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A MARKET RESEARCH ON CHALLENGES INFLUENCING ARTIFICIAL INTELLIGENCE ADOPTION

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Abstract. Although there are many theoretical references regarding the adoption of artificial intelligence, its practical challenges remain unknown. This article uses a market research aiming to identify the critical success factors to prepare for the artificial intelligence implementation, indicating the most appropriate strategies to adddress them. The results allow us to conclude that there are several challenges, the main ones being the lack of data infrastructure and trained people, and the lack of a better understanding of applications. Artificial intelligence, as well as other disruptive technologies, makes room for rethinking business models, not only improving existing processes, but also making it possible to see new opportunities. It is interesting to point out that, much more than a simple innovative project to improve processes and business, a succesful artificial intelligence implementation enables the creation of a new culture of interaction, experimentation, automation, analysis and prediction.

Keywords: artificial intelligence, adoption, SWOT analysis, GUT method.

JEL Classification: O2, O20.

Introduction

Due to its learning capabilities, artificial intelligence has great potential to assist companies in different activities, like resolution of tasks considered difficult, tedious, time-consuming or dangerous, as well as problems that previously could not be solved (Gudivada et al., 2019). Despite representing an important resource for the organizations, however there are many challenges and critical factors that influence its adoption (Crawford, 2021).

The goal of this research is to study the profile of companies that have already implemented this technology. To accomplish this, a detailed list of interviewing and questionnaires were conducted to experts and companies, providing a huge amount of collected data that was analysed using SWOT tool and GUT Matrix.

The purpose of SWOT is to carry out a thorough research on the internal aspects of a company, followed by the exploration of the environment in which it is inserted (Giannoccaro, 2013). The main objective of the SWOT analysis is to maximize the potential of strengths and opportunities and, conversely, to minimize the influence of weaknesses and threats (Benzaghta et al., 2021). The method actually works as an analytical tool for internal and external audit, making it easier to understand the situation in different departments within an organization or between an organization and its customers, suppliers, shareholders and companies of the same group (Fei et al., 2021). Additionally, it is the most objective way to define the level of capability of a company, and what it needs to survive threats and to take advantage of opportunities, serving as a basis for justifying strategic options (Borucka, 2018).

On the other hand, organizational problems are usually identified in the form of balance sheets. The GUT matrix is a tool that helps in its quantification with the objective of prioritizing possible corrective and preventive actions aiming at partial or total elimination of these problems (Daychoum, 2016).

The starting point for assembling the GUT matrix is to prepare a list of problems, covering the aspects to be analyzed. Then, a grade will be assigned to each issue listed with respect to the following aspects: gravitry, urgency, and trend (Mello et al., 2022).

The insights generated through these tools make it possible to evaluate the most appropriate approaches to answer the research questions, which are to identify the challenges and success factors in the adoption of artificial intelligence and indicate the best strategies to address them.

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1. Theoretic framework and proposed method

The term "artificial intelligence" was created in 1956 by John McCarthy, who described it as science or engineering capable of developing intelligent machines (Mueller & Massaron, 2018).

If we go back a little, more specifically during the Industrial Revolution of the nineteenth century, we can see that the demand for machines that reduced or completely replaced repetitive operations performed by workers strongly leveraged new scientific and engineering developments (Chalmers et al., 2020). Similarly, the technological revolution of the twentieth century, especially the invention of computers, made room for the emergence of artificial intelligence and machines that were capable of reducing or replacing tasks performed by humans with the use of their intellect (Paul et al., 2020).

However, it was only in the eighties that logical and mathematical reasoning became the main trend in the field of artificial intelligence and, with a gradual improvement in the processing capacity of computers, studies in this area reached a new level (Meske et al., 2022). The problem is that new technologies were still working with limited program and data resources and, as a result, it was not possible to carry out human-machine interactions through images, sounds and languages in a natural way, not to mention the simulation of the capacity of thinking of humans (Halverson et al., 2021).

Finally, after nearly twenty-five years of research on neural networks, that researchers were able to effectively obtain effective results. The great power of deep learning networks today, combined with the very high processing capacity of computers, is capable of classifying images with very high precision (Minh et al., 2022).

However, organizations that intend to adopt artificial intelligence face many challenges, from the lack of knowledge of its effective advantages to the lack of skills (Lee & Qiufan, 2021).

In order to evaluate the adoption of new technologies, there are several theories available in the literature, such as: TAM – Technology Acceptance Model (Davis, 1989), TPB – Theory of Planned Behavior (Ajzen, 1991) and UTAUT – User Acceptance of Information Technology (Venkatesh, 2003). Specifically in relation to the adoption of artificial intelligence, two theoretical frameworks have been widely cited (Tamilmani et al., 2021): TOE – Technology-Organization Environment (Tornatzky et al., 1990) and DOI –Diffusion of Innovation Theory (Rogers, 1995).

The Technology-Organization-Environment model proposes three elements that influence the process of adoption and implementation of technological innovations: the organizational context, the technological context and the environmental context (Moradi & Nia, 2020). The organizational context is defined by descriptive measures, such as: size of the organization, centralization, formalization, and complexity of administrative structures, the quality of its human resources, and the amount of slack resources that are available internally. The technological context, on the other hand, involves internal and external technologies that are relevant to the firm (Hadwer et al., 2021). The external environment is the space in which the firm conducts its business. This environment involves the industry in which the firm operates, its competitors, suppliers, and negotiations with the government (Awa et al., 2017). All these "actors" can influence the degree to which the firm feels the need, seeks and introduces new technologies (Baker, 2012). On the other hand, the Diffusion of Innovation theory (DOI) seeks to explain how, why and at what rate new ideas and technology spread (Lee, 2021).

However, models provide a prediction that does not necessarily reflect practical reality (Tang et al., 2021). Therefore, the assessment of the real situation based on organizations that have already adopted artificial intelligence is the safest way to assess the challenges and success factors that can serve as a benchmark for new entrants.

2. Proposed method

The proposed method was the data collection techniques used in the field survey were an initial interview with experts and sending a questionnaire to companies.

The first step was an interview with 10 experts aimed to validate the questionnaire to be applied. The experts are consultants specialized in the implementation of artificial intelligence projects. The justification for the choice was based on the fact that these professionals have both theoretical and practical knowledge.

They did a list of possible strengths and weaknesses of the companies for which they provide consultancy, and also indicated market threats and opportunities. The three most voted suggestions in each item were included in the questionnaire and sent to the participants for validation.

At this stage, it was defined that the survey would be sent by e-mail to CIO's (Chief Information Officers) in Latin America of companies that already use artificial intelligence, and that have over US$1 billion in revenue and over 2,000 employees, emphasizing that the focus is the company's global strategies and not the emphasis on local initiatives.

The questionnaire was sent to 75 companies, being 5 of each of the following industries: aerospace, agriculture, automotive, consumer goods, chemical and petrochemical, electronics, financial, insurance, oil and gas, pharmaceutical, public sector, retail, technology, telecommunications, and transport and logistics.

Another premise adopted was the choice of organizations in which the author and/or experts have a professional relationship and who were previously willing to participate. Therefore, there was a 100% guarantee that the questionnaires would be answered.

According to the experts, the following premises were defined in relation to possible weaknesses: 1) appropriate data infrastructure to support artificial intelligence projects, 2) people trained in artificial intelligence, and 3) maturity of artificial intelligence and understanding of

applications, especially in relation to how they can be used to solve the company's demands and/or problems.

On the other hand, the following premises were defined in relation to possible strenghts: 1) interest and support from the leaders in eventually implementing artificial intelligence projects, 2) cultural acceptance of new technologies, mainly involving digital transformation, and 3) increased investments in artificial intelligence in the coming years.

For each of the statements, the interviewers answered whether they totally agree, partially agree, minimally agree, minimally disagree, partially disagree or totally disagree, with weights of 3, 2, 1, –1 being assigned, respectively, –2 and –3, depending on adherence.

Regarding threats, the items to be validated were: 1) costs of acquisition and implementation of an artificial intelligence project, 2) efficiency of law enforcement in relation to data ownership and governance in artificial intelligence systems, and 3) impact of artificial intelligence on ethical conduct and the level of employment.

On the other hand, regarding opportunities, the items to be validated were: 1) exponential growth in the volume of data generated, 2) significant increase in the processing capacity of computers, and 3) large amount of technologies available on the market for the development of artificial intelligence systems.

Similarly, the interviewers assessed whether the statements represent a great opportunity, a moderate opportunity, a small opportunity, a small threat, a moderate threat or a large threat, with weights of 3, 2, 1, –1, respectively. –2 and –3, depending on the indicated option.

This information served as a parameter for the application of the SWOT tool, that helps in the identification of the internal performance (strengths and weaknesses) and external environment (opportunities and threats).

Additionally, the GUT matrix was used, which is a tool that helps to quantify problems, with the objective of prioritizing possible corrective and preventive actions aiming at their partial or total elimination. Thus, weights from 1 to 5 were assigned to each problem related to the following aspects: gravity, urgency and tendency.

Gravity represents the impact that the problem causes in relation to tasks, people, results, processes and organizations, among others, in particular the cost factor, which can cause possible losses or damages, with extremely serious problems weighing 5, very serious it has a weight of 4, serious has a weight of 3, a little serious has a weight of 2 and without gravity it has a weight of 1.

Urgency, on the other hand, refers to the time needed to resolve the problem. The greater the urgency, the less time available and vice versa. Thus, problems in which immediate action is needed has a weight of 5, resolution is urgent has a weight of 4, needs to be resolved as soon as possible have a weight of 3, a less urgent resolution has a weight of 2 and, if you can wait, it has a weight of 1.

Finally, in relation to the tendency, the potential of the problem and its probability of getting worse over time are highlighted. It is the evolution of the trend of growth, reduction, maintenance or disappearance of the problem. Thus, if the problem gets worse quickly, the weight is 5, it gets worse in the short term it has a weight of 4, it gets worse in the medium term it has a weight of 3, it gets worse in the long term it has a weight of 2 and, if nothing changes, the weight is 1.

Problems that generate a higher numerical value should be prioritized as they are more serious, urgent and with a greater tendency to worsen.

3. Results and discussion

In the following, an overview of the in-depth analysis of the collected data is provided, as well as the application of the SWOT tool and the GUT matrix, and the recommendation of the strategies to be used according to the analyzes carried out.

3.1. Internal environment

The results and the weighted average of the answers regarding the internal environment are presented in Table 1, and the higher the weighted average, the higher the level of agreement of respondents in relation to the premises.

Regarding the strengths, considering the percentages of all who agreed, the interest and support of the leaders obtained 70% agreement, the cultural acceptance of new technologies was 76% and the increase in investments in artificial intelligence in the coming years was 62%.

On the other hand, in regards the weaknesses, the agreement rates were even higher, as can be seen by the weighted averages, with the appropriate data infrastructure obtained 91%, people trained had 93%, and maturity and understanding of applications, had 94%.

Table 1. Answers regarding the internal environment

Weight	Internal	Leaders	New Support	Increase Tech	Data Invest	Trained Infra	Maturity People
3	Totally Agree	19%	21%	19%	56%	43%	43%
2	Partially Agree	31%	31%	20%	26%	31%	31%
1	Minimally Agree	20%	24%	23%	9%	19%	20%
–1	Minimally Disagree	14%	16%	14%	4%	4%	3%
–2	Partially disagree	11%	6%	13%	3%	1%	1%
–3	Totally disagree	5%	2%	11%	3%	1%	1%
	Average	0.87	1.15	0.47	2.09	1.99	2.01

Table 2. Answers regarding the external environment

Weight	External	Volume of data	Proc. Capacity	Amount of tech	Costs	Law Enforc.	Ethics Employ.
3	Great Opportunity	74%	53%	43%	0%	0%	0%
2	Moderate Opportunity	26%	41%	33%	0%	0%	0%
1	Small Opportunity	0%	6%	24%	0%	0%	0%
–1	Small Threat	0%	0%	0%	10%	11%	40%
–2	Moderate Threat	0%	0%	0%	33%	53%	36%
–3	Great Threat	0%	0%	0%	57%	36%	20%
	Average	2.74	2.47	2.19	2.47	2.24	1.84

3.2. External environment

The results and the weighted average of the answers regarding the internal environment are presented in Table 2.

All assumptions had 100% agreement. All respondents understood that the volume of generated data, the processing capacity and the large amount of technologies are opportunities. Additionally, they all also agreed that the costs, the effectiveness of law enforcement, and the impact of artificial intelligence on ethical and employment pose threats.

In terms of criticality, the most worrying external environment item, according to respondents, was the acquisition cost, with 57% considering it as a major threat. Second was the effectiveness of law enforcement with 53% considering it as a moderate threat. The impact of artificial intelligence on ethical and employment, in turn, got 40% of responses considering it a small threat.

Table 3. SWOT analysis

OPPORTUNITIES					
POSITIVE		2.74	2.47	2.19	18.43
	0.87	2.38	2.15	1.91	
	1.15	3.15	2.84	2.52	
	0.47	1.29	1.16	1.03	
THREATS					
POSITIVE		2.47	2.24	1.84	16.31
	0.87	2.15	1.95	1.60	
	1.15	2.84	2.58	2.12	
	0.47	1.16	1.05	0.86	
OPPORTUNITIES					
NEGATIVE		2.74	2.47	2.19	**45.07**
	2.09	5.73	5.16	4.58	
	1.99	5.45	4.92	4.36	
	2.01	5.51	4.96	4.40	
THREATS					
NEGATIVE		2.47	2.24	1.84	39.89
	2.09	5.16	4.68	3.85	
	1.99	4.92	4.46	3.66	
	2.01	4.96	4.50	3.70	

In evaluating the opportunities, most respondents considered all items as a great opportunity, with 74% in relation to the volume of data, 53% in relation to the processing capacity and 43% in relation to large amount of technologies.

3.3. SWOT analysis

It is important to note that, as the weighted averages were positive, then all assumptions adopted, both in relation to the internal environment and relative to the external environment, were correct.

Through the application of the SWOT tool in the market research results, it was identified that the quadrant with the highest value was the one associating weaknesses with opportunities, the sum of which reached 45.07, as noted in Table 3.

The first item that should be analyzed are the exponential growth in the volume of data generated versus lack of appropriate data infrastructure to support artificial intelligence projects, which obtained an index of 5.73.

The second is the exponential growth in the volume of data generated versus the fact that artificial intelligence is still a very new concept, whose applications need to be better understood internally, especially in relation to how they can be used to solve the demands and/or problems of the company, whose index it was 5.51.

Finally, exponential growth in the volume of data generated versus the absence of people trained in artificial intelligence, which had an index of 5.45.

Making a brief analysis by industry, it is interesting to observe that the items to be evaluated remain the same. Only the order of importance varies depending on each industry.

For example, the exponential growth in the volume of data generated represents a greater opportunity for financial, retail and telecommunications industries.

On the other hand, the lack of appropriate data infrastructure to support artificial intelligence projects, the absence of people trained in artificial intelligence and the maturity of the technology are a greater challenge for the electronics, oil & gas, and pharmaceutical industries.

The results are shown in Table 4.

In addition, in most industries, that is, in agriculture, automotive, consumer goods, chemical and petrochemical, electronics, oil & gas, and pharmaceutical, the first

Table 4. SWOT analysis by industry

	Volume V	Infra I	People P	Maturity M	VxI	VxP	VxM
Industry							
Aerospace	2.60	2.20	1.80	2.20	5.72	4.68	5.72
Agriculture	2.60	2.40	2.20	2.20	6.24	5.72	5.72
Consumer Goods	2.60	2.40	2.20	2.20	6.24	5.72	5.72
Automotive	2.80	2.20	1.80	1.80	6.16	5.04	5.04
Chemical and Petrochemical	2.80	2.20	1.80	1.80	6.16	5.04	5.04
Electronics	2.60	**2.60**	**2.40**	**2.40**	6.76	6.24	6.24
Financial	3.00	1.60	1.80	1.80	4.80	5.40	5.40
Insurance	2.80	1.80	1.80	1.80	5.04	5.04	5.04
Oil & Gas	2.60	**2.60**	**2.40**	**2.40**	6.76	6.24	6.24
Pharmaceutical	2,60	**2.60**	**2.40**	**2.40**	6.76	6.24	6.24
Public Sector	2.80	2.20	2.20	2.20	6.16	6.16	6.16
Retail	3.00	1.60	1.80	1.80	4.80	5.40	5.40
Technology	2.60	1.40	1.40	1.40	3.64	3.64	3.64
Telecommunications	3.00	1.40	1.60	1.60	4.20	4.80	4.80
Transportation & Logistics	2.80	2.20	2.20	2.20	6.16	6.16	6.16
Average	**2.74**	**2.09**	**1.99**	**2.01**	**5.73**	**5.45**	**5.71**

item that should be analyzed is the exponential growth in the volume of data generated versus lack of appropriate data infrastructure to support artificial intelligence projects. The second is the exponential growth in the volume of data generated versus the maturity of the technology and also the lack of qualified people.

In the aerospace industry, the first items that should be analyzed arethe exponential growth in the volume of data generated versus lack of appropriate data infrastructure to support artificial intelligence projects and also the technology maturity. The second is the exponential growth in the volume of data generated versus the lack of qualified people.

In the finance, retail and telecommunications industries, the first items that should be analyzed arethe exponential growth in the volume of data generated versus lack of qualified people and also the technology maturity. The second is the exponential growth in the volume of data generatedversus lack of appropriate data infrastructure to support artificial intelligence projects.

Finally all the items in the insurance, public sector and technology industries should be analysed simultaneously.

3.4. GUT matrix

In addition, the GUT matrix was applied to assess the gravity, urgency and tendency of the problems, the results of which are shown in Table 5.

Using the weights from 1 to 5 according to the level of gravity, urgency and tendency multiplied by the

Table 5. Problem analysis

Weight	Problems	Infra	People	Maturity	Costs	Law	Ethics/Empl
5	Extremely Serious	44%	49%	4%	19%	0%	0%
4	Very Serious	37%	33%	17%	26%	13%	7%
3	Serious	19%	19%	43%	33%	26%	33%
2	A little Serious	0%	0%	36%	23%	61%	49%
1	Without Gravity	0%	0%	0%	0%	0%	11%
G	Weighted Average Gravity	4.26	4.30	2.90	3.40	2.51	2.36
5	Immediate action is needed	19%	23%	23%	6%	1%	1%
4	Resolution is urgent	21%	26%	20%	9%	3%	3%
3	Needs to be resolved ASAP	36%	29%	39%	23%	7%	9%
2	Less urgent Resolution	14%	13%	36%	34%	51%	33%
1	Can wait	10%	10%	11%	29%	37%	54%

End of Table 5

Weight	Problems	Infra	People	Maturity	Costs	Law	Ethics/Empl
U	Weighted Average Urgence	3.24	3.39	3.93	2.29	1.80	1.64
5	Problem gets worst quickly	23%	4%	3%	0%	0%	0%
4	Gets worst in the short therm	26%	23%	14%	0%	56%	0%
3	Gets worst in the medium therm	33%	41%	47%	0%	44%	0%
2	Gets worst in the long therm	19%	31%	36%	3%	0%	100%
1	Nothing Changes	0%	0%	0%	97%	0%	0%
T	Weighted Average Tendency	3.53	3.00	2.84	1.03	3.56	2.00
GxUxT		48.72	43.73	32.37	8.02	16.08	7.74

percentage indicated by the participants, we can conclude that the main problems were related to internal limitations.

The problem that requires highest priority is the lack of appropriate data infrastructure with 48.72, followed by the lack of people trained with 43.73 and the fact that artificial intelligence is still a new concept, which obtained 32.37.

3.5. Recommended strategies

Based on these analyses, a growth strategy is recommended, which refers to environments with a favorable situation and possibility of opportunities, but whose companies have internal limitations.

Data is the fuel of artificial intelligence and the first challenge that organizations face today is to have an infrastructure capable of collecting, storing, organizing and managing this huge volume of information.

The second challenge is the lack of people trained in artificial intelligence. It is a professional profile focused on data, algorithms and statistics, that is, able to work much more with mathematics than with computing. In artificial intelligence projects, an algorithm learns from the data and builds a mathematical model that represents the task to be performed. When real data is entered, the system is able to recognize the same patterns found during data training and their results are then incorporated into traditional procedural programs that work according to the recognized model. This training process is time-consuming and does not have a defined deadline, so usual software development flows cannot be applied. Generally, people with artificial intelligence skills are rare and highly sought after, which makes salaries more expensive and reduces the availability of professionals in the market. Therefore, the importance of the technology developed and used being accessible to everyone within the corporation, regardless of their level of knowledge.

The third challenge for companies is the understanding of artificial intelligence, which is a popular topic and one that has been arousing a lot of interest on the part of organizations from all segments. Many of them believe that it can easily solve any business problem, however artificial intelligence is still a very new concept, whose applications need to be better understood by companies, especially in relation to how they can be used to solve demands and/or the internal problems.

Therefore, the recommended strategies for companies, taking into account the strategic posture of growth, are innovation strategies, where they anticipate their competitors in improving their weaknesses, that is, adapting their internal infrastructure processes, empowering their teams and seeking a better understanding of artificial intelligence applications.

For this journey of improvement and adaptation to be made in a faster and more efficient way, it is recommended that the strategy includes the support of partners, whether educational institutions or start-ups, from suppliers, whether technology or consulting, and /or benchmarking with other companies.

Conclusions

The main opportunity identified was the exponential growth of data volume, which is the fuel for artificial intelligence projects, and the main internal limitations were the lack of appropriate data infrastructure to support artificial intelligence projects, the absence of people trained in artificial intelligence and the fact that artificial intelligence is still a very new concept, whose applications need to be better understood internally, especially in relation to how they can be used to solve the company's demands and/or problems.

Regarding the artificial intelligence maturity, it is necessary that companies define what they are and their demands or problems to later understand how artificial intelligence could help. For that, it is necessary to know in depth the applications, the available technologies and, mainly, the success cases. The indicated strategy was to use the benchmarking, which is a process through which organizations seek better performance by learning successful practices, whether carried out within the organization itself, by competitors or even by organizations operating in market segments as long as their business processes are relevant. The adoption of benchmarking is important because it enables a deep understanding of the processes and scopes that lead to superior performance, enabling the organization to find innovative solutions and, in addition,

it makes it possible to stimulate continuous improvement and seek ways to achieve its goals.

Regarding the absence of people trained in artificial intelligence, an innovation strategy was indicated for training internal teams, including the following actions: 1) assess the qualifications of the current internal team and check what are the gaps in relation to skills in artificial intelligence, 2) identify professionals with the profile to work with artificial intelligence, 3) build a data learning culture throughout the organization, and 4) find different options for training in artificial intelligence.

Regarding the lack of appropriate data infrastructure to support artificial intelligence projects, an innovation strategy based on three pillars was indicated: collection, organization, analysis and immersion. Data collection aims to make data simple and accessible, regardless of its location, as well as ensuring flexibility in relation to ever-changing data. Data organization aims to create a ready-to-use, reliable analytics foundation with integrated governance, protection, and compliance. Data analysis, in turn, aims to build and scale with reliability and transparency. Finally, immersion aims to operationalize artificial intelligence across the enterprise.

An action plan is suggested covering the following steps: 1) data collection and organization through hybrid cloud, information architecture and data lakes, 2) data analysis through the use of artificial intelligence applications and, finally, 3) scalability to a level of immersion.

The success in relation to the collection and organization of data slides in the way in which these processes are carried out, mainly with regard to the increasingly regular use of cloud environments. A hybrid cloud would be a highly recommended option, as it is a solution that combines a private cloud with one or more public cloud services, with proprietary software that allows communication between each distinct service. A hybrid cloud strategy provides companies with greater flexibility, moving workloads between cloud solutions as needs and costs fluctuate. Hybrid cloud services are important because they give companies greater control over their private data. An organization can store sensitive data in a private cloud or in an on-premises data center while leveraging the robust computing resources of a public cloud. For a long time, data were kept isolated and access to them was difficult, making it impossible to carry out effective analyses.

A great option to eliminate data inconsistencies, resolve duplications and define a single location for access is to create a data lake, that is, a repository that centralizes and stores all types of data generated by the company or for the company. Unlike the data warehouse, where data is stored that is already clean and organized, making it immediately available for analysis and use, data in data lakes is stored without processing or adjustments. As not necessarily all the data will be used, the idea of leaving the data in its raw state is more advantageous, so that there is no unnecessary cleaning work, after all, one of the major problems for organizations is that they spend about 80% of their time in data preparation and only 20% in analysis. In addition to the reduction of unnecessary work, and its added cost, in data lakes it is possible to accumulate a much larger volume of information than in data warehouses and in an extremely faster way.

To build AI models from scratch and scale them across the business, organizations need building, production, and management capabilities. One way to start this process in a faster and easier way is to use ready-made artificial intelligence applications that already include specific functionalities, such as computer vision and machine learning, without the need to have prior knowledge of algorithms. This is a highly recommended option for companies that are starting the process of adopting artificial intelligence, as it presents low risk and can serve as a laboratory for use in a specific application in some department of the company.

The last step is immersion, that is, the ability to apply artificial intelligence across the enterprise. In many cases, this will require organizations to develop entirely new workflows and business processes across all departments. As the company becomes familiar with this technology, the idea is to scale to other departments and, later, to more complex artificial intelligence models until, in the future, to extend to the entire company.

Artificial intelligence had an accelerated growth due to the hype and now, that we have more experience and wisdom, we know more assertively what can and cannot be done. Consequently, the adoption curve becomes more discerning. It is the stage of maturity, where technology starts to be seen in a rational way, no longer as magic that will solve all the companies' problems, but as an extremely useful tool for some of them.

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