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The evolution of Artificial Intelligence: What challenges for Moroccan startups?

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Abstract

Between fascination and concern, artificial intelligence (AI) is attracting increasing attention from business managers in all sectors where it can be applied, be it automotive, finance, tourism, agriculture or artistic creation. Today, economic models are changing with the development of digital technology and the new technologies that derive from it, such as AI, biotechnology, robotics, big data and the Internet of Things. Indeed, the consequences of this revolution will affect how companies operate, how they organise their work, how they create jobs, their external environment and the economy as a whole. Aware of this challenge, Moroccan startups must first determine whether the necessary resources are available, whether they have been properly evaluated and whether the right questions are being asked, in order to integrate AI effectively into their growth strategy. Therefore, the objective of our research is to show to what extent AI practices are beneficial for Moroccan startups, which face many problems that affect their contribution to Moroccan economic development. In this article, we will answer the question: what are the benefits of AI practices for Moroccan startups? To answer this question, we chose an inductive mode of reasoning accompanied by an in-depth semi-directive qualitative approach, in this regard, we used an interview guide by theme on a sample size of 100 respondents based on literatures both empirical and theoretical. We focused on the particularities of Moroccan startups, the practices of AI. We then conducted a qualitative study to examine the perceptions of AI by managers of some innovative Moroccan startups. Finally, we showed the importance of the implementation of AI as an economic opportunity, while at the same time detecting the limitations and challenges it can pose to society and startups. The results received through our study show that the challenges that AI can present for startups, such as technological issues, performance, skills and profiles, constitute crucial factors for their versatile developments.

1. Introduction

The rapid rise of artificial intelligence is fascinating the world. Stirring up a mixture of enthusiasm and anxiety, it raises important questions about the impact it could have on the global economy. The net effect is difficult to predict, given the complexity with which AI will impact on the economies of different countries and companies. In any case, we can say with certainty that a set of measures will need to be devised to safely harness the immense potential of AI for the benefit of innovative companies.

The current economic climate is characterised by globalisation, changing markets and the challenges posed by the financial crisis, which has turned the international economy upside down. This state of affairs makes the national economic environment highly unstable and particularly hostile to development, especially for small and medium-sized enterprises. The latter are increasingly faced with a competitive environment that can influence their organisation, their operations and even their survival in the market (Tilfani, 2011). Competitiveness remains the credo of any company wishing to perpetuate its activities at the dawn of a fourth industrial revolution.

The economic model is in the throes of change as a result of developments in digital technology and the technologies that flow from it, including artificial intelligence (AI), big data, biotechnology, robotics and the Internet of Things. The consequences of this revolution will have an impact on the organisation of work, employment, the environment and whole swathes of our economy. Hence the interest of Moroccan SMEs in seizing this opportunity by adopting the appropriate digital tools for their transformation (Rabbah, 2003). AI abounds in technologies that enable SMEs to understand their environment and act accordingly, in order to achieve greater efficiency and better business development (Buchanan, 2005; Schuhmacher & al, 2021). In order to succeed in this challenge, Moroccan SMEs must, on the one hand, integrate AI into their strategy, but first they need to know whether the necessary resources are available, evaluate them properly and ask themselves the right questions.

Thus, our study aims to show the extent to which AI practices can be beneficial for Moroccan SMEs, which suffer from numerous problems hampering their development and responsible for the modest contribution of their productivity to the national GDP (10%) (Nobari & Dehkordi, 2023). This study will attempt to answer the question 'what are the benefits of AI practices for Moroccan SMEs? In order to answer this question, we will focus on AI practices and the

specific characteristics of Moroccan SMEs. We will then analyse why AI and SMEs are not yet closely associated and, finally, we will show the interest of these SMEs in adopting AI as an economic opportunity, while trying to identify the constraints and challenges that AI will generate for both society and businesses.

2. Literature review

2.1. The beginnings of AI

It all began in 1956. The term "artificial intelligence" was used for the first time in front of a large audience. In the summer of 1956, John McCarthy launched the premise of a technology that had not yet been developed, but which is omnipresent in our daily lives today (Akdim et al, 2021). It was at the summer conference of the prestigious Dartmouth University in New Hampshire that John McCarthy made his research proposal. His aim was to impress, but above all to raise funds for his revolutionary idea. What followed were weeks and months of research into whether a computer could gain autonomy. For a computer to be autonomous, it had to be able to think for itself. The aim was to demonstrate that a computer could solve problems by itself (Akdim et al, 2021).

This ambition did not appear out of nowhere. It is part of a linear development of computing capabilities that were strongly catalyzed by the needs of the Second World War. Unprecedented funds were invested by the US government (Reema Aswani, 2020) during the war to strengthen their military capabilities. AI is thus a logical continuation of innovation. Early research was more exploratory than conclusive. The idea was not to solve a problem, but to explore the limits of human knowledge. It was also part of a Cold War context in which the USA and the USSR were in competition. Competition was no longer just military, but also astronomical and technological. This was the beginning of the "race to the stars". As astronomy and technology were intrinsically linked, the development of one was a catalyst for the other (Reema Aswani, 2020). As soon as AI was accepted as a technology in its own right, it became of great interest to operations and management. It took part in the search for process optimization and the resolution of basic management problems. Subsequently, AI was separated out to be seen as a unique discipline, not just a tool. Indeed, people working in operations often lacked the ability to properly manipulate AI (Bock et al, 2020).

AI then made its appearance in the world of cinema. This point in history is very important, as it exposes the notion of extra-human intelligence to the general public for the first time. It marked the beginning of the fear that AI inspires to this day. From the outset, AI was portrayed

as a threat in science fiction films and other works. As a result of the image built up around the concept of AI and the other disadvantages it could bring, including the elimination of certain low-skilled jobs, developers feared that sales of AI-based products would stall. However, buyer resistance was negligible, and a massive sale of such products took place. AI capitalization was already growing rapidly (Bock et al, 2020). Despite this strong growth, private investors remained vigilant and on the sidelines. For a long time, AI research remained dependent on military funding. Between 1962 and 1975, AI was mainly used by the Defense Advanced Research Projects Agency (DARPA). These were the main investors. Thus, AI was mainly used in research into weapons development, military decision optimization and inter-unit communications (Bock et al, 2020).

2.2. Attempting to define AI

AI is poorly understood by much of the world. Even for those working in the field, a clear definition is hard to come by. We've often tried to link it to another field for a better understanding. The first, and the one that most often attracts attention, is mathematics. We know that people trained in this field must have good mathematical skills. It is necessary to have a good understanding of certain mathematical tools in order to answer problems that will be solved by AI. However, AI cannot really be associated with mathematics, as it is a discipline that has no principles of its own and is developed for specific problems and to meet specific needs depending on the program. Its development process does not follow a linear logic (Castillo et al, 2021). This contrasts with the discipline of mathematics. Here, mathematics is merely a tool. Subsequently, there has been a tendency to associate AI with software engineering. Since the aim of software engineering is to add information and knowledge to a program, we may well ask what differentiates AI from any other program. There is a fine line between these two disciplines, but neither encompasses the other.

Secondly, AI can be combined with linguistics. Programs are created from a new language containing several grammatical rules. We're talking about learning a separate computer language. However, this remains a simplistic view of the discipline itself. We keep it as a possible association, but not its definition. The definition of AI encompasses all these fields, but is not really defined by any of them. Every AI-based program is personalized and unique. It depends on the developer's objectives and the tools used to create it (Castillo et al, 2021).

AI has two main objectives: to develop an "intelligent" machine and to understand the nature of human intelligence. However, AI is not an entity in its own right that we simply observe.

Humans model it, develop it and then observe it. What do humans expect from such a machine? First of all, we expect it to be able to communicate. Indeed, communication is often seen as the mirror of intelligence. We also expect it to be full of knowledge. It is also expected to have a purpose, a specific use. And finally, one of the current goals of AI development is to enable the machine to be creative. It must be able to observe, learn and adapt, proposing new alternatives without having been previously programmed for these new ideas. To this day, the issue of richness of knowledge and creativity remains unresolved. Knowledge for an AI program is represented by the amount of data inserted into it. Little access to data limits the machine's knowledge. Creativity is an even bigger problem. It's one of the skills of human intelligence that developers are still struggling to integrate. Schank offers a simple definition of AI as "an attempt to create a new computer technology that relates to some behaviour previously done by only humans" (Castillo et al, 2021).

2.3.   AI and services

The division of labor from the early years of AI development to the present day has changed dramatically. Today, the vast majority of jobs are in the tertiary (personal services) and quaternary (larger-scale services) sectors. The world of services is currently more capitalized and larger. AI can play a big role in this world. The goal of AI here is "the configuration of technology to provide value in the internal and external service environments through flexible adaptation enabled by sensing, learning, decision-making, and actions" (Bock et al, 2020). AI thus brings real added value to the service sector. It has a significant impact on several levels. Firstly, it reduces the need for human capital, replacing it with the use of its technology. Customers also often tend to prefer their service brought to them by AI-based tools than by human employees (Déjoux, 2020). Operations and processes are often automated and customized according to the company's objectives. On the other hand, the use of AI-based machines reduces the margin for error in the services offered, since it cannot suffer from human characteristics such as subjectivity and energy loss. AI has its impact on marketing too. It enables companies with a very heterogeneous customer base to be faced with the most personalized selection possible. For example, Zara, which has stores in various parts of the world, uses AI to personalize its store content according to the preferences of consumers in the region in question (Castillo et al, 2021). AI also helps to better understand a customer's needs based on the analysis of their emotions through facial recognition, for example (Bock et al, 2020). What's more, AI, particularly in the service sector, cannot be defined as a single entity

with functions simply associated with its objectives. AI is nothing without its technological tools.

The best-known tool is the chatbot. It is made up of different programs that communicate directly with humans by auditory or textual means (Déjoux, 2020). The chatbot receives a question from a customer, for example, translates it into its own language and provides an answer corresponding to what is asked (Aoki, 2020). There's also the virtual assistant, often found in our Smartphones or connected devices at home. It has the ability to respond to voice requests to play music, tell a joke, give a definition, schedule an alarm, add a task to do or even initiate a phone call. We're all familiar with the Alexa assistant produced by Amazon, Siri by Apple or the Google Home. AI is also necessary for the operation of robots that can produce a service similar to that of a human, such as bringing an order to a restaurant for example. There's also the blockchain tool, which enables information to be stored in a highly secure way, without allowing it to be modified in any way.

Another tool is the Internet of Things, better known as IoT. This is a tool that enables information to be sent and received from one device to another via an Internet connection. AI is often integrated into IoT devices, such as the one known as Alexa. This is an AI that is vocally present in devices built using IoT. It responds, provides information and gets to know its user. The aim is to provide the best personalized service over time. A tool that is more than necessary and used in all circumstances is the algorithm. It contains several rules to follow in order to solve a problem. Machine learning uses algorithms and large quantities of data to enable the computer to learn without being told to do so. Deep learning is a highly sophisticated tool derived from machine learning. It simulates the human ability to learn from its own experiences to deliver better results in the future (Bock et al, 2020). The neural network is the most advanced tool in artificial intelligence. It operates in exactly the same way as the human brain. It perceives an image, a sound, or any other form of information, analyzes it using the data it already has in the system, and reacts in accordance with the information it initially received. There are no principles to limit or influence task flow (Bock et al, 2020).

2.4. AI and its importance for managers

According to ISO 2382-28, AI is 'the ability of a functional unit to perform functions typically associated with human intelligence, such as reasoning and learning'. But there are many definitions of artificial intelligence that coincide with the timeline of AI. The story began in 1950, when Alan Turing simulated an 'imitation game' test, pitting a computer against a human

without the latter knowing whether he was dealing with a machine or a human. In 1956, at a seminar on cybernetics, the term AI made its appearance (Henno, 2017). Just like the definition of what an intelligent machine is: a machine capable of reproducing human behaviour in a specific domain or not, and at the same time, a machine capable of modelling the way a human being functions. AI now encompasses a range of processes, applications and techniques that enable computers to simulate and reproduce human intelligence (Saheb, T. 2023).

Intelligence is therefore an indissociable whole that artificial intelligence theorists have broken down, for better understanding, into different functions enabling all cognitive functions to be simulated (Hao et al, 2024):

- Perceptive capacities or how to capture information flows: hearing, sight, etc.
- Memory, learning and knowledge representation.
- Calculating representations. Thought.
- Expressive communication abilities.
- Executive abilities.

These 5 cognitive functions describe the broad spectrum of use of AI and help to better understand why it seems to be found "just about everywhere". To carry out these 5 cognitive functions, current AI uses three technologies: rule engines (IF... THEN...), machine learning and deep learning (Alan, 2022; Nobari & Dehkordi, 2023) each of which is a subset of AI (Jones, 2015; Gbadegeshin et al, 2022). It is in this assemblage that the impact of AI in the enterprise must be analysed. Thanks to this convergence, AI requires a real potential that manifests itself through several functionalities, namely the optimisation of existing processes, automation, assisted steering, the action of detecting, predicting and interacting more and more 'naturally' with humans thanks to developments in the automatic processing of natural language. AI fully expresses its potential through various functionalities: it optimises existing processes, automates (e.g. data mining), enables assisted steering, detects, predicts and interacts with human beings (Berdeche, 2015; Zahlan, 2023).

The real integration of AI into the enterprise is not simply a matter of optimising processes, but of developing new organisational schemes, restructuring working methods, creating new services, reviewing interactions with customers and therefore renewing business models (Trivedi &, 2024). It is also reshuffling the competitive deck, opening up opportunities for innovators. AI is also renewing certain geostrategic issues, because those who possess the data,

as well as the skills and technologies to process it by designing AI algorithms, hold one of the keys to tomorrow's power in a digital world (Villani, 2018; Wang &, 2024). To make this intelligent transition a success, companies will have to invest in AI, prioritising innovation, value creation and optimising risk management. (CIGREF guide, 2016; Wang, 2024).

In the era of this intelligent transition, businesses will undergo a major transformation. By demystifying AI and understanding its main principles, managers must be fully aware of the potential, but also the limits, of today's AI in order to protect themselves and imagine future sources of productivity gains and new revenue creation (Thomson et al, 2016; Polireddi, 2024). In order to highlight the impact that AI can have on the organisation of work within Moroccan SMEs, we need to highlight some of the specific features, constraints and opportunities of these businesses (Storey et al, 2024).

3. The integration of artificial intelligence technology and its implications

3.1.   Artificial intelligence and competitiveness

It's important for a company to invest in AI integration to remain competitive over the next 5-15 years. This, however, is what Storey et al. (2024) elaborates. The authors foresee four possible scenarios for the future of AI. The first scenario is said to be optimistic. This is what is predicted by Brandusescu (2021). He foresees a future inspired by science-fiction films. It would be made up of futuristic medicine, where genetics could be controlled and no more diseases could be transmitted this way. It could also be nanotechnology, which would put any imagined innovation into 3D format. The robotization of the workplace could also mean that humans have nothing to do but enjoy their free time.

Then there's the scenario imagined by the pessimists. They see the danger in machine decision-making. If machines are at the heart of the most important decisions, humans will find themselves in the position of second-class citizens. Many jobs are at risk of being lost, and that doesn't just include low-skilled jobs. High technologies like AI-assisted driving will also lead to job losses for all transport operators (cabs, trucks, and drivers). On the other hand, we find the scenario predicted by the doubters. They truly believe that AI will never go beyond certain limits of presence in our world, and that it will never be able to take its rightful place. As long as it can't be creative, it can't overtake humans. The last scenario is that of the pragmatists. Not frightened by AI, this scenario implies that AI will always advance, but that humans will always be one step ahead of technology. The author seems more in tune with Chevalier and Déjoux (2021) optimistic scenario. They predict that computer intelligence will be equivalent to human

intelligence by 2029. In this linearity, he predicts AI machine independence in 2045. So, we're really talking about the next few decades. Companies that also believe in this scenario have already begun to implement AI technology within their processes. The author calls them "digital firms".

These are compared with traditional companies, and several characteristics can be observed: they have fewer employees, on average 15% fewer. They have a higher market capitalization, but lower revenues than traditional companies. The author believes this is due to recent investment in AI. It takes some time for positive results to appear at this level. However, with such investment, improvements in productivity, product innovation, and future revenue growth are expected (Storey et al, 2024). We are in the midst of the fourth industrial revolution, characterized by new technologies and innovation. The biggest companies are no longer the ones we used to know, as in the United States, General Motors, Ford, or even Exxon in 1995. In 2016, we find Walmart, Exxon and Apple in the same order. Today, rare materials such as gold, diamonds and minerals are no longer the most valuable commodities on earth. Indeed, knowledge and data have taken on a much higher value. Power is in the hands of the intangible. Thus, knowledge engineering was developed in the 70s, and over time became part of the discipline of AI. AI is dependent on data and knowledge. If knowledge is available, then effective tools and algorithms can be built to optimize business operations (Han and Anderson, 2020).

AI can be integrated into many different types of business, including manufacturing. Companies that do so are called "Smart Factories". Their production is more flexible, faster, contains high technology, and requires very little human assistance. Robotization and digitization of systems are yielding very positive results (Han & Anderson, 2020). On the other hand, to illustrate our starting point more concretely, Akdim et al. (2021) show us how optimal it is to maintain the relationship with the customer through electronic means. In general, the cost of this in-store contact is $10. By telephone, it's $5. But especially online, it's just $0.01. The easiest to access and most cost-effective means are: e-mail, directed site visits, tutorials, chatbots and bulletin boards. Authors also testify to a positive relationship between consumer satisfaction and customer relationship management on the Internet (Akdim et al, 2021).

In the service sector, AI also has significant positive impacts. Firstly, it can increase service quality (Han & Anderson, 2020). Kroger and Microsoft, for example, are partnering to develop intelligent supermarkets that offer tailored advertising and faster product information. It

increases customer satisfaction, since it is less prone to fatigue and therefore to human error. It improves the quality of marketing, since it offers each store a proposal of products to sell, according to its culture and location. It can also reduce service defects. Walmart is currently developing totally intelligent supermarkets where cameras can detect a lack of merchandise in a department in real time and quickly notify staff. Finally, for those countries that allow it (notably North America), AI-based cameras can recognize and analyze customers' emotions to offer them better service according to their needs (Bock et al, 2020).

3.2. Consumers and AI

The consumer is at the heart of the problem of integrating AI into the enterprise. Acceptance of the new technology can be represented by an S-curve (Dunphy, 1995). In the beginning, a certain slowness is observed. This is known as the "inertia" period, because the company doesn't want to take too many risks and continues to invest in the tools it has already developed in the past. When this phase is over, and the company is sure that the new technology will not be rejected by the market, it invests even more in its marketing and increases its sales. Consumers will be at a higher level of acceptance, and rapid growth can be observed in the middle of the S-curve. This is also the period when other companies will seek to develop substitutes for the product developed by the original company. At the end of the S-curve, growth is slow. Every opportunity has already been exploited and sold to the general public. Revenues stagnate (Bock et al, 2020).

Convincing consumers to adapt to new technological products is not an easy task, but it is a necessary one. There are different types of consumers. There are the enthusiasts or "early adopters" (Nobari & Dehkordi, 2023), who wait for the technology to come out and often pre-order it. Then there are the "laggards" (Nobari & Dehkordi, 2023), who will wait for the opinions of enthusiasts and public opinion before finally adopting the technology. Finally, there are the "pragmatists". These evaluate the cost of adapting to the technology as more important than "the benefits" (Nobari & Dehkordi, 2023). To sell an AI-based technology, you need to invest almost as much in research as in marketing. This is extremely important, as the two are intrinsically linked. Older people are generally the last adopters, so marketing is often aimed at a younger population with prior knowledge of the technology. Nor should technology be pushed forward too quickly, as this could lead to "innovation overload" (Nobari & Dehkordi, 2023). Consumers no longer have the time to follow the evolution of the product, and their attention

is lost. Consumer education must be gradual, to avoid rushing them and risking "technostress". This can have a catastrophic effect on product development.

3.3. The specific characteristics of Moroccan SMEs

Whether developed or developing, SMEs are a key component of the economic fabric of most economies. In Morocco, SMEs make up 95% of the productive fabric. We can cite a set of characteristics of Moroccan SMEs mentioned in the literature review:

- Centralisation and personalisation of management;
- A simple information system with the absence of a real information system;
- Rapid innovation;
- Proximity between employees and bosses;
- Flexibility of management style;
- Speed of reaction.

Some entrepreneurs set up businesses because they have capital to invest, while others become entrepreneurs through inheritance from their families. In all cases, it is difficult to say that they have an entrepreneurial spirit, a taste for risk and the ability to manage it. The owner does everything, directing, managing and participating in production. This reflects the failure to separate the two functions of ownership and control; in other words, on the one hand, the successful growth of their business is confronted with the risks of loss of control and financial difficulties, and on the other, the problem of growth and financial independence presents itself to them as a multiple permanent challenge (Maniani, 2009). However, the foundations on which an entrepreneur can create a viable business are the know-how, personal skills and knowledge that they have acquired over the course of their professional and personal educational lives.

According to the ANPME, SMEs are present in all sectors of economic activity, with a rate of 98%: industry, crafts and construction and public works, trade and services, which include tourism, communications, transport and financial services. However, the share of SMEs in the creation of overall value added is 21%. This participation varies widely, from 0.2% in the production and distribution of electricity, gas and water, to 73% in real estate and services, and 20% in manufacturing. Data from the Statistics Directorate show that the Greater Casablanca region accounts for 41% of SME-SMIs, the Tangiers - Tetouan region 9%, Rabat -Salé - Khemisset 8%, Meknes - Fes 9% and the remaining 33% are spread over the last 14 regions. Moroccan SMEs suffer from a number of problems that hamper their development. These are

either linked to the environment, or to the entrepreneur himself. These problems are responsible for their modest productivity contribution to national GDP (10%). In addition to legal and administrative problems, financial problems, commercial problems, human and social problems, there are those linked to the internal management of SMEs, such as (Guerraoui, 2002):

- The behavioural criterion of managers: Moroccan SMEs have a family aspect, which implies a difficulty at the level of corporate governance;

- Human resources management problem;

- Business organisation problem: are rather dominated by a linear structure;

- Liquidity management problem;

- Lack of a management control system;

- Lack of strategy;

- Problem with financial management and budgetary control;

- Problem with stock management;

- Insufficient information technology;

Faced with this situation, we wonder to what extent the practice of AI can be a solution for greater efficiency, better collaboration and a real driver of business development.

4. Qualitative study: Measuring managers' perceptions of AI

4.1. Methodology of the study

Epistemological reference seems to be of essential importance for our research. Indeed, the adoption of our methodological path and the relevance of the results represent two important benchmarks for carrying out the empirical evaluation and providing relevant elements to answer the main question of this research study, which is to determine the challenges of Moroccan startups in the field of artificial intelligence. To achieve our research objectives, we will present the methodological choices associated with the data collection and processing procedures used in the semi-structured interview guide. Methodologically, startups constitute the subject population of our research.

The study covers 100 technology startups across Morocco. The study is not limited to any specific or particular field. With a view to ensuring that our sample is representative, our empirical study will focus on innovation companies operating in various fields of activity and at different stages of the life cycle. To carry out this study, we first opted for an interpretivist

epistemology with an inductive mode of reasoning that enables us to test the research problem in the field. For this epistemology consists of discovering reality based on empirical studies by Aberdeen (2013). The ultimate objective of our study is to approach the perception of the impact of AI on the organisation of work. To achieve this, a qualitative study was carried out with 100 people made up of directors, managers and employees from different sectors of Startups located in Casablanca city.

4.2. Results of the study

The study highlights the disparity in the perception of AI and its impact on the profitability of innovative companies. The first noteworthy finding is the fact that a significant percentage, 86% of executives interviewed, are quite supportive of integrating AI into business practices. While it is only for 14% of employees. Employees' perceptions are influenced by their limited knowledge of what AI is. AI is perceived as something that is very complex to implement, or that robots will one day replace all employees. Many predict that AI will change a significant number of jobs, particularly middle management positions. It is fair to say that managers are more measured in estimating that AI will have positive effects on working conditions, while other employees are even more reserved. From a technological and financial point of view, 63% of the managers interviewed stress that AI could be a heavy burden for startups, given that it is perceived as a prospect for large companies that have a well-established information system, a massive amount of data and an appropriate budget. Beyond these issues, the human factor is another concern for managers. For 72% of managers, the first challenge is to rethink the organisation of work and the division of tasks between staff and AI. The Human Resources departments will be the ones most called upon to help realise the opportunities offered by AI by anticipating its human impact. We focused our interview on three levels of perception: the integration of AI into corporate strategy, the impact of AI on work organisation and the role of HR in the success of this transformation.

4.2.1. Integration of AI into company strategy

The study shows that the emergence of AI creates an ambivalent perception among some interviewees. Indeed, the companies covered by our sample are not all at the same level of anticipation and preparation for AI. The degrees of preparation are contrasting and on the whole modest. Only 21% of managers say that AI is currently a strategic priority. 69% of employees are unsure about the use of AI. The development of AI is generally perceived positively by managers, most of who believe that AI will improve the company's performance (87% of

managers), lead to faster and more reliable decision-making (67%) and improve the organisation and way of working (83%). Nevertheless, employees remain more reserved. The main obstacles to AI that came up frequently during our interview can be summarised as follows:

- Faced with the emergence of AI, employees fear first and foremost the risk of the dehumanisation of work and the loss of social ties (for 76% of them).
- For managers, the main risk is generating more control and reporting (91% of managers), followed by the risk of delegating the skills of a manager (decision-making, supervising and motivating teams and defining and then executing a strategic vision) (66%) and the risk of dehumanisation and loss of social ties (35%).

4.2.2. Impact of AI on work organization

About 70% of executives are concerned about the challenge of work organisation and the division of tasks between humans and AI, which need to be rethought, compared with 32% of managers and 78% of employees. Next comes the AI culture itself among employees, with 26% for executives, 31% for managers and 16% for employees, and finally, support and training in the skills required (55% for executives and managers and 30% for employees). Expectations can be summed up as:

- Training on the technologies and tools used by AI.
- Training to collaborate or interact with intelligent machines.
- An understanding of the new professions linked to AI.

About 74% of managers are aware that AI in the workplace will bring speed, flexibility, productivity gains and therefore cost reductions, or energy savings. Better production planning, more agile, fluid, faster and more flexible methods will make it possible to respond appropriately to market requirements.

4.2.3. Role of HR in successful AI integration

HR is a real driving force to support this transformation and put in place the AI adoption framework. 80% of directors, 72% of managers and 84% of employees insisted on the importance of taking into consideration the challenges of AI for an SME, namely:

- The establishment of a real framework for adopting AI: giving meaning, raising awareness among managers and employees, guaranteeing the quality of jobs and quality of life at work, creating a framework of trust by ensuring ethics of data and algorithms.

- Managing the skills challenge: recruiting and retaining AI talent, anticipating changes in employment and skills by having a real benchmark for professions;

- Anticipation of transformations of the organization and its functioning: new balance between centralization and decentralization, increased transversality and transparency, the evolution of the role of managers;

- Guaranteeing corporate social responsibility in the transition, in conjunction with all stakeholders;

- The implementation of AI within the HR function to support employees;

- The degree of preparation of startups for these transformations. Innovative companies less prepared for the development of AI will need to be the subject of specific attention and support in an effort uniting public authorities, branches and professional and trade union organisations.

Artificial intelligence is therefore a recent concept, complex and difficult to define. A start-up with the means to invest in integrating artificial intelligence into its processes is likely to come out on top. Artificial intelligence and competitiveness go hand in hand. However, what may seem like a mere opportunity today will become a necessity over the next ten years. Indeed, every company, in order to maintain its competitiveness, will have to transform itself in the direction of the industrial revolution 4.0. On the other hand, several challenges to the integration of AI in startups have been identified by the literature (figure 1).
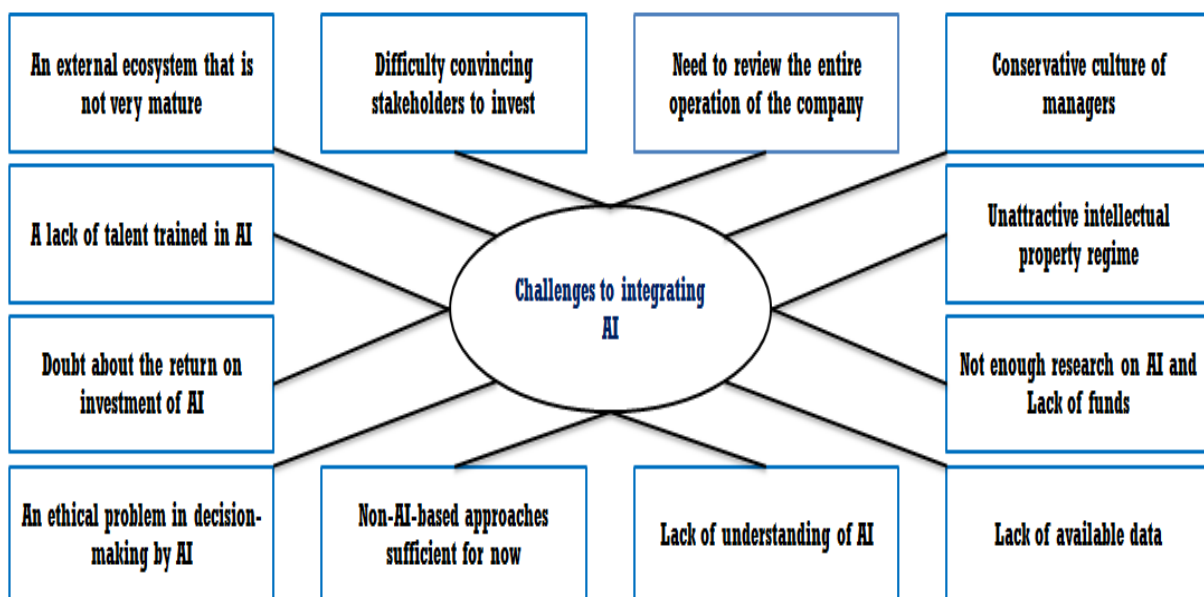
Figure 1. Challenges to integrating AI into startups (elaborated by the authors)

Companies seem to see only the importance of AI implementation costs without dwelling on the possible benefits (table 1). The benefits can be found in time savings, cost reductions and better data analysis. On the other hand, governments play an important role in determining the use of enterprise AI. Legislation exists to limit the collection of personal data. As data is needed to feed AI algorithms, its limited existence reduces the chances of using this technology.

Table 1. The different types of challenges to the integration of artificial intelligence in startups in Morocco

The Different Types of Challenges	Examples
Government Challenges	- Lack of subsidies - Strict Regulations
Operational Challenges	- Lack of talent - Cost of training/adaptation
Financial Challenges	- Startup size - Very expensive AI
Complexity Challenges	- Conservative managers - Lack of understanding

* Source: elaborated by the authors

4.3. Summary of study results

Through this study we can decide on a set of findings which govern the perception of AI by employees within startups:

- The concept of AI is still poorly perceived, especially by employees, it is associated with the use of the machine, what relationship will it have with humans and the real impact on the landscape of the company (Vauplane, 2015). For managers and executives, AI represents an opportunity to optimize the organization and gain productivity;

- The success of this transformation requires good framing of the integration of AI into the company's strategy, by defining the areas where AI offers the most potential. On the other hand, we must ensure respect for ethics;

- The issue is as much human as technological. Under the influence of technology, the tasks performed by workers will evolve. This implies new needs in know-how and knowledge. Therefore, it is important to anticipate as best as possible the capacities and knowledge which will make it possible to explain, to carry out pedagogy to create a framework of trust, to anticipate and manage the evolution of skills, organizations, operations in guaranteeing corporate social responsibility.

5. Challenges and opportunities of AI for Moroccan SMEs

Moroccan innovative companies have become aware of the interest they could find in adopting digital tools, it is however necessary to make them accessible to these companies unfamiliar with this technology. The objective is to highlight the challenges and opportunities that AI can present for the company, while clarifying some preconceived ideas.

5.1. Technological challenges

It is obvious that small businesses, like large ones, will have to adopt artificial intelligence innovations if they want to remain competitive (Ganascia, 2007). According to the "Very and Small Businesses barometer"[1] carried out quarterly by Ifop with Fiducial, for 52% of French small business owners, digital represents as much a threat as an opportunity. Conversely, 11% of small business owners maintain a generally negative view of the digital transition, especially in the construction and personal services sectors. For many bosses, the digital transition remains inevitable. In fact, 63% of them estimate that it will have a direct impact on their marketing method in the next five years. The same with the offer of products and services (71%), but less with the production methods (42%) which require a more substantial investment for VSEs and therefore represent a more difficult milestone to pass.

Digital technology, of course, imposes changes on companies that are expensive. However, with "turnkey" solutions in the cloud, companies can easily and inexpensively benefit from all the advantages of AI. And some tools can be deployed very simply without even the intervention of an IT department.

5.2. Performance Challenges

AI at work represents an opportunity to help workers in their daily tasks, to make them more efficient, while they are subject to ever more distractions in an increasingly connected world. According to David Kenny, general manager of IBM: "The digitalization of basic tasks will allow humans to concentrate on their creativity and they will thus be able to increase their skills and their access to knowledge". AI will bring speed, flexibility, productivity gains and therefore cost reductions, or even energy savings. Better production planning, more agile, more fluid, faster and more flexible methods to respond appropriately to market requirements. Therefore, it is clear that when a boss integrates AI into his company, the entire organization of work must

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[1] https://www.fiducial.fr/Barometre-des-TPE

be rethought: transform his HR department, develop new training for staff, rethink his hiring criteria, etc. (Consultancy Services et al, 2014).

AI is also virtual assistants offering several features intended to simplify work through voice activation, dictation of emails, setting up automatic reminders linked to locations or contacts. There are also chatbots, or conversational agents, which rely on software capable of simulating human conversations by using AI to react to key words and give responses designed in advance. Thanks to them, Moroccan innovative companies can create interactive knowledge bases that employees consult to find precise information on the company and its core activity. AI allows companies to meet the challenge of predictive analysis which is no longer reserved for large companies. With machine learning, Moroccan innovative companies can meet ever-increasing customization requirements (Surden, 2014). Solutions available via the cloud thus offer companies the possibility of operationalizing tools capable of distinguishing significant relationships between different variables, and therefore of building and testing analysis models. For companies, it is a more precise management of the activity, which integrates, for example, the quantification of the customer potential for a given product or data on the implementation of acquisition strategies.

5.3. Skills needs and profiles

The search for skills and training in areas related to AI are becoming urgent issues for the company. We must anticipate future AI skills needs and start raising employee awareness.

Indeed, one of the major challenges of data intelligence lies in the creation of future teams, joining the dynamics of agility and making it possible to combine the right skills and time for a project. The identification of skills mobilized in an automated and digitalized economy must, however, be regularly updated, taking into account the pace of technological developments. This means that the demand for skills, in a context of accelerating technological change, will constantly evolve. A higher level of digital skills will certainly be a guarantee of better employability and the possibility of progress in the future, for all qualification levels.

Certainly, Moroccan startups that embrace artificial intelligence will be more inclined to engage with their customers, and will have accelerated rates of innovation, greater competitiveness, higher margins and productive employees. Nevertheless, it's not enough to want it, as these startups need to evaluate their vision and transform their people, processes, technology and data readiness in order to unleash the power of artificial intelligence and thrive in the digital age.

We also see that many projects are driven by goals, but without a well-defined strategy and skilled staff failure can be at the end of the road. For example, most innovative companies reported some failure among their AI projects, with a quarter of them having a failure rate of up to 23%. Lack of qualified personnel and unrealistic expectations were identified as the main causes of these failures. In fact, the cost of AI solutions, lack of qualified personnel and data bias were identified as the main factors holding back the implementation of AI technology in these startups.

The Implications of the findings for future research and practice:

1) Theoretical, methodological and empirical contributions:

- Development of a literature review which examines the evolution and specificities of AI within Moroccan startups.
- Identification of the challenges of integrating artificial intelligence into Moroccan startups.
- This research highlights four categories of issues (governmental, operational, financial and complexity) in the development and management of AI in startups.
- The use of an in-depth qualitative approach based on a semi-directive interview guide (sent precisely to the managers of the startups).
- This research equips managers with tools allowing the optimization of the determinants of the leverage of AI integration at the level of their startups.
- This research allows the management of the organization of innovative companies a better ability to play on the synergy between AI activities to maximize their results and profitability.
- Another contribution of this research, the inclusion of the budget and means component in the integration of AI within Moroccan startups, and its decisions with regard to their determinants.
- Projecting a roadmap into the future to develop and improve the dynamics of Moroccan clusters carrying added value.

2) Theoretical, methodological and empirical limitations:

- Lack of recent theoretical and empirical studies and statistics to better shed light on the two notions, namely: AI and Startups.

- Lack of research on the evaluation of indicators measuring the integration of AI within Moroccan startups.

- We presented the results of the qualitative study. We wanted to process these quantitative results using the XLSTAT software, relying on structural equation models, however the reduced number of respondents does not meet the conditions of use of this software.

- The focus of the study only on the Moroccan context and the focus of the study on a given period, the extension of this period could produce even more surprising results.

6. Conclusion

The economic model is changing following the development of digital technology and the technologies that result from it. The aim is to know to what extent Moroccan SMEs can be a key player in this transformation and understand AI as an essential asset for better strategic visibility and good performance. In order to achieve this, we had to understand the ideas received about this transformation by the employees of certain startups that were the subject of our sample, and at what level they are motivated to integrate AI into their organization. Our study made it possible to measure the perception of AI by company staff. AI, a practice that is still ambiguous for a considered percentage of employees interviewed and an opportunity to improve productivity for managers. The latter see it as a real challenge which will bring speed, flexibility, productivity gains and therefore cost reductions, or even energy savings. Better production planning, more agile, more fluid, faster and more flexible methods to respond appropriately to market requirements. The challenge for this type of company is that they are able to meet the challenge relating to certain organizational, technical and resource issues in particular.

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