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Implications and Impact of AI for the future of work, the economy and innovation



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Implicações e impacto da IA para o futuro do trabalho, economia e inovação

Implications and Impact of AI for the future of work, the economy and innovation

Topics

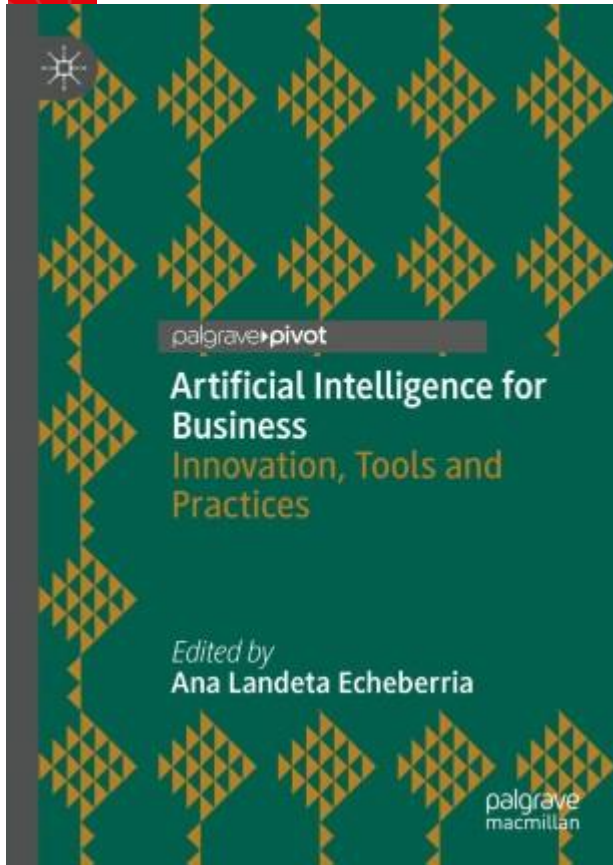
- ▶ Book: *Artificial Intelligence for Business*
- ▶ Business benefits of AI
- ▶ AI and the Economy
- ▶ Economic characteristics of AI
- ▶ AI in the world of work
- ▶ The impact of AI on education
- ▶ The application of AI in Human Resources
- ▶ AI in business: future research agenda

Book

Artificial Intelligence for

Business. Innovation, Tools and Practices

- ▶ This book seeks to build a shared **understanding of Artificial Intelligence (AI) within the global business scenario** today and in the near future. Drawing on academic theory and real-world case studies, it examines **AI's development and application across a number of business contexts.**
- ▶ Taking current scholarship forward in its engagement with AI theory and practice for enterprises and applied research and innovation, it outlines **international practices for the promotion of reliable AI systems**, trends, research and development, fostering a **digital ecosystem for AI** and preparing companies for job transformation and building skills.
- ▶ This book will be of great interest to academics studying Digital Business, Digital Strategy, Innovation Management, and Information Technology.



▶ <https://link.springer.com/book/10.1007/978-3-030-88241-9>

Book (cont.)

Artificial Intelligence for Business

Innovation, Tools and Practices

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[Chapter 2: AI: Methods and Techniques. Knowledge-Based Systems.](#) Authors: David Lizcano, Juan Pazos

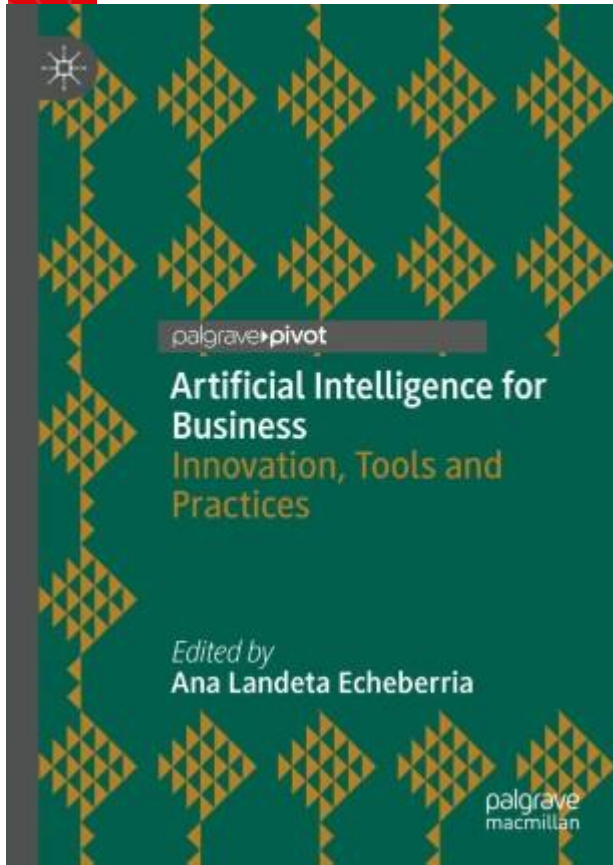
[Chapter 3: The Impact of AI on Business, Economics and Innovation.](#) Author: Ana Landeta

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THE IMPACT OF AI ON BUSINESS, ECONOMICS AND INNOVATION

Business benefits of AI

Some of the ways a company could benefit from AI will be the following ones eUKhost, (2019) :

- ▶ **Improving personalised shopping experiences;** providing customers with personalised marketing increases engagement, helps generate customer loyalty and improves sales. AI is able to provide highly accurate offers to individual customers.
- ▶ **Automating customer interactions;** AI is enabling companies to automate customer interactions communications by intelligent machines that are able to replicate human functions.
- ▶ **Real-time Assistance;** daily communication with high volumes of customers throughout each day. AI to interact, in real-time, to send personalised travel information, such as notice of delays.



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Business benefits of AI *(cont.)*

Some of the ways a company could benefit from AI will be the following ones eUKhost, (2019) :

- ▶ **Data mining;** one of the biggest advantages of using cloud-based AI is that AI apps are able to quickly discover important and relevant findings during the processing of big data. This can provide businesses with previously undiscovered insights that can help give it an advantage in the marketplace.
- ▶ **Operational automation;** AI is able to operate other technologies that increase automation in business.
- ▶ **Predicting outcomes;** AI is able to predict outcomes based on data analysis.
- ▶ **Improve the recruitment process;** AI is now helping businesses automate the recruitment of new employees. It is able to quickly sift through applications, automatically rejecting those, which do not meet the company's personal specification.



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Business benefits of AI *(cont.)*

Rahman, W. (2019) suggests the following **takeaways for Business Leaders**:

- ▶ To use AI effectively in your business, you need **data**, in huge amounts and diverse forms.
- ▶ You'll also need **more computing power and storage** than you've probably needed before, and additional skills to those in your current technology & business teams.
- ▶ As you start to use AI technology, **the more data you get, the more ways you're likely to discover to use it.**
- ▶ And as the ways you could use data & AI increase, so will the **opportunities to make & save money.**
- ▶ But this will go hand-in-hand with increased possibilities to do **inappropriate things with data and AI technology** — inadvertently or consciously.



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Business benefits of AI *(cont.)*

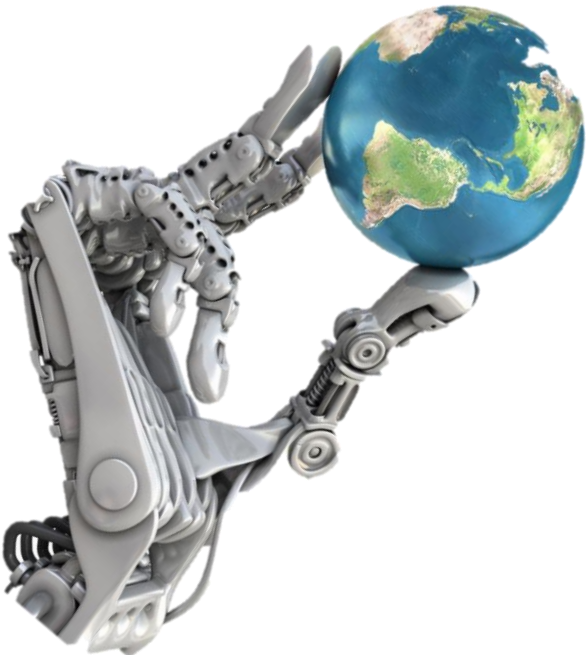
Rahman, W. (2019) suggests the following **takeaways for Business Leaders**:

- ▶ Successful use of AI technology **to improve business is a collective effort**, and as a business leader, you're part of a large team of people that can achieve improvements.
- ▶ But when AI causes problems, the **responsibility** may be less widely shared.
- ▶ As a business leader, you're part of a much smaller group that will determine how an organisation prepares for and **respond to the opportunities and risks around AI in business**.
- ▶ And because regulators and governments typically struggle to keep pace with technology innovations, you may find yourself **facing questions, choices and dilemmas with implications** far beyond your own business.



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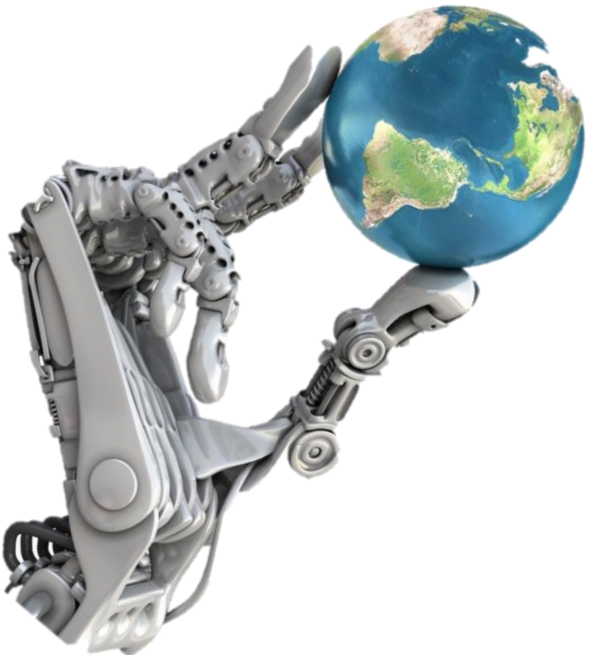
The importance of Machine Learning in business



- ▶ Without a doubt, the importance of Machine Learning (ML) for business is unquestionable, as are their **many applications and foreseeable benefits**, as seen below.
- ▶ In the first place, the design of ML in business as a **catalyst instrument for enhancing business scalability and improving business operations** for companies across the globe. AI tools and numerous ML algorithms have gained tremendous popularity in the business analytics community.
- ▶ ML is **Transforming The Business World in several ways** due to the power of AI to automate the decision making process.

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The importance of Machine Learning in business *(cont.)*



- ▶ Each of these approaches relies upon access to data and powerful computing capacity.
- ▶ **Automating ML:** early adopters of ML are finding ways to automate ML by embedding processes into operational business environments to drive business value.
- ▶ **Real-Time Decision Making:** for businesses today, growth in data volumes and sources.
- ▶ **Driving Business Value:** leaders in ML have been deploying “run-time” decision frameworks for years.

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Business Benefits of Machine Learning

Machine learning in business **helps in enhancing business scalability and improving business operations for companies** across the globe. AI tools and numerous ML **algorithms** have gained tremendous popularity in the **business analytics community**. Factors such as growing volumes, easy availability of data, cheaper and faster computational processing, and affordable data storage have led to a massive ML boom. Therefore, organizations can now benefit by understanding how businesses can use ML and implement the same in their own processes, as (Flatworld Solutions Pvt. Ltd) stated.



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AI and the Economy

Across a variety of statistics - including robotics shipments, AI start-ups, and patent counts -there is evidence of a **large increase in AI-related activity**. We also review recent research in this area that suggests that AI and robotics have **the potential to increase productivity growth but may have mixed effects on labor, particularly in the short run**. In particular, **some occupations and industries** may do well while others experience **labor market** upheaval.

We then consider current and potential policies around AI that may help **to boost productivity growth** while also mitigating any labor market downsides, including evaluating the pros and cons of an AI specific **regulator**, expanded **antitrust enforcement**, and **alternative strategies for dealing with the labor market** impacts of AI, including **universal basic income** and **guaranteed employment**.



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Economic characteristics of AI

In accordance with OECD (2019), from an economic point of view, recent advances in AI either **decrease the cost of prediction or improve the quality of predictions available at the same cost.**

Many aspects of decision making are separate from prediction. However, improved, inexpensive and widely accessible AI prediction could be transformative because prediction is an input into much of human activity. As the cost of **AI prediction has decreased, more opportunities to use prediction have emerged**, as with computers in the past. The first AI applications were long-recognised as prediction problems.



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AI in the world of work



AI presents different **limitations**, the most significant being its own **technical** limitations, together with **the possible reticence of consumers to their use** (including the safety problems created by robots inside factories), **the legal vacuums that still exist and which stand in the way of their implementation**, or the **moral debates** around the different responsibilities with regard to possible failures of the systems.

AI can also lead to an **increase in the precariousness of certain jobs**, by limiting their tasks, making it necessary to implement **codes of conduct for the protection of human beings from robots**.

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AI in the world of work *(cont.)*



In general, the studies analysed coincide in indicating that **the development of AI and robotics will have consequences**, both direct and indirect, especially with regard to **the contents of jobs**, which will tend to become less routine, while requiring more specialised technological knowledge.

Because robotisation may mean shrinking demand for workers, especially those who perform routine tasks which can easily and rapidly be mechanised, but also an **increase in qualified workers**, especially those which require certain creativity or personal or interpersonal skills.

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The new ways of working

- ▶ The new digital scenario has generated **numerous changes in the internal organisation of work**, rendering many jobs obsolete and therefore destined to disappear, while at the same time others are appearing, requiring new skills and aptitudes.
- ▶ The specific characteristics of those new forms of work, technological innovation and competence alter **the work methods**, leading to less direct contact with the company, which could give rise to changes in work procedures: it will be necessary to redefine who the result is to be reported to, how, how often, the types of communication, the frequency and times of meetings, training, etc.
- ▶ Digitalisation has also had an impact on **the automation of some tasks**, especially administrative tasks, some of which are now done by the customers themselves (filling in forms, withdrawing money, bookings, etc.).



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Teleworking

Teleworking is not suitable for all kinds of work; it is only possible for those tasks, which can be done through technological means. **The implementation of teleworking in the organisation not only means working from home, it also makes it necessary to redefine some of the elements of that work, such as:**



- ▶ **Time:** determining the working hours and the length of the workday, holidays, days off, leave and times of reversibility.
- ▶ **Space:** establishment of the workplace where the task will be done, which must meet certain minimum conditions in order to ensure the effective prevention of occupational hazards and adequate health and safety conditions.
- ▶ **Remuneration:** determining which costs and expenses will be borne by the company and which by the workers, while at the same time it will be necessary to review the complements deriving from work at home.
- ▶ **Work conditions:** health and safety in the workplace.
- ▶ **Work tools:** ownership and maintenance of the work equipment, insurance, and the confidentiality and security of data.
- ▶ **Work methods and training.** Company control.

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Work on digital platforms

The example of digital platforms perfectly fulfils that new reality: **their algorithms control and monitor the workers, assess their performance, while offering workers the opportunity to work from any place, at any time and in any job which is suited to them.** In the words of Tirole, J. (2017-443), on digital platforms “everyone is a winner”.

In particular, digital work platforms **are opening up opportunities**, which previously did not exist, **especially for women, young people, people with disabilities and marginalised groups** throughout the world.

With digital platforms, **it becomes possible to divide the work into micro-tasks** (short individual tasks), which means contracts for the exact time and the specific duration of the service, and for minimum remuneration.



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The impact of AI on Education

The Education System must not only **incorporate technological subjects**, it must also include **subjects which make it possible to develop skills which cannot be automated** and which will be those sought after by companies in their recruitment processes, which may include the following (Magro *et al* 2018):

- ▶ **Digital knowledge:** making your way, personally and professionally, in the digital economy.
- ▶ **Management of information:** seeking, obtaining, evaluating, organising and sharing information in digital contexts.
- ▶ **Digital communication:** communicating, interacting and collaborating efficiently with tools and in digital environments.

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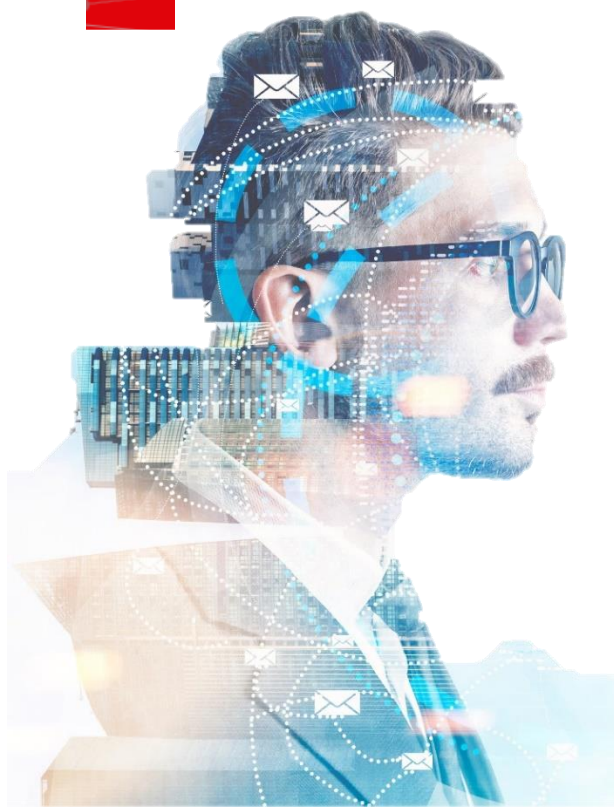
The impact of AI on education *(cont.)*

- ▶ **Online working:** working, collaborating and cooperating in digital environments.
- ▶ **Continuous learning:** managing learning autonomously, knowing and using digital resources, maintaining and participating in learning communities.
- ▶ **Strategic vision:** understanding the digital phenomenon and incorporating it into the strategic orientation of the organisation's projects.
- ▶ **Online leadership:** directing and coordinating distributed work teams online and in digital environments.
- ▶ **Customer focus:** listening, understanding, knowing how to interact with and meet the needs of the new customers in digital contexts.



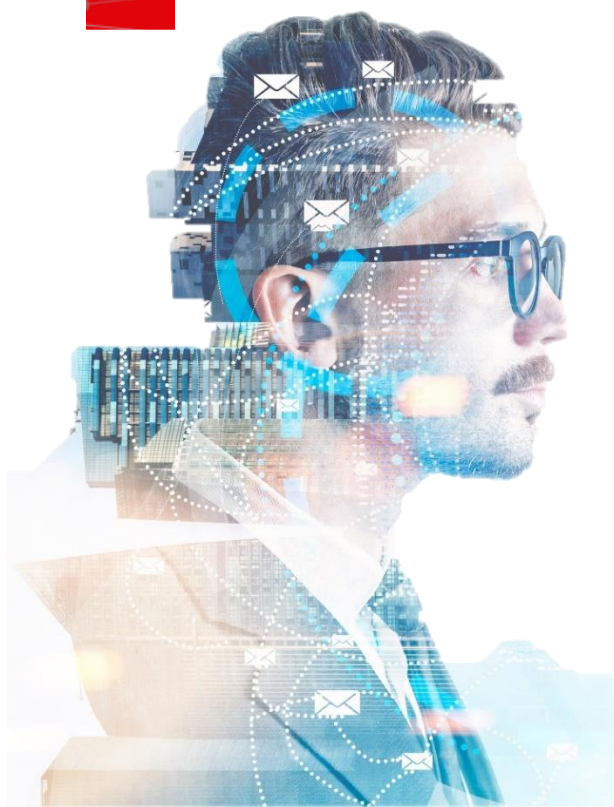
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The application of AI in Human Resources

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- ▶ **Improving performance.** AI is very useful in any company department, which works with data and where decisions are based on objective analyses. Thanks to its application, it is possible to improve the organisation of work in accordance with the performance of the workforce.
 - ▶ **Analysing absenteeism.** Thanks to analysis of the information related to worker absences, it is possible to predict when absenteeism from work is more frequent, in order to both mitigate its effects and develop and implement an improvement plan.
 - ▶ **Retaining talent.** Algorithms also play a part in determining the characteristics of high-performance teams, which employees have the greatest leadership capabilities, or which ones are most likely to leave the organisation.

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The application of AI in Human Resources *(cont.)*

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- ▶ **Company selection and recruitment processes.** AI can be applied to selection tests in order to identify those candidates who meet the established requirements and who are likely to perform best within the organisation. It is based on pre-established patterns and the behaviour of the candidates during the tests, reducing the relative importance of the person's CV.
 - ▶ **Designing training plans.** Equipping employees with new skills is essential for both their personal development and that of the company. Knowing how frequently training initiatives are carried out and what their results are helps in planning in accordance with the needs of the company, and also to ensure that it is an incentive.

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AI in business: future research agenda



Research questions in the following **Business Domains**:

- ▶ Strategy
- ▶ Relationship Marketing
- ▶ Customer acceptance
- ▶ Social acceptance
- ▶ Management
- ▶ Workforce
- ▶ Transhumanism

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AI in business: future research agenda *(cont.)*

Business Domain: Strategy

Research Questions:

- ▶ How to design human–machine integrated service strategies?
- ▶ How to create original, unique goods with AI applications?
- ▶ How to identify consumer preferences for human or machine services?
- ▶ How to streamline processes for human and machine service providers?
- ▶ How hard is to duplicate competitive advantages based on robots and automated systems?
- ▶ How robots and automated systems depreciate over time and what kind of investment is required to keep the pace of innovation under an AI-led business environment?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



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AI in business: future research agenda *(cont.)*

Business Domain: Relationship Marketing

Research Questions:

- ▶ How will cognitive and emotional-social complexity dimensions influence robot design?
- ▶ Which relationship marketing capabilities should be programmed in service robot?
- ▶ How will the engagement process evolve between humans and AI-enabled machines? And, what about enabled-AI Robot-to-Robot engagement?
- ▶ How can robots and automated systems based on AI empower consumers with disabilities to go beyond their cognitive and physical limitations?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



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AI in business: future research agenda *(cont.)*

Business Domain: Servicescape

Research Questions:

- ▶ How can service robots be effectively integrated into the servicescape?
- ▶ How will the new servicescape look like in a robot dominated service environment?
- ▶ What will be the core dimensions of servicescape in the service robots?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



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AI in business: future research agenda *(cont.)*

Business Domain: Customer acceptance

Research Questions:

- ▶ Beyond the physical and virtual nature of service objects, what drives customer preference for physical or virtual robots?
- ▶ How can the more cost-effective virtual robots (e.g. holograms rather than physical robots at information counters) be designed to achieve greater consumer acceptance?
- ▶ Which consumer and context factors determine the optimal level of humanoid appearance and social skills for service robots?
- ▶ How robot gender and personality will impact consumer responses to service robots?
- ▶ Which service and industry characteristics will potentially moderate the impacts of determinants of customer acceptance of service robots?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



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AI in business: future research agenda *(cont.)*

Business Domain: Social acceptance

Research Questions:

- ▶ How can employees deal with working alongside humanoid robots that can operate for extended periods without human intervention (making their own decisions and acting independently)?
- ▶ How can humans deal with autonomous systems in social environments?
- ▶ Can humanoid robots be accepted to be part of social events (professional or not) as any human?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



THE IMPACT OF AI ON BUSINESS, ECONOMICS AND INNOVATION

AI in business: future research agenda *(cont.)*

Business Domain: Management

Research Questions:

- ▶ How should organizations manage and implement AI systems in their organizations?
- ▶ How should organizations stimulate employees to use such systems?
- ▶ How can we re-train workers for intuitive and empathetic skills to remain employable?
- ▶ How can we educate students for intuitive and empathetic skills to remain employable in an AI-led business environment?
- ▶ How can organizations improve knowledge creation with automation using generative models of deep learning?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



THE IMPACT OF AI ON BUSINESS, ECONOMICS AND INNOVATION

AI in business: future research agenda *(cont.)*

Business Domain: Workforce

Research Questions:

- ▶ How can we engage stakeholders to develop new product/experiences embracing BCI and DBS technologies?
- ▶ How can we engage employees in the application of transhumanistic technologies to improve job performance?
- ▶ What is the impact for the company of recruiting employees with BCI and DBS technologies?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)



THE IMPACT OF AI ON BUSINESS, ECONOMICS AND INNOVATION

AI in business: future research agenda *(cont.)*

Business Domain: Transhumanism

Research Questions:

- ▶ How to connect humans and/or AI-enabled machines for collective intelligence?
- ▶ How may transhumanistic technologies enhance human well-being?
- ▶ How citizens/consumers/employees who decide not to use BCI and DBS technologies will interact with those who do?

(Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I., 2020)





Muito grato pelo convite e pela atenção



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