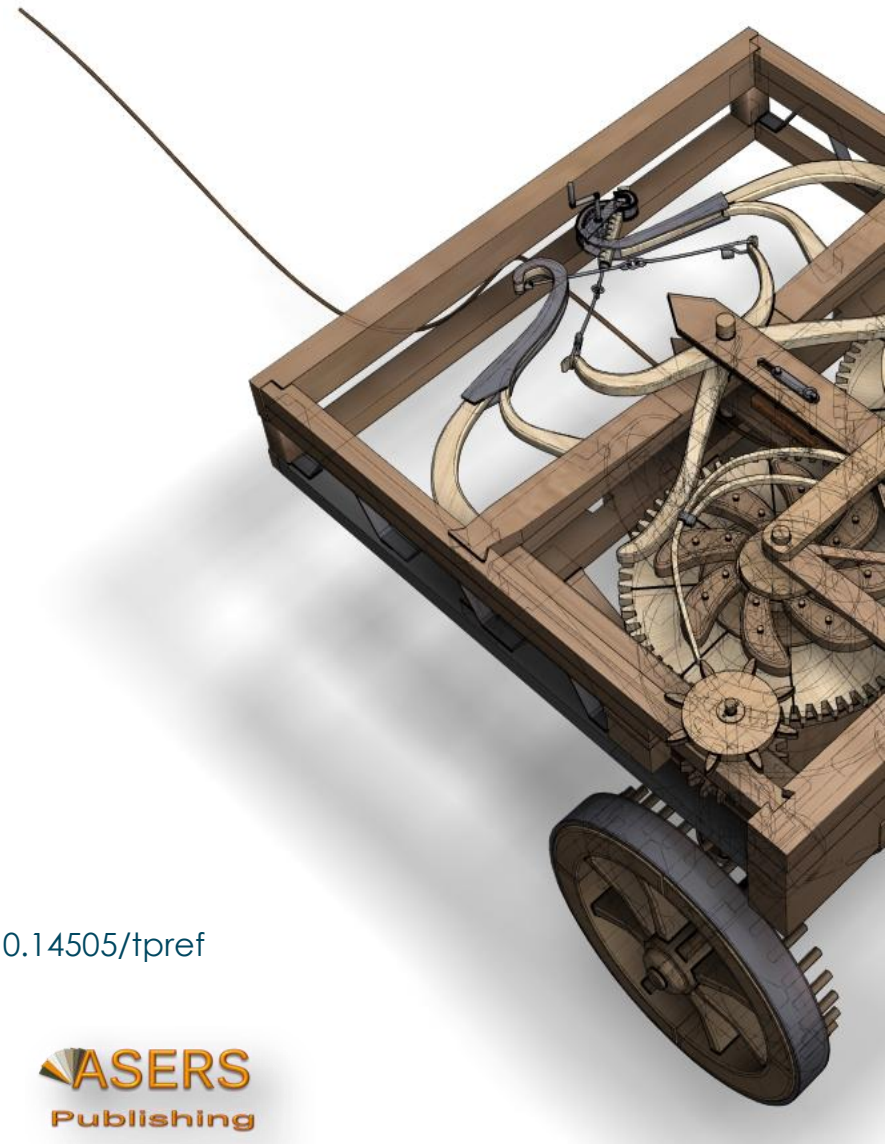
Theoretical and Practical Research in Economic Fields



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The Challenges and Opportunities of Artificial Intelligence for Entrepreneurs. Case Study of the Rabat-Salé-Kénitra Region

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Abstract: In today's rapidly evolving work environment, artificial intelligence (AI) is becoming a key driver of innovation and efficiency for entrepreneurs. However, with this technological progress come significant regulatory challenges that need to be addressed. This article examines how entrepreneurs can navigate these regulatory requirements while harnessing the potential of AI. The study was conducted with a sample of 50 entrepreneurs from the Rabat-Salé-Kénitra region. Data was gathered through a self-administered questionnaire, and hypotheses were tested using a structural equation model. The findings confirm that both the opportunities presented by AI and the regulatory challenges it brings have a strong, positive impact on its implementation. On the other hand, the lack of technological skills was found to have a negative but insignificant effect on the adoption of AI

Keywords: artificial intelligence; entrepreneurs; technological opportunities; regulatory challenges; innovation.

JEL Classification: O00; O36; L26; C10.

Introduction

In an ever-evolving economic landscape, artificial intelligence (AI) is emerging as a key driver of transformation and innovation for businesses (Jorzik, P., *et al.* 2024). This groundbreaking technology is redefining operational and strategic paradigms, offering new opportunities while presenting complex challenges. Entrepreneurs, in particular, find themselves at a crossroads, faced with an increasingly sophisticated environment where adopting cutting-edge technologies like AI can represent both unprecedented opportunities and a minefield of potential obstacles.

Artificial intelligence encompasses a wide range of technologies that enable computer systems to perform tasks once thought to be the domain of human intelligence. These capabilities include, but are not limited to, self-learning, recognizing complex patterns, and making nuanced decisions (Gil de Zúñiga *et al.* 2024). This technological advance opens up vast possibilities for entrepreneurs: from automating repetitive processes to fine-tuning operations and creating highly personalized customer experiences.

AI thus promises to redefine operational efficiency and drive entrepreneurial innovation. However, its integration into the business world raises fundamental questions, particularly concerning regulation, data privacy, and ethical considerations. These multidimensional challenges require a holistic approach, combining visionary strategy with social responsibility.

As AI continues to transform industries, entrepreneurs are at the forefront of this technological revolution. They stand to benefit from the vast potential AI offers, but they must also confront the associated risks.

Navigating this ecosystem is no easy feat, as technological innovation often collides with evolving regulatory frameworks, emerging ethical concerns, and shifting societal expectations.

Against this dynamic and complex backdrop, a central question arises: How can entrepreneurs effectively overcome regulatory challenges while fully capitalizing on the opportunities offered by artificial intelligence in a rapidly evolving professional context?

This question prompts several critical areas of reflection. It requires exploring the mechanisms through which AI can transform existing business models and foster entrepreneurial innovation. At the same time, it necessitates a thorough understanding of the specific challenges posed by AI in terms of regulatory compliance, data protection, and business ethics.

To address this issue comprehensively, a multidisciplinary approach is essential. This approach must combine a deep understanding of the technological aspects of AI, an analysis of current and emerging regulatory frameworks, and a reflection on the ethical and societal implications of adopting AI in the entrepreneurial context.

By exploring these interconnected dimensions, this research aims to provide entrepreneurs with actionable insights and concrete strategies. The goal is to equip them to successfully navigate this new technological paradigm, maximizing the benefits of AI while minimizing the associated risks of its adoption and use.

1. Literature Review

1.1 Artificial Intelligence

In The Science of Artificial Intelligence (AI) aims to enable machines to perform tasks that humans typically carry out using their intelligence. AI, in its essence, seeks to replicate the cognitive processes that define human problem-solving, decision-making, and learning. This can range from simple tasks like recognizing patterns to more complex ones, such as autonomous decision-making or natural language processing. The true potential of AI lies in its ability to adapt and learn from experiences, much like humans do. Unfortunately, the concept of AI first emerged in 1956 (Ayhan, D. & Ahmet, C. T, 2024), and it is often more accurate to refer to it as "Heuristic Computing," a term that better captures the goal of finding solutions through trial and error, approximations, and pattern recognition.In this course, we will not focus on intelligent machines or programs, as those terms refer to specific forms of AI that can mimic human intelligence to varying degrees (Longo *et al.* 2024). Instead, we will dive deeper into the foundational principles of AI, its applications, and how it influences various sectors today. By understanding the underlying mechanisms, entrepreneurs and professionals alike can appreciate the balance between AI's potential for enhancing human capabilities and its challenges, such as ensuring ethical use and addressing regulatory concerns. Another interpretation, provided by Thomas, emphasizes the analysis of human intellectual activities for which no known methods are available in advance. This perspective suggests that AI, in its essence, revolves around solving problems that were once considered impossible to tackle by machines, often because no predefined methods existed to achieve the solutions. In this sense, AI continues to push the boundaries of what machines can accomplish. Thomas's interpretation aligns with the idea that once a method becomes fully understood and can be codified; it ceases to be regarded as AI. This dynamic nature of AI's definition reflects its ongoing evolution and its role in revolutionizing industries and systems globally (Griffiths, T. L, 2020). In July 1956, a pivotal conference was held at Dartmouth (USA), which lasted for eight weeks during the summer. This conference, which brought together some of the brightest minds in mathematics and computer science, marked a significant turning point in the development of AI. The event was organized by young American researchers John McCarthy and Marvin Minsky, alongside seasoned researchers Nathaniel Rochester and Claude Shannon. The initial goal of the gathering was to discuss and lay the groundwork for what would later be recognized as the field of Artificial Intelligence. While the conference was initially planned for 11 participants, it expanded to host 20 attendees, including influential figures such as Warren McCullough, Julian Bigelow, Claude Shannon, and Ross Ashby. The gathering of these experts, who came from diverse backgrounds, laid the foundation for AI as a field of research. The participants engaged in debates about the nature of intelligence, the potential of machines to simulate it, and how these ideas could transform society. At the time, McCarthy, one of the key organizers, coined the term "Artificial Intelligence" to set his work apart from the emerging field of "cybernetics," which was led by Norbert Wiener and focused on communication and control processes in both humans and machines (Haenlein, M. & Kaplan, A., 2019).

This period marked the birth of two distinct schools of thought. McCarthy's AI community, which was primarily based in the United States, focused on creating machines that could simulate aspects of human cognition. In contrast, the European cybernetics and systems theory movement, which was centered on

understanding complex systems and feedback mechanisms, focused more on the interconnectedness of systems. These two communities were initially in competition, but their collaboration and cross-pollination of ideas laid the groundwork for future innovations. Over the years, these two schools of thought continued to evolve, with AI experiencing periods of rapid growth, often called "the summers of AI," and times of stagnation, known as the "AI winters," during which funding and interest in the field decreased significantly (Hutton, D.M. 2011). The concept of Artificial Intelligence is not singular but encompasses various sub-concepts and is applied across different domains. AI, in its broadest sense, can be categorized into three main types: Weak AI (or Narrow AI, ANI), General AI (AGI), and Superintelligent AI (ASI) (Ridzuan *et al.* 2024). While the ultimate goal for many researchers is to achieve AGI, the field remains largely focused on Weak AI and General AI at present. These different types of AI represent different levels of cognitive ability and autonomy that machines can possess. Weak AI, also known as Narrow AI, refers to AI systems designed to perform specific tasks or solve particular problems. These systems are highly effective in their designated domains but are limited to the tasks they are programmed for. A prime example of Weak AI is speech recognition, where AI systems can understand and process human speech with high accuracy (Ridzuan *et al.* 2024). However, these systems cannot perform tasks outside their specific programming. In contrast, General AI (AGI) is more advanced and refers to AI systems that can perform a wide range of tasks, similar to how humans can think, learn, and adapt to new situations. While AGI remains a theoretical concept, it is considered the next milestone in AI research. These systems would possess the ability to learn from diverse experiences and make decisions across various domains without needing specific programming for each new task. A system like ChatGPT is a generative model that has demonstrated remarkable abilities in natural language processing but still lacks the broader cognitive flexibility that AGI would require (Ridzuan *et al.* 2024; Hutton, D.M. (2011)).

Superintelligent AI (ASI), according to Ridzuan *et al.* (2024), is still a theoretical concept. This form of AI would go beyond human cognitive abilities, performing tasks and making decisions in ways far superior to human intelligence. Although ASI is not yet a reality, it raises important questions about the future of AI and its potential impact on society. As the field continues to evolve, the focus remains on Weak AI (ANI), which, while limited, is already making significant strides in fields such as healthcare, finance, and autonomous systems.

1.2 Regulatory Challenges

At present, Morocco lacks a dedicated law to regulate Artificial Intelligence (AI). The complexity and rapid growth of AI technologies have caused a delay in establishing comprehensive regulatory frameworks worldwide. While many regions are catching up, Europe recently adopted the **AI Act** in December 2023 (Busch *et al.* 2024), a milestone that reflects the urgency of regulating this transformative technology. In the United States, the government has also moved to regulate AI, with a decree issued to guide its development and ensure its ethical use. Meanwhile, the **Bletchley Council**, an advisory body, has embraced a collective approach to address the risks associated with AI and its integration into various sectors of society. However, globally, regulatory measures often struggle to keep pace with technological progress, and the timing of such legislation rarely aligns with the pace at which new technologies like AI emerge. Given the rapid development of AI, it is imperative that regulatory bodies act quickly and decisively to manage its integration responsibly (Díaz-Rodríguez *et al.* 2023).

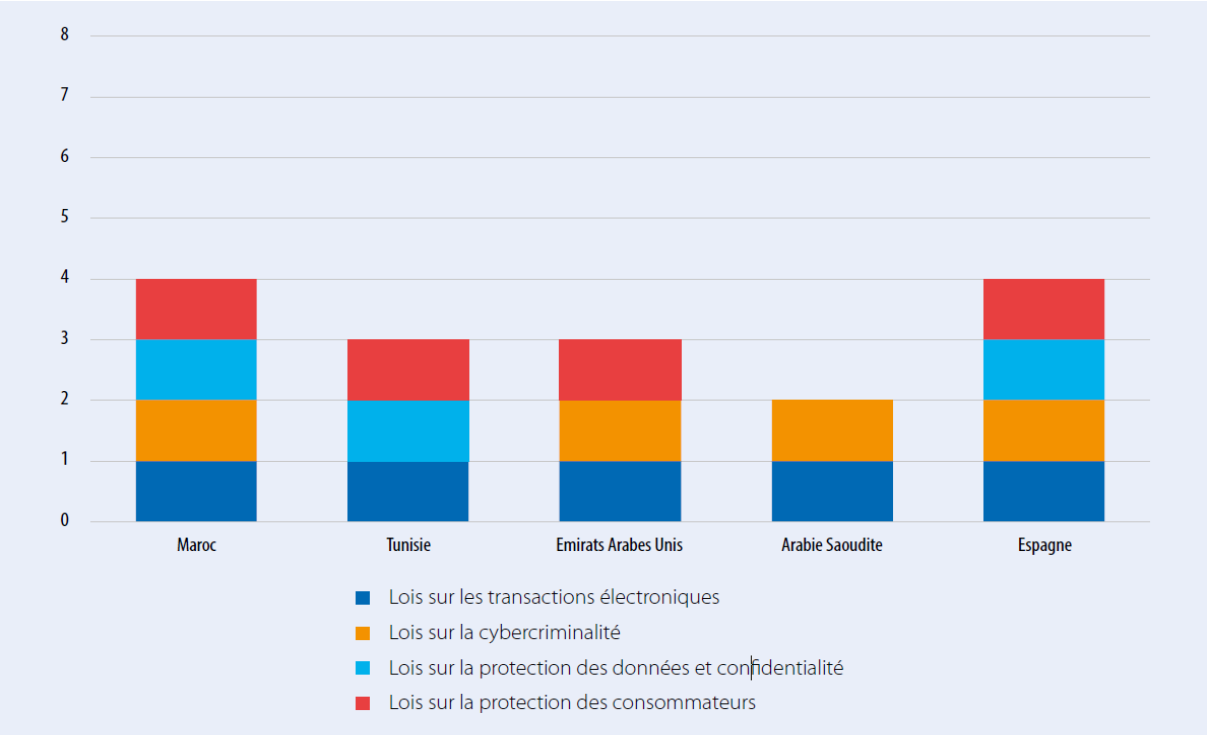
In Morocco, the existing regulatory framework covers several areas that could be applicable to AI, particularly in the realm of human rights. Key areas of concern include:

- Discrimination, particularly algorithmic bias in AI systems;
- Violations of individual freedoms, such as data privacy issues and freedom of expression;
- Concerns about the manipulation and misuse of personal data, which could lead to surveillance or unauthorized profiling.

Despite the absence of an AI-specific law, Morocco has developed a framework of laws that regulate cyberspace, touching on critical issues such as electronic transactions, consumer protection, data protection, and cybersecurity. The country has enacted data protection laws that ensure personal data is handled responsibly, and there are specific measures in place to flag and remove harmful online content. These measures aim to protect the digital rights and freedoms of Moroccan citizens, ensuring that technology is used ethically and does not infringe upon personal liberties. Morocco has also taken steps to address online hate speech, disinformation, and fake news through various regulations designed to combat these threats (Moroccan Data Protection Authority, 2022). In addition to these measures, Morocco introduced Open Data initiatives in 2011, with the creation of an Open Data portal to promote transparency and the sharing of public sector data. By 2022, Morocco ranked 35th globally in the Open Data Watch index, reflecting its commitment to data openness and accessibility. Furthermore, the country's e-government development index (EGDI) improved significantly from 0.5729 in 2020

to 0.5915 in 2022, signaling progress in digital governance. Morocco now ranks 101st globally in this index, which measures the development of e-government services. The country also places 128th in the Electronic Participation Index, demonstrating efforts to enhance citizen engagement through digital means (Open Data Watch, 2022).

Figure 1. Cyberlois available in Morocco compared with other countries



Source: Adapted, Global Cyberlaw Tracker.

While Morocco's existing legal frameworks are a solid foundation, the complexity of AI technologies poses new challenges. As AI systems become more advanced and autonomous, the issue of accountability becomes increasingly important. AI technologies, particularly in sectors such as healthcare, finance, and law enforcement, can significantly impact decisions that affect individuals' lives. This raises the question of how responsibility should be assigned when an AI system makes an error or causes harm. Who is held accountable for the decisions made by machines, especially as AI systems are often designed to learn and adapt without direct human intervention? This issue of accountability is central to ongoing regulatory debates and needs to be addressed to ensure that the benefits of AI are maximized without sacrificing public trust.

In general, the issue of responsibility in AI regulation is closely tied to civil liability law, which deals with the attribution of fault in the event of harm or injury. However, Morocco currently lacks specific provisions or legal structures to regulate AI and its related technologies. This gap in the regulatory framework presents a significant challenge, as AI systems continue to evolve rapidly, creating a need for regulations that are flexible and responsive to the fast-changing technological landscape. Without specific laws, it will be difficult to address the ethical, legal, and social implications of AI, especially as its use becomes more widespread across industries (Atakishiyev, S *et al.* 2024). The country must address this regulatory gap to ensure that AI technologies are used responsibly, ethically, and in a way that aligns with national interests and global standards.

1.3 Opportunities Offered by AI

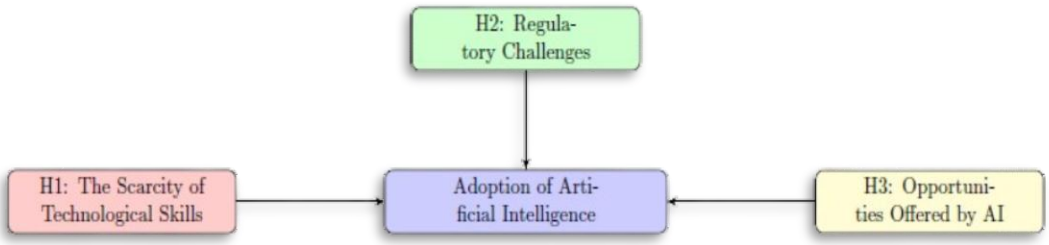
Artificial Intelligence (AI) is opening doors to transformative possibilities, suggesting a new cycle of economic development. Morocco stands at a pivotal moment were embracing this cornerstone of the Fourth Industrial Revolution could bring widespread benefits across multiple sectors. By integrating AI into its national strategies, Morocco can enhance the quality of life for its citizens through better healthcare, safer transportation, and cost-effective services tailored to their needs (EL ARABI, H. & HAFIDI ALAOUI, M. S, 2024). For instance, AI-powered diagnostic tools can help detect diseases early and personalize treatment plans, leading to improved patient outcomes and reduced healthcare costs (Kalra, N *et al.* 2024). In transportation, AI systems like advanced driver-assistance programs can significantly enhance road safety by reducing accidents and optimizing traffic flow

(Guner Tatar *et al.* 2024). The potential of AI extends beyond healthcare and transportation. AI can democratize education and training, making knowledge and skills more accessible, especially in underserved regions. This became evident during the COVID-19 pandemic, where AI-powered platforms supported remote learning, tracked population health through mobile apps, and facilitated real-time communication between governments and citizens (World Health Organization, 2021). Moreover, AI can improve workplace safety by automating high-risk tasks, minimizing human exposure to hazardous conditions. For example, in Morocco's thriving automotive industry, AI plays a critical role in developing autonomous vehicles, using **machine learning** to train cars to react effectively in emergencies or prevent accidents altogether (Alahmari, N *et al.* 2023). AI's ability to drive innovation is equally transformative. In Morocco's tourism sector—a key economic pillar—AI has the potential to revitalize operations and customer engagement. Machine learning enables the creation of intelligent chatbots, which act as virtual assistants equipped with natural language processing and cognitive intelligence. These chatbots can handle thousands of inquiries simultaneously, offering personalized recommendations, assisting with bookings, and providing cultural insights to enhance the tourist experience. This not only improves efficiency but also strengthens the identity and branding of Moroccan businesses. In public services, AI's capabilities are redefining how governments can operate more efficiently and sustainably. AI can optimize energy consumption, streamline waste management, and enhance public transportation systems, resulting in cost savings and environmental benefits. Additionally, specialists predict that AI will play a growing role in the judicial system and crime prevention. AI-powered systems can quickly analyze vast datasets, assess risks, and even predict criminal behavior, enabling law enforcement agencies to act proactively. For instance, platforms like social media already utilize AI to monitor and flag illegal activities or harmful content, creating safer digital spaces (Knott, A *et al.* 2024). These opportunities highlight AI's potential to revolutionize industries, improve governance, and elevate Morocco's standing as a technological leader in Africa. However, realizing this potential requires addressing challenges such as the scarcity of skilled talent and regulatory hurdles. By developing strategies to foster innovation while managing risks, Morocco can leverage AI to achieve sustainable and inclusive growth.

Hypotheses: Based on our analysis, we propose the following hypotheses:

- **H1**: The scarcity of technological skills negatively impacts AI adoption.
- **H2**: Regulatory challenges positively impact AI adoption.
- **H3**: Opportunities offered by AI positively impact AI adoption.

Figure 2. Conceptual framework of our study



Source: Author's Development

2. Data And Methodology

Our research focuses on analyzing the regulatory challenges and the opportunities offered by artificial intelligence for entrepreneurs in a professional context. The study was conducted based on a questionnaire provided through Google Forms, which contained 19 closed-ended questions, including single choice, multiple choice, and frequency questions. The areas covered in this questionnaire focus on various aspects related to artificial intelligence, regulatory challenges, the scarcity of technological skills, and the opportunities offered by AI. We sent the questionnaire via email, LinkedIn, etc., to a series of contact lists, using the convenience sampling method. The response collection from entrepreneurs took one month, and we managed to obtain 50 responses. Almost all items were rated on 5-point Likert scales.Our sample was distributed as follows: 35.3% women and 64.7% men, with 56.9% of respondents being between 25 and 34 years old, and 35.3% being under 25. To analyze the problem, namely, how can entrepreneurs effectively address regulatory challenges while fully

capitalizing on the opportunities offered by artificial intelligence in a rapidly evolving professional context, we used structural equation modeling methods based on SPSS and Smart PLS software.

Methodology

The structural equation modeling method was chosen for this study due to its ability to simultaneously analyze multiple complex relationships between latent and manifest variables. This approach is particularly suited for research problems involving theoretical models that integrate causal relationships across different dimensions. In fact Here are the steps of our methodology

a.Model Measurement and Exploratory Factor Analysis

To run this model, we used SPSS v.26. For the analysis, we proceeded in three steps, from exploratory factor analysis to confirmatory factor analysis, then we tested the structural model. Finally, we performed a principal component analysis (PCA) to reduce and structure our data. (Tables 1, 2, 3)

b.Confirmatory Factor Analysis

We used confirmatory factor analysis (CFA) using SMARTPLS v.26 software to predict the measurement model, and the results are presented in (Tables 4 and 5).

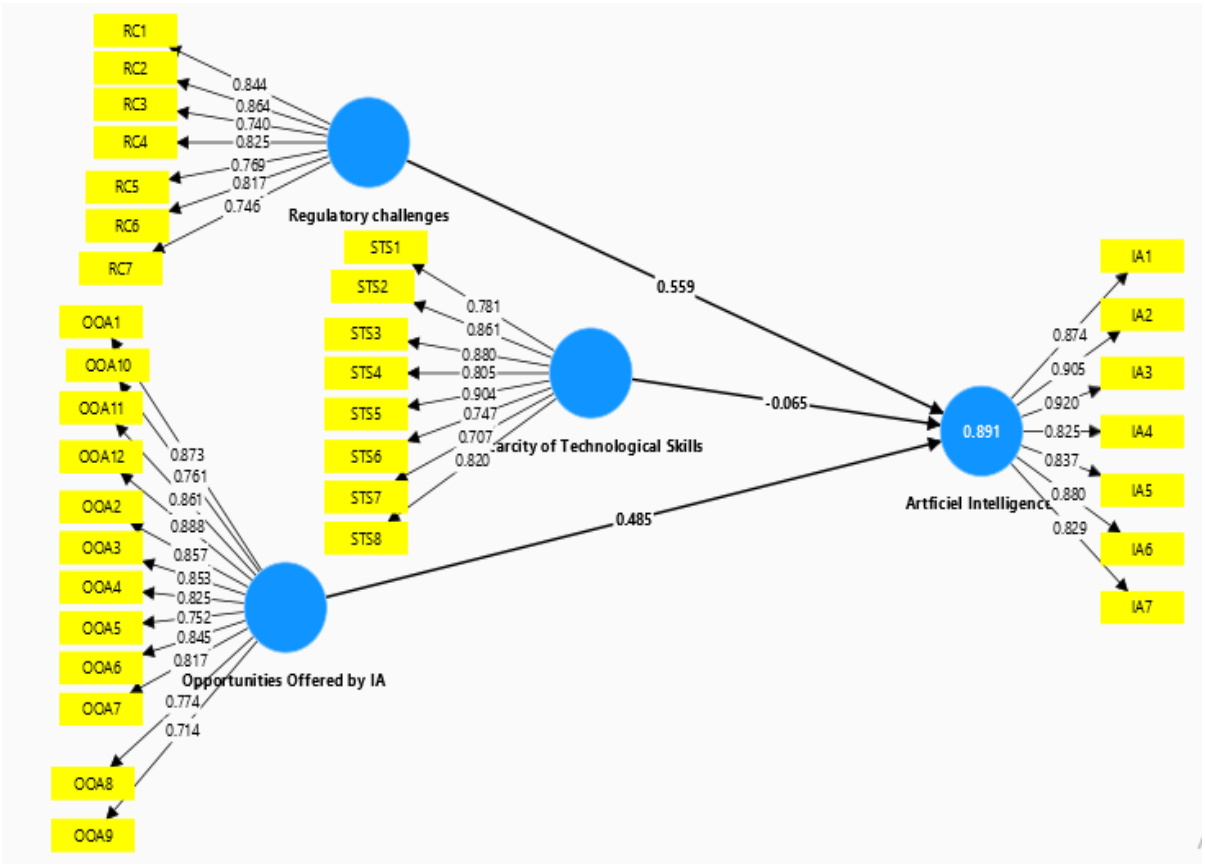
c.Reliability and Validity Analysis

The Cronbach's α for each of the six measurement constructs, such as Artificial Intelligence, Regulatory Challenges, Skill Scarcity, and Opportunities Offered by AI, exceeded the threshold value of 0.70, thus showing acceptable reliability as suggested by Bagozzi & Yi (1989) (Table 1). The composite reliability and validity were evaluated with values ranging from 0.922 to 0.961, surpassing the proposed threshold of 0.70 (Lance *et al.* 2006) (Table 3). To determine convergent validity, Table 7 shows that the values of the average variance extracted (AVE) range from 0.663 to 0.738, which is considered acceptable (Fornell & Larcker, 1981).

d.Discriminant Validity, Descriptive Statistics, and Correlations

Discriminant validity was assessed according to the criteria set by Fornell & Larcker (1981). Table 4 shows that the values on the diagonals, which are the square root of the AVE, represent discriminant validity, and the values below the diagonals are the correlations between the variables.

Figure 3. The conceptual model of the study under Smart PLS



Source: Author's Development

Table 1. Factor Analysis with Varimax Rotation

Factors	Variables	Relative Contribution	Eigen values	Total Explained Variance	Cronbach's Alpha
Artificial Intelligence	IA1	,895	11.516	73.919	,948
	IA2	,899			
	IA3	,916			
	IA4	,819			
	IA5	,824			
	IA2	,869			
	IA3	,815			
	IA4	,825			
Regulatory Challenges	RC1	,819	8,624	64,678	,907
	RC2	,848			
	RC3	,707			
	RC4	,806			
	RC5	,799			
	RC6	,841			
Scarcity of Technological Skills	STS1	,777	10,252	66,814	,927
	STS2	,849			
	STS3	,870			
	STS4	,793			
	STS5	,912			
	STS6	,755			
	STS7	,731			
	STS8	,821			
Opportunities Offered by AI	OOA1	,874	14,287	67,330	,955
	OOA2	,842			
	OOA3	,842			
	OOA4	,804			
	OOA5	,734			
	OOA6	,825			
	OOA7	,831			

Source: Author's Development

Table 2. Kaiser-Meyer-Olkin (KMO) Index and Bartlett's Sphericity Test

Variables	KMO Index and Bartlett's Test		
" Artificial Intelligence "	Kaiser-Meyer-Olkin Index for Measuring Sampling Adequacy.		,877
	Bartlett's Test of Sphericity	khi-deux approx.	360,529
		Ddl	28
		Signification	,001
" Regulatory Challenges "	Kaiser-Meyer-Olkin Index for Measuring Sampling Adequacy.		,806
	Bartlett's Test of Sphericity	khi-deux approx.	230,433
		Ddl	21
		Signification	,001
" Scarcity of Technological Skills "	Kaiser-Meyer-Olkin Index for Measuring Sampling Adequacy.		,871
	Bartlett's Test of Sphericity	khi-deux approx.	281,153
		Ddl	28
		Signification	,001

Variables	KMO Index and Bartlett's Test		
" Opportunities Offered by AI "	Kaiser-Meyer-Olkin Index for Measuring Sampling Adequacy."		,912
	Bartlett's Test of Sphericity	khi-deux approx.	561.121
		Ddl	66
		Signification	,001

Source: Author's Development

Table 3. Test d'individualité des items

	Artificial Intelligence	Scarcity of Technological Skills	Regulatory Challenges	Opportunities Offered by AI
CR	0,957	0,940	0,922	0,961
AVE	0,738	0,665	0,663	0,672
RC1			0.841	
RC2			0.862	
RC3			0.737	
RC4			0.824	
RC5			0.772	
RC6			0.820	
RC7			0.751	
IA1	0.891			
IA2	0.900			
IA3	0.912			
IA4	0.820			
IA5	0.827			
IA6	0.874			
IA7	0.820			
IA8	0.821			
OOA1				0.872
OOA2				0.858
OOA3				0.854
OOA4				0.827
OOA5				0.754
OOA6				0.846
OOA7				0.815
OOA8				0.772
OOA9				0.712
OOA10				0.760
OOA11				0.861
OOA12				0.887
STS1		0.782		
STS2		0.861		
STS3		0.880		
STS4		0.807		
STS5		0.904		
STS6		0.747		
STS7		0.704		
STS8		0.819		

Source: Author's Development

Table 4. Variable corrélation root square of AVE

	Artificial Intelligence	Scarcity of Technological Skills	Regulatory Challenges	Opportunities Offered by AI
Artificial Intelligence	0.859			
Scarcity of Technological Skills	0.748	0.815		
Regulatory Challenges	0.921	0.695	0.802	
Opportunities Offered by AI	0.880	0.872	0.822	0.820

Source: Author's Development

3. Case Studies

In the context of our article, the study focuses on analyzing the impact of regulatory challenges related to Artificial Intelligence (AI) and their influence on the opportunities offered by this technology to entrepreneurs, specifically in the Rabat-Salé-Kénitra region. The main objective was to understand how regulations influence the competitiveness and innovation of entrepreneurs in an environment where AI is becoming a driver of economic transformation.

What was done:

A thorough analysis was conducted using advanced statistical tools such as SPSS and Smart PLS to assess the impact of regulations on opportunities related to AI. Structured questionnaires were distributed via Google Forms to a wide range of entrepreneurs in the targeted region to collect data on their perceptions of regulatory challenges and AI-related opportunities. The study also utilized Likert scales to measure respondents' attitudes and opinions.

How it was achieved:

The production process of the study involved several key steps:

Survey design: Questionnaires were developed to collect data on entrepreneurs' perceptions of the regulatory challenges associated with AI and the opportunities it offers.

Data collection: Once the questionnaires were ready, they were distributed to entrepreneurs in the Rabat-Salé-Kénitra region, specifically targeting those who use or are in contact with AI-based technologies.

Data analysis: The collected data were analyzed using statistical tools to identify relationships between variables (*e.g.*, the impact of regulatory challenges on business competitiveness).

The logic behind the approach:

The idea behind this research was to understand the complex interactions between regulations and the opportunities offered by AI. In a global context where AI represents both a growth opportunity and a regulatory challenge, it is essential to understand how these factors interact at the local level. The aim was to provide practical recommendations for entrepreneurs to navigate a complex regulatory environment while leveraging new technologies.

This work is innovative because it provides a region-specific perspective on a global issue, addressing an area that is still developing. The study enriches the existing literature on AI regulation, particularly in developing countries where regulatory challenges are often more pronounced and less studied.

What is important and new:

This study is particularly important because it offers a detailed, localized view of regulatory challenges while shedding light on the practices of entrepreneurs in a developing environment. The analysis also provides concrete solutions to the challenges they face, which is crucial for encouraging innovation while adhering to ever-evolving regulations. The rigorous methodological framework and the collected data allow for practical recommendations based on robust analysis.

In summary, this study makes a significant and novel contribution to the understanding of the interaction between regulation and technological innovation in the field of AI.

Table 5. Structural Model Estimation (Path Coefficients)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P value
The scarcity of technological skills -> Artificial Intelligence	-0,027	0,005	0,120	0,228	0,819
Regulatory challenges -> Artificial Intelligence	0,607	0,582	0,121	5,017	0,000
Artificial Intelligence -> Opportunities offered by AI	0,406	0,411	0,147	2,753	0,006

Source: Author's Development

4. Discussions

This research highlighted the regulatory challenges faced by entrepreneurs regarding the opportunities offered by artificial intelligence in a professional context. In fact, the analysis of the model allows for drawing important conclusions about the scarcity of technological skills and artificial intelligence (Table 5).

• Relationship between "the scarcity of technological skills" and artificial intelligence the results of the statistical estimates from our model show a negative correlation between the scarcity of technological skills and artificial intelligence (β = -0.027), T = 0.228. However, the examination of the p-value = 0.819 implies a non-significant relationship between the two variables.

This result confirms our first hypothesis, which states that the scarcity of skills has a negative impact on artificial intelligence. This means that the adoption of AI is hindered by the shortage of the necessary technological skills required for its development and implementation. According to a study by Capgemini (2019), this slows down entrepreneurs who wish to integrate artificial intelligence (AI) into their operations. The lack of qualified talent can lead to several challenges.

Firstly, there is a barrier to innovation. Entrepreneurs may have innovative AI-based ideas, but without access to experts capable of developing and implementing these solutions, these projects may never come to fruition. This can delay the growth of the business and limit its competitiveness.

Secondly, the high cost of talent: Due to the shortage of AI specialists, available experts are in high demand. This drives up their salaries, making it more expensive to recruit such profiles. For small businesses or startups with limited resources, this can be a significant barrier to AI adoption, especially with the complexity of AI technologies. In fact, working with AI technologies requires a combination of technical skills, such as proficiency in programming languages (Python, R), understanding machine learning algorithms, big data processing, and AI ethics. The high level of specialization required limits the number of professionals capable of mastering these technologies.

Moreover, the delay in implementation: The lack of internal AI skills can lead to delays in project implementation, as it is necessary to train staff or hire external consultants. This can delay the adoption of new technologies, which is crucial in sectors where rapid innovation is a competitive advantage.

Additionally, increased dependence on external providers: In the absence of internal skills, entrepreneurs often have to rely on service providers or consultants to develop AI solutions. This dependency can limit their ability to innovate quickly and adapt solutions based on the evolving needs of the business.

Finally, a lack of agility: Without the necessary skills, it is harder for a company to adjust or optimize its AI systems. This can prevent the company from fully leveraging AI to improve its processes or offer new products or services.

Furthermore, the scarcity of AI skills can severely limit entrepreneurs in their ability to adopt and fully exploit the potential of artificial intelligence, hindering their growth and competitiveness.

• Relationship between 'Regulatory Challenges' and Artificial Intelligence

The results of the statistical estimates from our model show a positive correlation between regulatory challenges and artificial intelligence (β = 0.607), T = 5.017. However, the examination of the p-value = 0.000 ($p \leq 0.05$) implies a significant relationship between the two variables.

This result confirms our second hypothesis, which states that regulatory challenges have a positive impact on artificial intelligence. This means that it is essential for regulation to be implemented quickly for better adoption of AI. First, in encouraging responsible innovation, regulatory challenges push entrepreneurs to adopt a more

ethical and responsible approach in developing AI solutions. By integrating ethical considerations and safety standards into their products, they can stand out in the market and attract ethically-minded customers.

Second, the creation of clear standards. In fact, regulations can provide clear frameworks regarding the use of AI. This helps entrepreneurs understand the legal requirements and market expectations, thereby facilitating the integration of AI into their business processes without the fear of violating laws.

Additionally, strengthening consumer trust. Strong AI regulations, particularly in data protection and transparency, enhance consumer trust. Entrepreneurs who comply with these standards can increase their credibility and acceptability in the market, which can promote their growth.

Not to mention, facilitating access to financing. Companies that demonstrate their compliance with regulations may find it easier to secure funding, as investors are increasingly concerned with ethical and regulatory issues. A positive regulatory framework can thus open financing opportunities for entrepreneurs.

Finally, protection against abuse: Regulatory challenges aim to prevent potential abuses related to AI, such as discrimination or privacy violations. By implementing measures to protect consumers, entrepreneurs can avoid reputation crises and legal issues, allowing them to focus on innovation.

• Relationship between 'Opportunities Offered by AI' and Artificial Intelligence

The results of the statistical estimates from our model show a positive correlation between the opportunities offered by AI and artificial intelligence ($\beta = 0.406$), $T = 2.753$. However, the examination of the p-value = 0.006 ($p \leq 0.05$) implies a significant relationship between the two variables.

his result confirms our third hypothesis, which states that the opportunities offered by AI have a positive impact on artificial intelligence. First, AI enables entrepreneurs to access advanced tools and technologies that facilitate the development of innovative products and services. With AI, it becomes possible to automate repetitive tasks, analyze large amounts of data, and improve the quality of offerings. This leads to an increase in operational efficiency, allowing businesses to focus on value-added activities.

Moreover, AI strengthens data-driven decision-making. Entrepreneurs can leverage advanced analytics systems to better understand consumer behaviors and preferences, thereby identifying crucial market trends. This allows them to adjust their business strategy and offer solutions that are better tailored to their customers' needs.

AI also fosters the personalization of customer experiences. By using machine learning algorithms, entrepreneurs can provide personalized recommendations and services, thus increasing customer satisfaction and loyalty. This ability to customize offerings is a major competitive advantage in the market.

Furthermore, the rise of AI paves the way for new business models and emerging sectors. Entrepreneurs now have the opportunity to launch innovative startups or diversify their activities by integrating AI technologies, which can enable them to position themselves in untapped markets. Finally, the promise of AI attracts significant investments. Entrepreneurs who adopt AI-based solutions are often seen as high-potential players, which facilitates access to funding and resources to support their growth.

1. Relevance of the topic in the current context

Artificial intelligence (AI) is a rapidly growing field, and its impact on entrepreneurs and businesses has become a central topic in economic and technological discussions. By exploring the regulatory challenges related to AI and how they influence the opportunities offered by this technology, this article addresses a current and crucial issue. In a world where regulations are constantly evolving, understanding these challenges is fundamental to the success of entrepreneurs.

2. Originality and contribution to research

The article provides an in-depth analysis of the interactions between the opportunities offered by AI and the regulatory challenges in a specific professional context. It offers innovative perspectives on the impact of regulation on innovation and business competitiveness. This study stands out with its entrepreneur-focused approach in the Rabat-Salé-Kénitra region, bringing a new geographical and contextual contribution that may not have been sufficiently explored in existing literature.

3. Rigorous methodology

The study uses a robust statistical evaluation method, including structural equations based on tools such as SPSS and Smart PLS, enabling reliable and robust conclusions. The use of structured questionnaires (via Google Forms) and Likert scales ensures a clear and consistent methodological approach. These methods are well-detailed, allowing other researchers to replicate the study and verify the results.

4. Potential impact on entrepreneurial practices

One of the most important aspects of this article is its ability to influence entrepreneurial practices. By identifying the specific regulatory challenges faced by entrepreneurs and the opportunities AI can offer, the article provides practical recommendations for navigating a complex environment. This type of applied research can directly assist entrepreneurs in adapting their strategies, overcoming regulatory hurdles, and leveraging new technologies to enhance their competitiveness.

5. Relevance for policymakers and researchers

In addition to being useful for entrepreneurs, this article also offers valuable insights for policymakers regarding public policy and regulation. The study highlights the need for clear and adaptive regulations to encourage innovation and support business growth. Therefore, this article can be useful not only for industry practitioners but also for public policies aimed at fostering innovation while protecting citizens' interests.

6. Current challenges and future perspectives

This article does not limit itself to a simple analysis of present challenges but also proposes future directions, particularly on how regulations could evolve to better support technological progress. Furthermore, the article paves the way for future research, such as exploring new dimensions of AI-regulation interactions in other regions or sectors.

In summary, this article is significant because it addresses a relevant and timely issue, employs a rigorous methodology, and offers practical solutions for entrepreneurs and policymakers. This makes it not only worthy of reading but also a valuable contribution to advancing knowledge in an evolving field.

However, Exploration of the Interaction Between AI and Regulation: The study provides an in-depth perspective on how regulatory challenges influence the opportunities offered by artificial intelligence, a field where knowledge is still developing. By focusing on the impact of regulation on innovation and business competitiveness, this research enriches discussions on the regulatory impact on emerging technologies.

1. Geographical and Contextual Contribution: By specifically focusing on entrepreneurs in the Rabat-Salé-Kénitra r egion, this study provides a new and unique contribution by examining regional contexts that are often underexplored in existing literature. This opens the way for a better understanding of the local dynamics of AI and regulation, particularly in developing countries.

2. Robust Methodological Approach: The use of advanced tools such as SPSS and Smart PLS, along with structured questionnaires and Likert scales, strengthens the credibility of the research and allows for precise analyses. This solid methodological framework contributes to expanding scientific knowledge by providing reliable foundations for further research in the same field.

3. Practical and Theoretical Implications: This research goes beyond the theoretical analysis of regulatory issues by offering practical recommendations for entrepreneurs, making it both academic and applied. This dual approach enriches existing knowledge by combining theory and practice.

4. Opening Avenues for Future Research: The article does not limit itself to the results obtained, but also suggests directions for future research, such as studying AI-regulation interactions in other regions or sectors. This shows that the research is not an end in itself, but a starting point for further work.

In summary, this research makes a significant contribution to advancing scientific knowledge on the impact of AI regulation, while offering new perspectives and opening avenues for future research.

Conclusions

Artificial Intelligence (AI) technology presents both a challenge and an opportunity for current entrepreneurs. The rapid advancements in this field open up unprecedented opportunities for innovation, operational efficiency, and value generation. However, entrepreneurs must face a complex and ever-changing regulatory environment.

To meet these challenges, it is essential to remain vigilant regarding regulations and establish solid compliance strategies. Collaboration with specialists in AI law and ethics is also recommended to anticipate and respond to legal requirements while avoiding potential risks.

By leveraging the opportunities offered by artificial intelligence, entrepreneurs have the potential to transform their business models, optimize their processes, and improve customer experience. However, it is crucial to integrate AI thoughtfully, considering its ethical and societal consequences. Adopting a balanced approach that combines technological innovation with social responsibility allows entrepreneurs not only to overcome regulatory constraints but also to position themselves as leaders in an increasingly competitive market.

Moreover, despite the multitude of challenges, artificial intelligence presents a favorable environment for those willing to invest in knowledge and innovation while respecting current regulations. Such a strategic approach offers the opportunity to benefit from technological progress and build a resilient and sustainable business, ready to face future challenges.

This article has explained how the opportunities offered by AI, regulatory challenges, and the scarcity of technological skills impact artificial intelligence among entrepreneurs in the Rabat-Salé-Kenitra region. In fact, our results show that the relationship between the scarcity of technological skills and artificial intelligence (AI) is characterized by a negative correlation. The results of a study indicate that this scarcity limits the adoption of AI by entrepreneurs because the lack of qualified talent leads to various obstacles. First, it hinders innovation because even with promising ideas, entrepreneurs struggle to find experts capable of realizing them. Additionally, the high costs of AI specialists become a barrier for small businesses, which often have limited budgets. The complexity of AI technologies requires specific technical skills, which reduces the number of available professionals. The lack of internal skills also leads to delays in project implementation, forcing companies to rely on external consultants, limiting their agility and ability to innovate quickly. In summary, the scarcity of AI skills represents a major challenge for entrepreneurs, hindering their ability to fully leverage the potential of this technology.

On the other hand, the relationship between regulatory challenges and AI is positive, with regulations promoting faster adoption of this technology. Regulatory challenges encourage entrepreneurs to adopt an ethical approach to AI solution development, distinguishing them in the market. By providing clear frameworks, regulations help entrepreneurs navigate legal requirements while strengthening consumer trust. By complying with these standards, businesses can also facilitate access to funding, as investors are increasingly concerned with ethical and regulatory issues. Moreover, these challenges aim to prevent abuse related to AI usage, thus protecting entrepreneurs from potential crises.

Finally, the opportunities offered by AI translate into a positive relationship that stimulates innovation and business efficiency. AI allows entrepreneurs to access advanced technologies, thus facilitating the development of innovative products and services. By automating tasks and analyzing massive data, businesses can improve their operational processes and personalize customer experiences. The rise of AI also opens the door to new business models, encouraging entrepreneurs to explore untapped markets. Furthermore, AI attracts investments, as businesses that integrate it are seen as high-potential players, facilitating their growth. In sum, artificial intelligence offers entrepreneurs significant opportunities to innovate, grow, and enhance their competitiveness in the market.

Limitations and Perspectives

The study presents several limitations that should be taken into account. First, the regulatory context surrounding AI is rapidly evolving and varies from country to country. This means that while the study explores current legislative frameworks, it could quickly become outdated with the emergence of new laws. This limits the universal applicability of its conclusions, especially for entrepreneurs operating in diverse regulatory environments. Additionally, the study suffers from a lack of concrete examples. While it addresses legislative frameworks and suggests strategies, it remains theoretical and does not provide practical examples showing how entrepreneurs can actually navigate these regulations while using AI. This lack of pragmatism limits the usefulness of the study for those seeking practical solutions.

Moreover, the reliance on external expertise is another limitation. The study does not sufficiently address the challenges related to entrepreneurs' dependency on external consultants to understand and comply with regulations. This can be a major obstacle, particularly for small businesses that lack the financial resources or flexibility to hire such experts, potentially affecting their agility and competitiveness.

On the other hand, the study also presents interesting perspectives. It highlights opportunities for regulatory innovation for entrepreneurs. By adopting a proactive approach, entrepreneurs can not only comply with regulations but also contribute to shaping policies that better meet their needs, collaborating with regulators to create a favorable environment for innovation.

Furthermore, the study suggests that entrepreneurs can differentiate themselves by adopting ethical standards in the field of AI. By becoming leaders in this area, they can not only comply with current regulations but also enhance their market reputation by positioning themselves as ethical and responsible players.

When managed well, AI adoption can also lead to the acceleration of internal processes. By automating certain tasks and using predictive analytics tools, entrepreneurs can gain competitiveness while remaining

compliant with legislative requirements. This synergy between technological innovation and compliance could encourage faster adoption of AI, even in sectors where regulations are strict.

Moreover, the importance of this study lies in its ability to provide concrete insights for local entrepreneurs, by identifying regulatory obstacles and challenges related to the scarcity of skills, while highlighting strategies to effectively and responsibly leverage the potential of AI. By offering a detailed analysis of current trends and suggesting pragmatic approaches to navigate regulations, this study serves as a valuable guide for entrepreneurs looking to innovate while adhering to ethical and legal standards. It also contributes to expanding knowledge on the impact of AI within a specific regional context, marking a significant advancement in studies on the digital transformation of businesses in Morocco.

Credit Authorship Contribution Statement

The authors contributed equally to this research.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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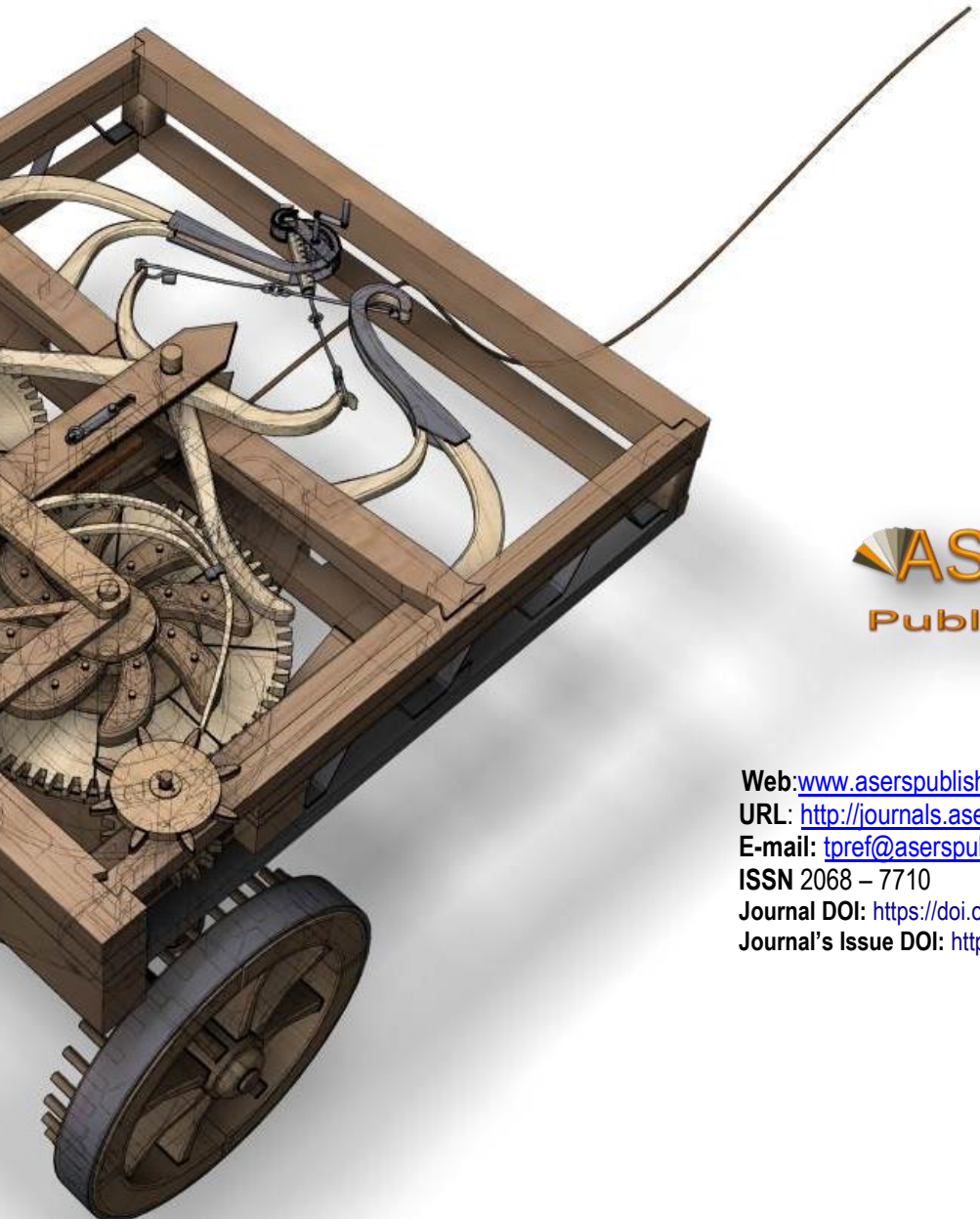

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