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► **To cite this version:**

Fabrice Lollia. Digital transformation: A literature review of the integration of artificial intelligence into the company's organisational strategy. International Workshop. An International and Interdisciplinary Perspective on Digital Transformation: The Case of Developing and Emerging Economies., Sep 2021, Paris, France. hal-03708807

HAL Id: hal-03708807

<https://hal.science/hal-03708807v1>

Submitted on 29 Jun 2022

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Biography

Fabrice LOLLIA holds a PhD in information and communication sciences from Gustave Eiffel University and an EMBA from the Rennes School of Business. He is an associate researcher at the DICEN idf laboratory, where his research focuses on the impact of new technologies on organisations.

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Abstract

This communication aims to propose a point of view on the impact of intelligence artificial in companies in the digital transformation framework based on literature review.

We propose a definition of artificial intelligence within companies in order to highlight their strengths and weaknesses by presenting some answers to ensure the best success of its implementation.

Keywords

Artificial intelligence, digital transformation, enterprise, implementation, employees, performance.

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1. Introduction

Today's society gives an important place to new technologies and their pervasiveness (Claverie, 2010). Shaped by a need for urgency linked to a culture of instantaneity, new technologies now have an essential place in our lives and particularly within companies. The increase of these technologies through the computing power of machines, their refinement in the whole range of everyday situations, such as facial recognition, knowledge extraction and other possibilities, shows us the efficiency of artificial intelligence (AI) to such an extent that the question of artificial intelligence as intelligence augmented (IA) is raised. According to Hassani et al. (2020), it would ultimately result from augmented intelligence through new technologies. This is in line with the view of complementarity held by Virginia Rometty (ex-CEO of IBM) that 'Artificial intelligence will not lead us to a world of humans versus machines, but rather to a world of humans plus machines. This places us in a context where AI and its technologies (machine learning, deep learning, chatbot, neural network, virtual assistant and others) are fundamental to reshaping organisational processes in companies due to the recognition of its effects on business performance.

However, these developments raise questions regarding work situations and the consequences of this new kind of pervasiveness, where AI is often equated with a *job disrupter*. We can also wonder about its effects on the working conditions of employees and the solutions relating to its acceptance by employees in the work situation.

Several books and reflections have been produced on this subject. However, a speculative aspect of AI persists, 'in the *sense that it is not based on empirical data from the point of view of the actors involved*' (Tamari et al., 2021).

It is undeniable that over the last ten years or so, this technology has made impressive progress due in particular to the collection of data relating to big data and the increase in calculations, the implication of which cannot be denied. AI is, therefore, in the process of overturning the organisation of work while modifying employment within companies. Whether it is at the

process or organisational level of the company, its influence on the performance of the company is topical.

Therefore, this article aims to answer these questions by providing an enlightened point of view from the scientific literature on the introduction of AI within companies and its impact on work situations, considering the point of view of the actors concerned. To do this, we propose to first address artificial intelligence in work situations within companies. We will then discuss the reasons for its development in companies and the consequences, particularly in the work situation. Finally, we will propose solutions for its proper implementation within companies.

2. Science's perception of AI in business: the difficult challenge of a precise definition.

The notion of AI is still very vague for non-specialists. In England, for example, *"42% of respondents offered a plausible definition of AI, while 25% thought it was robots"* (Cave *et al.*, 2019). Therefore, it is well established that AI is a poorly understood concept and misunderstood.

There are a plethora of definitions of AI in the scientific literature. For example, according to Gamkrelidze *et al.* (2020), AI can be defined as *"a set of algorithms, machines, and more broadly technologies in different forms (software, robotics, etc.) that are inspired by or aim to imitate human cognitive faculties such as perception, production and understanding of natural language, knowledge representation, or reasoning"*.

While according to Hassani *et al.* (2020), *"AI is essentially a computer system that mimics human cognition by using data accessed from a different source/system to make decisions and learn from the resulting models."*

AI is therefore defined in our view as a form of intelligence emanating from the field of computer science and fuelled by technological augmentation to enable, through the imitation of human cognitive faculties, improved decision making and the resulting learning.

Thus, today, there are many functionalities concerning AI, such as searching and analysing information within technologies like facial recognition, recommendation, prediction, decision execution... Its development in multiple domains raises questions about its effects, notably in the world of work. The scientific literature reports numerous studies that it is important to examine the subject better.

3. Understanding AI in business: The problems and consequences caused by AI in the business world.

First of all, the literature addresses the question of the substitution of machines for humans. This famous '*myth of substitution*' (Dekker & Woods, 2002), or the '*replaced employee*' scenario (Ferguson, 2019), assumes replacing human employment with AI-enabled machines. The consequence is a loss of jobs for humans. Therefore, we are more in a perception of the substitution of humans than in the perspective of their 'augmentation' by AI (Zacklad, 2018). However, it is helpful to remember that organisations, particularly companies, have always aspired to transfer more tasks to machines to reduce costs and improve efficiency. The beginning was when human labour (so-called manual labour) in repetitive and mechanical tasks was replaced with assembly lines (Dopico et al., 2016).

Referred to as an era of automation in the scientific literature, studies on this subject are controversial (Hassani et al., 2020a). On the one hand, some research predicts a high degree of job automation. For example, Frey and Osborne(2017) estimate that this automation will concern 47% of jobs in the United States. On the other hand, in France, the share of potentially automatable jobs is estimated at 42% (Roland Berger, 2014, p. 8).

On the other hand, some studies (Arntz *et al.*, 2016) qualify these statements by demonstrating much lower figures of 10 to 15% of the jobs that can be automated and the impossibility of total automation of jobs. Therefore, it is mainly a misleading hyper-mediatization that would hide the job opportunities linked to automation (Autor, 2015). Furthermore, the trend is not towards job loss but instead towards greater employability due to a reorganisation of work overtime.

Even better, some research shows that AI would be a source of job creation. For example, Wilson *et al.* (2017), for example, anticipate the creation of three new categories of AI-driven business and technology jobs. Trainers', whose role would be to teach AIs the language of humans. Explainers", who would be the interface between technologists and business leaders. This function is essential given the increasing complexity of AI systems. Supporters", whose task would be to monitor the operation of the AI and to check that its unintended effects are dealt with appropriately promptly. There is thus the emergence of new professions and jobs related to AI, particularly in the design of its systems (Wilson *et al.*, 2017).

Also, it is important to understand that not all jobs are automatable. For example, according to Dejour (2018, the human aspects of a job (creativity, social relations, flexibility, precision, adaptability and problem-solving skills) would be challenging to automate.

Moreover, the France strategy report by Benhamou (2018) shows that all professions drawing their strengths from their human and social activities and mobilising so-called cognitive skills, calling on creativity as well as the resolution of complex problems, will be spared.

Finally, a look at changes in work and the nature of occupations and professional skills (Giblas *et al.*, 2018) is essential. Indeed, work patterns could change with the delegation of repetitive tasks to AI systems. This would lead to time savings that could be used in other ways by employees, for example, for social and relational skills (Villani *et al.*, 2018), such as for training.

Finally, it is important to consider the effects of AI on actors from an emotional point of view. The relationship between humans and machines in a work situation is now a given (Schweitzer & Puig-Verges, 2018). In this aspect, research shows that social interactions take place between humans and AI-enabled machines. Reeves and Nass (1996) explain that there are exact social expectations when communicating with artificial entities and assigning rules for social interactions. These effects propagate intrusively into humans, interfering with decision making and creating perverse effects on decision making. For example, in some cases, humans will delegate certain decisions to AI-enabled machines even though their judgment is better due to human input (Agrawal *et al.*, 2019).

Also, even if research shows that AI can have a positive effect on the well-being of employees when it is used in the form of "augmentation and not substitution" (Henkel *et al.*, 2020), other questions remain, in particular, that of the link between know-how and pride in a work complementarity perspective with an AI-equipped machine in a work situation (Dignum, 2018). (Henkel *et al.*, 2020), other questions remain, in particular, that of the link between know-how and pride in a perspective of work complementarity with an AI-equipped machine in a work situation (Dignum, 2018).

Worse still, there is another problem in human-AI interaction and, particularly in its dimension of trust in the face of an algorithm whose neutrality is called into question. Indeed, Yapo and Weiss (2018) demonstrate in their research how algorithms resulting from machine learning are affected by biases. In contrast, they are supposed to be an asset, a strength, thanks to their

neutrality. Indeed, the biases of programmers are found in artificial intelligence algorithms. We will then find ourselves with biased and non-neutral algorithms, creating ethical conflicts. For example, in facial recognition, black people are more identifiable for common crimes than the general population.

This has led to erroneous arrests by police forces in the USA. Many American states have been forced to abandon facial recognition in the field of personal security for these reasons.

4. What are the recommendations for an exemplary implementation of AI in companies?

The body of research in the scientific literature points to three solutions: collaboration and proactivity, and acceptance by the actors.

4.1 Collaboration

The literature points to human-machine collaboration as a solution to the uncontrollable control of the machine over the human. It is worth noting that: *'52% of companies are already using AI solutions or have plans to do so in short to medium term'* (Tata Consultancy Services, 2018). The question now is how it would be possible to work with AI without being subjected to it and thus avoid the scenario of the augmented and dominated employee (Ferguson, 2019), an employee who would be a victim of AI through dependency. To the result. It would be a matter of setting up a relationship of human-machine cooperation where AI would be perceived as an aid tool, a complementary tool whose human presence would be indispensable and recognised under a position of technological ambivalence (Ellul, 1988). In other words, the professional (radiologist, employee, doctor) would use the machine's skills while accepting the undeniable fact that the machine can perform certain tasks much more efficiently than they can (Daugherty & Wilson, 2018). The work of Wang et al. (2016) on image-based cancer detection is very relevant in this respect. Their experiment shows that in the case of breast cancer metastasis detection, combining the predictions of the AI learning system (deep learning) with the diagnoses of the human pathologist reduces the error rate by 85%. This shows that the strength of one is complementary to the limitations of the other (Jarrahi, 2018). This complementarity would be expressed as a human-IA duo where "AI would be responsible for the execution, management and organisation, while humans would be responsible for creation, imagination, cooperation and emotions" (Dubet, 2019)

However, many researchers point to the limitations of this relationship, not least because it is not human in nature (van den Bosch & Bronkhorst, 2018; Zouinar, 2020). The question of the augmentation of work by AI is also an angle to consider in understanding this collaboration. This augmentation could be seen as a '*symbiotic amplification*' (Zacklad, 2018), in the sense that a new organ would replace a missing organ with more strength (Zacklad, 2018).

Finally, the notion of intelligibility is also mentioned in the scientific literature. It would therefore be appropriate to develop, within AI systems such as machines based on deep learning (expert machines and complex automatisms), a more intelligible, less opaque process, defended by 'explicability' (Zouinar, 2020), which amounts to adopting an inflationary and substantialist approach to the ethics of artificial intelligence (Bruneault and Laflamme, 2021).

The inflationary perspective on the ethics of artificial intelligence accepts that AI is a technological endpoint of human development. So much so that it is thought that advances in deep learning will replace the intuitive tasks of humans.

On the other hand, the inflationary approach is a view of AI in which technological development is inevitable, necessary and irreversible. There is, therefore, an urgent need to adopt a proactive stance aimed at anticipating AI-related issues.

The aim of the concept of intelligibility is, ultimately, to resolve the difficulty of understanding how these systems work in order to move towards the scenario of the 'rehumanised employee' (Ferguson, 2019), trying to avoid the opacity effect known as the 'black box' while emphasising ethically driven principles (Hooker & Kim, 2019). For example, concretely, one of the solutions could be drawn from the principle of ethics by design. This is an R&D approach that integrates human impact issues into the design of AI applications so that they are understandable to the most significant number of people, but also that they are part of an orientation present in the code of coders, which would make it possible to prohibit liberticidal and unworthy algorithms (Bensoussan, 2020; Dignum, 2018).

This issue has already been studied: Roth *et al.* (1987) observed the effects of the opacity of these systems on human activity. Research has also focused on early expert systems and automation at the level of work situations (deTerssac *et al.*, 1988; Parasuraman & Wickens, 2008).

4.2 Proactivity

Proactivity must make sense in identifying the sectors and jobs affected by the transformation imposed by AI. This is how employees can be trained in the challenges of AI and how it will be possible to produce new jobs that will bring out new talents. Of course, these talents will not only be able to develop new skills in the field of computer science. Still, from a proactive perspective, they will also be able to be one step ahead of the problems that will emerge from AI, whether they are ethical, legal, technical or economic.

It seems appropriate to insist on the training of employees who, because of their indispensable presence, seem to be the essential transitional foundation for the future integration of AI into jobs in companies in a sustainable manner (Benhamou, 2018b). In this respect, it should be noted that half of the companies have implemented or are considering AI projects in the short term, but they are inclined to have obstacles in the form of changes in skills and qualifications (Tata Consultancy Services, 2018).

4.3 Acceptance by actors

The pervasive dimension of AI means that, like many technological tools, particularly security tools, its perception by the actors within the organisation is necessary for its proper implementation (Lollia, 2019). For example, if AI is perceived by stakeholders (employees, consumers, etc.) as a surveillance tool, which may be due to the feeling of traceability linked to the exploitation of big data, its implementation within the company will be undermined. On the other hand, if it is perceived as a tool that is an integral part of the company by the employees, its use, following adequate training, will help ensure that the tool is well implemented within the company due to a practical perception of the tool. This means that the technicality of AI is not the essential element to consider for this technology to be accepted within the company. It is rather a question of its perception by humans and the whole notion of change management that accompanies it (Lollia, 2019 ; Moss Kanter, 2011 ; Autissier & Moutot, 2015). This is why, for example, an AI-based solution whose objective would be to ensure the company's profitability might not be effective due to the unethical perception of the tool by employees. On the contrary, as it has already been proven by scientific research (Lollia, 2019b), although effective and necessary for the organisation, the tool could harm the company by not being

adopted by the organisation's stakeholders. In this case, it is feared that the tool will not be used or misused to harm its implementation within the company.

5. Conclusion

AI is today implanted in a dichotomous vision of society and business. On the one hand, it represents the worst, the loss of jobs, the dominance of the machine over man, accompanied by a transformation of know-how. But, on the other hand, it appears to be the remedy for the ills suffered by the employee at work through the so-called automatable heavy manual tasks, the creation of new jobs and a new reorganisation of work in favour of the more efficient company. And at the centre is the problem of responsibility defended by ethics (Dignum, 2018).

From a more global perspective, AI is transforming employment. To do this, it is reorganising it by removing jobs and creating others, improving specific areas of employment while eliminating others. This reorganisation raises new questions and new challenges, particularly from the actors' point of view, where there are still many grey areas. For example, how does the actor feel about having done a job with a machine while sharing his know-how? Is the feeling of pride the same? Should the new skills acquired during this man-machine collaboration be considered in the employee's salary? Can the situation of machine dependency be measured? How do ethics play into the performance of the company?

Therefore, it is clear that there are still many avenues of research in artificial intelligence and its place in the business world. Moreover, they presage a promising future-ready for scientific exploitation.

BIBLIOGRAPHY

- Agrawal, A., Gans, J. S., & Goldfarb, A. (2019). Exploring the impact of artificial Intelligence: Prediction versus judgment. *Information Economics and Policy*, 47, 1-6. <https://doi.org/10.1016/j.infoecopol.2019.05.001>
- Arntz, M., Gregory, T., & Zierahn, U. (2016). *The risk of automation for jobs in OECD countries: A comparative analysis*.
- Autissier, D., & Moutot, J.-M. (2015). *Agile change: Transforming quickly and sustainably*. Dunod.
- Autor, D. H. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation. *Journal of Economic Perspectives*, 29(3), 3-30. <https://doi.org/10.1257/jep.29.3.3>
- Benhamou, S. (2018a). The world of work in 2030: Four Scenarios. *Max Neufeind, Jacqueline O'Reilly and Florian Ranft (2018). Work in the Digital Age: Challenges of the Fourth Industrial Revolution. London/New York, Rowman & Littlefield International, 259-270.*
- Benhamou, S. (2018b, July). What impacts of artificial intelligence on the future of work? *Analysis*, 46-49.
- Bensoussan, A. (2020). What legal regulation for artificial intelligence? *Enjeux Numériques. Human and Artificial Intelligences. What Interactions?* , 12. <http://Annales.org/enjeux-numeriques/2020/en-12-12-20.pdf>
- Bruneault, F., & Laflamme, A. S. (2021). Ethics of artificial intelligence and social ubiquity of information and communication technologies: How to think about the ethical issues of AI in our information societies? *tic&société*, Vol. 15, N° 1 | 1st semester 2021, 159-189. <https://doi.org/10.4000/ticetsociete.5999>
- Cave, S., Coughlan, K., & Dihal, K. (2019). 'Scary Robots': Examining Public Responses to AI. *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society*, 331-337. <https://doi.org/10.1145/3306618.3314232>
- Claverie, B. (2010). *L'homme augmenté-Néotechnologies pour un dépassement du corps et de la pensée* - (L'harmattan).
- Daugherty, P. R., & Wilson, H. J. (2018). *Human+ machine: Reimagining work in the age of AI*. Harvard Business Press.
- De Terssac, G., Soubie, J.-L., & Neveu, J.-P. (1988). Expert systems and transfers of expertise. *Sociologie Du Travail*, 461-477.
- Dejoux, C. (2018). Augmented manager with artificial intelligence? *La Revue Rh & m*, 68, 24-25.
- Dekker, S. W., & Woods, D. D. (2002). MABA-MABA or abracadabra? Progress on human-automation coordination. *Cognition, Technology & Work*, 4(4), 240-244.
- Dignum, V. (2018). Ethics in artificial intelligence: Introduction to the special issue. *Ethics and Information Technology*, 20(1), 1-3. <https://doi.org/10.1007/s10676-018-9450-z>
- Dopico, M., Gómez, A., De la Fuente, D., García, N., Rosillo, R., & Puche, J. (2016). A vision of industry 4.0 from an artificial intelligence point of view. *Proceedings on the International Conference on Artificial Intelligence (ICAI)*, 407.
- Dubet, F. (2019). *Les mutations du travail*.

Ellul, J. (1988). *Le bluff technologique* (Pluriel). <https://www.fayard.fr/pluriel/le-bluff-technologique-9782818502273>

Ferguson, Y. (2019). What artificial intelligence does to humans at work. A sociological tour of a company. In *Les mutations du travail* (pp. 23-42). La Découverte; Cairn.info. <https://doi.org/10.3917/dec.dubet.2019.01.0023>

Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280.

Gamkrelidze, T., Zouinar, M., & Barcellini, F. (2020). Gamkrelidze, T., Zouinar, M. & Barcellini, F. (In press). The old challenges of "new" Artificial Intelligence systems in professional activities. In *Les transformations digitales à l'épreuve de l'activité et des salariés: Comprendre et accompagner les mutations technologiques*.

Giblas, D., Godon, A., Fargeas, M., Duranton, S., Gard, J., Audier, A., & Buffard, P. (2018). *Artificial intelligence and human capital. What challenges for companies*.

Hassani, H., Silva, E. S., Unger, S., TajMazinani, M., & Mac Feely, S. (2020a). Artificial Intelligence (AI) or Intelligence Augmentation (IA): What Is the Future? *AI*, 1(2). <https://doi.org/10.3390/ai1020008>

Hassani, H., Silva, E. S., Unger, S., TajMazinani, M., & Mac Feely, S. (2020b). Artificial Intelligence (AI) or Intelligence Augmentation (IA): What Is the Future? *AI*, 1(2), 143-155. <https://doi.org/10.3390/ai1020008>

Henkel, A. P., Bromuri, S., Iren, D., & Urovi, V. (2020). Half human, half machine - augmenting service employees with AI for interpersonal emotion regulation. *Journal of Service Management*, 31(2), 247-265. <https://doi.org/10.1108/JOSM-05-2019-0160>

Hooker, J., & Kim, T. W. (2019). Ethical Implications of the Fourth Industrial Revolution for Business and Society. In D. M. Wasieleski & J. Weber (Eds.), *Business and Society 360* (Vol. 3, pp. 35-63). Emerald Publishing Limited. <https://doi.org/10.1108/S2514-175920190000003002>

Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organisational decision making. *Business Horizons*, 61(4), 577-586. <https://doi.org/10.1016/j.bushor.2018.03.007>

Lollia, F. (2019). Organising in a hostile environment: The effect of geolocation on organising in a terrorist environment. *Journal of Human Mediatized Interactions/Revue Des Interactions Humaines Médiatisées*, 20(2). <https://doi.org/10.5281/ZENODO.4587093>

Moss Kanter, R. (2011). The change wheel: Elements of systemic change and how to get change rolling. *Harvard Business School Marketing Unit Case*, 312-083.

Parasuraman, R., & Wickens, C. D. (2008). Humans: Still vital after all these years of automation. *Human Factors*, 50(3), 511-520.

Reeves, B., & Nass, C. I. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. CSLI Publications; Cambridge University Press.

Roth, E. M., Bennett, K. B., & Woods, D. D. (1987). Human interaction with an "intelligent" machine. *International Journal of Man-Machine Studies*, 27(5-6), 479-525.

Schweitzer, M. G., & Puig-Verges, N. (2018). Will Developmental Robotics and Artificial Intelligence lead to the emergence of new values for humans? *Annales Médico-psychologiques, revue psychiatrique*, 176(3), 291-295. <https://doi.org/10.1016/j.amp.2018.01.008>

Tata Consultancy Services. (2018). *TCS-IDC study: French companies on the road to AI* (p. 48). <https://www.etude-intelligence-artificielle-tcs.com>

van den Bosch, K., & Bronkhorst, A. (2018). *Human-AI cooperation to benefit military decision making*.

Villani, C., Bonnet, Y., Berthet, C., Levin, F., Schoenauer, M., Cornut, A. C., & Rondepierre, B. (2018). *Making sense of artificial intelligence: For a national and European strategy*. Conseil national du numérique.

Wang, D., Khosla, A., Gargeya, R., Irshad, H., & Beck, A. H. (2016). Deep learning for identifying metastatic breast cancer. *ArXiv Preprint ArXiv:1606.05718*. <https://arxiv.org/pdf/1606.05718.pdf>

Wilson, H. J., Daugherty, P., & Bianzino, N. (2017). The jobs that artificial intelligence will create. *MIT Sloan Management Review*, 58(4), 14.

Yapo, A., & Weiss, J. (2018). *Ethical implications of bias in machine learning*. Proceedings of the 51st Hawaii International Conference on System Sciences.

Zacklad, M. (2018). *Artificial Intelligence: Representations and societal impacts*. 15 pages. <https://halshs.archives-ouvertes.fr/halshs-02937255>

Zouinar, M. (2020). Developments in Artificial Intelligence: What are the challenges for human activity and the Human-Machine relationship at work? *Activities*, 17-1.