transformation expands possibilities for experimentation, it also introduces tensions related to aesthetic homogenization and cultural repetition.

Because generative systems are trained on existing datasets, they tend to reproduce dominant visual conventions. Without critical intervention, this may reinforce standardized aesthetic languages, reducing the potential for singularity and disruption. The promise of innovation therefore coexists with the risk of normalization. Authorship becomes ambiguous, complicating traditional criteria of originality and cultural value.

Importantly, the impact of generative AI on artistic practice should not be understood as inherently emancipatory or reductive. Its significance lies in how it reorganizes creative agency. When engaged reflexively, AI can function as a tool for interrogating visual culture and exposing the structures that shape representation. In this sense, generative AI challenges artists to

redefine their role within increasingly mediated cultural ecosystems, foregrounding responsibility, critical awareness, and conceptual authorship.

4. Generative AI in education: pedagogy, learning models, and academic integrity

The growing presence of generative artificial intelligence within educational environments is reshaping pedagogical models and learning processes. As AI-driven systems become embedded in research, writing, and assessment, education increasingly unfolds through interactions between students, educators, and algorithmic mediators.

Generative AI alters traditional models of learning by facilitating exploratory and iterative engagement with content. At the same time, it challenges established systems of evaluation grounded in assumptions of individual authorship. The distinction between learning as a process and performance as an outcome becomes blurred, raising concerns about academic integrity.

Rather than framing integrity as a matter of prohibition, this paper approaches it as a structural issue. The challenge lies in assessment frameworks that fail to account for mediated knowledge production. Treating AI-generated content as inherently illegitimate obscures the deeper transformation of educational practices and discourages critical engagement.

The role of the educator is consequently redefined. Pedagogy shifts from content supervision toward the cultivation of critical judgment, ethical awareness, and epistemic responsibility. Educators increasingly function as guides who help students distinguish between algorithmic plausibility and conceptual understanding. When addressed critically, generative AI can expose the constructed nature of knowledge and encourage reflexive learning models grounded in human responsibility.

5. Ethical and epistemological tensions

The integration of generative AI into cultural and educational practices generates ethical and epistemological tensions that cannot be resolved through technical regulation alone. These tensions arise from the apparent authority of AI-generated outputs, which appear coherent and creative while remaining detached from intention and understanding.

One central tension concerns originality. Generative AI produces statistically plausible variations rather than intentional meaning. When originality is reduced to variation, creative and scholarly practices risk aligning with algorithmic probability rather than reflective judgment. Transparency and accountability constitute a second tension. Opaque systems complicate questions of responsibility and validation, particularly in academic contexts.

Epistemologically, generative AI challenges the authority of knowledge itself. When prediction replaces interpretation, knowledge risks being perceived as computational plausibility rather than reasoned understanding. Addressing these tensions requires frameworks that foreground human judgment and ethical responsibility, resisting the normalization of AI-generated content as epistemically equivalent to human reasoning.

6. European context and albania's integration

Within the European context, generative AI is increasingly addressed through frameworks that emphasize democratic values, cultural diversity, and educational responsibility. AI is not approached solely as innovation, but as a phenomenon requiring alignment with ethical governance and institutional accountability.

Albania's integration process provides a critical context for examining these issues. As institutions align with European standards, the adoption of generative AI poses both risks and opportunities. Without critical frameworks, AI may reinforce superficial modernization. When approached reflexively, it can support inclusive and critically informed cultural and educational practices.

Aligning AI with European values requires more than regulation. It demands a cultural and pedagogical shift toward human-centered technological engagement, emphasizing critical digital literacy and interdisciplinary dialogue.

7. Conclusion: toward human-centered ai in arts and education

This paper has argued that generative artificial intelligence represents a structural transformation in contemporary artistic and educational practices.

Its significance lies not in automation, but in its capacity to reshape the conditions of creativity and knowledge formation.

Generative AI expands creative and pedagogical possibilities while destabilizing traditional criteria of originality, authorship, and integrity. Its impact depends on how it is engaged. When adopted uncritically, it risks standardization and epistemic opacity. When approached reflexively, it can support critical inquiry and human-centered creativity.

Within the context of European values and Albania's integration, generative AI represents a test of institutional adaptability. The challenge lies in cultivating practices that preserve human agency while engaging productively with algorithmic mediation. Ultimately, the future of generative AI in arts and education will be determined not by machines, but by the ethical, cultural, and pedagogical choices made by human institutions.

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