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Challenges and Opportunities of Artificial Intelligence Regarding Rapid Technological Change

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Abstract

Artificial Intelligence (AI) attempts to replicate human traits/capabilities through the development of computer systems, capable of performing tasks/functions that would otherwise require human intervention. There has been a tremendous increase in the use of this tool and no sign that this will change, in the near future. The purpose of this study is to analyse the challenges and opportunities of AI regarding rapid technological change. Therefore, a survey was created (143 participants) based on this theme, focusing on different perspectives by gender and nationality. Chi-square tests were performed, and through the results we concluded that there is an apparent association between gender and being informed about AI. Further support exists for the null hypothesis that there is no association between gender and being against AI. Additionally, we concluded that Portuguese, Spanish, and Italian individuals, in general, align with their perception of technological change and development (the Portuguese perhaps being humbler). Finally, more in-depth research is warranted in the AI era on whether the female gender will perhaps continue to be victim of a lack of self-confidence in the work environment and possibly feeling the "impostor syndrome".

Keywords: Artificial Intelligence, dynamic capability theory, ethical boundaries, chi-square test.

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1. Introduction

This study explores the challenges and opportunities presented by Artificial Intelligence (AI) amidst the rapid technological development of today. AI is currently becoming a significant part of people's lives, work, and various sectors in which numerous companies are inserted. Industries, organisations and individuals are increasingly more dependent on AI, as it executes certain tasks progressively quicker and more efficiently than humans. Therefore, it is crucial, as technology advances, to understand the challenges and opportunities of AI, to better comprehend and prepare for a more AI dependent future.

For example, students alert to the [excessive] usage of AI in course assignments by colleagues and encourage teachers to control for this usage. A solution is the implementation of ZeroGPT to check just how much AI was used in the writing of an assignment (a percentage is given by the application). All assignments should provide an audit trail (a best practice) showing how AI was used in a project.

The study is divided into six parts. A literature review where topics such as Dynamic Capability Theory, AI in an organisational environment, and AI as a tool for research are explored. The following section contains the methodology. It articulates how both the study, and a survey were made by the authors, in terms of reasoning and rationale. The succeeding section consists of the results, where the data derived from the conducted survey is presented and rigorously analysed through Cronbach's Alpha Coefficient and Chi-square tests. The subsequent section comprises the discussion, which contains the following subtopics: Are males more aware and informed of AI than females? Or are females more perfectionist concerning what is considered being aware and informed? Is there a cultural alignment between Portuguese, Spanish, and Italian individuals on their perception of technological change and development? Technology as a modern lifestyle facilitator; Artificial Intelligence's future implications in society, the workplace, data security/collection, and politics.

The study, which discusses various topics, has the potential to enrich the reader's understanding of the theme at hand. Given the amount of information and data in the article, it is likely to provide significant insight into knowledge about AI, and the challenges and opportunities of this technology, in both the present and the future.

2. Literature review

2.1. Dynamic capability theory

While a variety of definitions of the term dynamic capability have been suggested, this study will use the definition first suggested by Teece et al. (1997). The author saw it as a framework to analyse the sources and methods of wealth creation and capture by private enterprise firms operating in environments of rapid technological change. According to Teece, dynamic capability theory is used in an attempt to provide a structure on how or why decision makers decide when there is a deep uncertainty to wager, or speculate, about the future. As aforementioned, it is the ability to manage an organisation and the environment, in addition to structuring the organisation, in the midst of ongoing change. This theory can be distinguished as operational skills that are currently involved in operating procedures in an organisation (Teece et al., 1997). According to Helfat et al. (2007), however, dynamic capability mentions "the capacity of an organisation to purposefully create, extend, or modify its resource base".

Three dynamic capabilities are necessary in order to meet new challenges. Organisations and their employees need the capability to learn quickly and to build strategic assets. New strategic assets such as capability, technology and customer feedback have to be integrated within the company. Existing strategic assets have to be transformed or reconfigured (Teece et al., 2007). For analytical purposes, Teece (2007) indicated that a dynamic capability can be enacted as the aptitude to "(1) sense and shape opportunities and threats, (2) seize opportunities, and (3) sustain competitiveness by improving, combining, protecting, and, when necessary, reconfiguring the business enterprise's resources" (Vu, 2020). To further explain the three capabilities: sensing - means identifying and assessing opportunities outside your company; seizing - refers to mobilising your resources to capture value from those opportunities; and transforming - by constantly renewing those assets (Kleiner, 2013). As previously mentioned, it can also be seen as spotting the capability of an organisation to explore and scan opportunities throughout markets and technologies (Teece et al., 2007). The definitions reflect a means to transform investment in research and development studies into new opportunities.

For a better understanding, Kleiner (2013) provides the strategic example of Nokia and compares it to Apple. Nokia missed the smartphone revolution because the company was not well equipped for sensing, especially compared to Apple, which was embedded in the milieu that was breeding the next generation of smartphones. Steve Jobs sensed what customers wanted, and he also knew what technologists were doing. Step by step, he built the capabilities that Apple needed. For example, to make the iPod work, Apple developed capabilities in digital rights management and handheld device design.

2.2. Rapid technological change in modern society

Rapid technological change involves, particularly, Artificial Intelligence, the Internet, machine learning, robotics, nanotechnology, biotechnology, renewable technology and 3D printing (UNCTAD, 2019). At present, some organisations are finding themselves endangered by this rapid technological development, while other corporations are compelled to embrace the changes of new technologies and business models to join the technological revolution (Hamdani et al., 2018). This is evidence that big tech companies are growing vigorously year after year, jeopardising many other industries in the market.

As pointed out previously, this phenomenon of technological development has been witnessed for the last few decades, derived by the possibility to collect and process a vast amount of data at exceptional speed, incorporating the use of artificial intelligence (AI) for better and smarter decision making (Hamdani et al., 2018). This is especially visible since data knowledge has come to be public domain knowledge. This substantial change is incorporated by big corporations for the reason exemplified in a report by Hamdani et al. (2018).

Modern society as we know it today, is full of big and constant technological changes. Companies, in order to keep up with these changes, have had to adapt and evolve to ensure ongoing growth and success. As a result, due to these rapid changes, certain technologies have assisted organisations to better understand their own consumers, and in some cases, to stand out from their competition (Cascio & Montealegre, 2016).

Decision making is one of the most important aspects of a company, and with the help of AI, the decision-making process has completely changed in many ways (Stone et al., 2020). Ethical considerations of researchers about this topic can vary, but it is difficult to deny the implications of AI when it comes to data analysis (Nassar & Kamal, 2021). Not only is analysing data an important activity to optimise processes and increase the overall efficiency of a business but analysing the different types of data in analytic data platforms is a crucial and essential way of gaining invaluable insights into consumer behaviour (Khade, 2016). This transformation can guarantee a more informed and better decision-making process and allow companies to adapt to the various markets and satisfy the different needs of their existing and future customers.

2.3 Artificial intelligence (AI)

2.3.1 Impact and applications in organisations

Organisations have been increasing their diversity in conversational agents, namely chatbots, as an innovative approach of interaction with customers. The implementation of AI as a connection between companies and consumers is present in websites, social media, and instant messaging apps (Jiang et al., 2022). A chatbot can be defined as a combination of "a program" (Kshetri, 2021) with "artificial intelligence" (Kshetri, 2021), with the purpose of helping automate customer service through interactions with humans. AI technology can be given the means to carry out interactions resorting to natural language, a conversational tone, and social cues (especially if it possesses a voice system as one of its features). The accurate replication of human traits can be achieved by chatbots through machine learning techniques and innovative algorithms (Nguyen et al., 2023).

AI has an extremely wide range of applications, having the power to affect most existing industries, possibly even reshaping several. This spectrum includes how companies' employees are affected by the technology, since an increased use and development of AI will increase the demand for highly skilled workers (Xu et al., 2023). According to Lakhani (2023), "AI won't replace humans - but humans with AI will replace humans without AI". A positive correlation between AI-savvy employees and their income growth can also be verified as AI is progressively implemented in functions and projects (Xu et al., 2023). Furthermore, despite the predictions that advances in this technology will replace many jobs, the growth in labour demand on certain organisational functions, such as accounting, finance, social information, and healthcare consultation is increasing. This phenomenon arises from the stimulating effect of AI on creativity, derived from the relationship between human and machine (Weiguo et al., 2020).

2.3.2 An innovative tool for research purposes

The usage of AI chatbots in research has increased in recent years. They can collaborate, communicate, and automate tasks, such as data tracking, mining and analysis. By processing information in a fast and accurate manner, AI provides researchers in multiple fields with the means to increase informed decision-making and facilitate pattern recognition in data sets. For instance, AI can identify a multitude of treatments and correlations in healthcare, through patient data analysis. Furthermore, by making use of this technology, economists are provided with forecasting models and swifter financial data examination (Cain et al., 2023). Moreover, AI is also integrated in disaster damage assessment, as a means of accelerating "aid responses and reconstruction efforts" (Hanson et al., 2023).

AI deep learning models' applications in academic research have also broadened. Deep learning models can be defined as "language models created to produce responses to textual stimuli that are indistinguishable from those produced by a human". By implementing AI within qualitative research, researchers are able to obtain aid in theme and content analyses, literature review

information filtering, and "conceptualization purposes". Originally costly in both time and resources, the previously mentioned research work can now be efficiently carried out with the help of this technology. AI is able to summarise large amounts of data and generate research questions based on processed information originating from both text and images (Christou, 2023). In addition to qualitative research, quantitative research can also be enhanced by resorting to statistical and simulation-oriented AI-based tools. They are capable of not only writing necessary code for statistical analysis using specific software, but also of conducting simulations and tests on delicate and complicated procedures (Esplugas, 2023).

2.3.3. The need for AI regulations and control

AI systems are evolving so fast that a call for a 6-month long pause appeared in order "to give AI companies and regulators time to formulate safeguards to protect society from potential risks of the technology". While AI is inarguably a tremendously useful tool, it poses many unregulated risks due to its rapid advancement that caught many off-guard. An open letter addressing this issue lists many concerns, among which are privacy issues and data protection, the spread of misinformation, and especially the development of "non-human minds that might eventually outnumber, outsmart, obsolete, and replace us", thus risking losing control of our civilization (Clarke, 2023).

An AI (or a chatbot) must first be trained on data. If this data is not diverse enough, or is rather biased, the results or decisions made by that AI will reflect the biases in the data, and perhaps even the biases of their creators. For instance, a chatbot assisting in the hiring process may be biased against certain groups of people or provide misinformation to a student in need of content. Furthermore, we do not understand how exactly these systems make decisions. Such a lack of transparency makes it difficult for researchers, for example, to trust the results of work done or assisted by AI and reproduce its findings. Lack of process means that they cannot make decisions or judge a situation in the same way a human can – they cannot make decisions independently. As such, AI cannot be held accountable, yet the increasing reliance on chatbots in organisations, academia, and by the general population alike raises concerns about the responsibility for the outcomes of these decisions (Cain et al., 2023). Some hypothesise that we may be re-inventing slavery that allows a clear conscience as we do not (yet) officially consider AI an autonomous being (Letheren et al., 2020). We wonder if an AI system could be a responsible actor of their actions instead of the human using the AI (Chia et al., 2023). Currently, AI is extremely unregulated and has potential for misuse by governments, corporations, and malicious individuals in order to control, manipulate, and restrict access to information (Cain et al., 2023). Even if harm is not intentional, organisations must keep in mind the unintended consequences of poorly programmed or designed AI (Letheren et al., 2020). Privacy, and especially breach of privacy and data, is also an emerging concern. Critics worry that the data used to train AI models might enable the technology to reproduce identifiable information or be tricked into revealing or collecting such information (Clarke, 2023). Moreover, hackers can take advantage of the power of AI to develop more advanced cyberattacks, hence getting around security measures, to exploit weaknesses in systems (Marr, 2023).

2.3.4. Artificial intelligence advertising and education: opportunities and threats

AI assistance has a vast potential in advertising. Artificial Intelligence is capable of analysing, interpreting, and creating vast amounts of data. While that introduces many potential promises, it also plagues us with potential perils. Personalised advertisements, tailored to each customer by collecting and processing their data, allow for more variation than ever before. However, such a number of advertising campaigns would be difficult to monitor and track. Major brands typically hold relatively homogenous associations among the wider public, but that associated brand meaning could now splinter. Consistency would be threatened by dozens or even thousands of different advertisement versions that come with personalisation (Campbell et al., 2022).

In the face of increasingly competent automation, many jobs would be (and are already) in danger of becoming obsolete (Letheren et al., 2020). In the US, AI contributed to nearly 4,000 job losses in May 2023, according to data from Challenger, Gray & Christmas. This can be explained by the intensification of interest in performing advanced organizational tasks and lightening workloads (Napolitano, 2023). Human workers may be displaced in fields like data analysis and research assistance (Cain et al., 2023). Because of the increased variety of advertisements, being creative may become more challenging. Creative teams might see a shift toward engineering and technical employees, therefore creative roles may become industrialised. Furthermore, the brands may turn toward personal decoders and virtual brand ambassadors instead of macro-celebrities, even going as far as using macro-celebrities' "deepfakes" instead (Campbell et al., 2022). Deepfakes can already cause significant damage, and the potential for harm could increase as technology evolves. For example, fake footage of a company CEO sharing unsavoury political ideologies via social media could seriously damage the company's reputation (Letheren et al., 2020). Regarding costs, while these could be greatly reduced by shrinking the advertising teams, they would soar in sight of new expenses of digital security and monitoring fake content from potential brand attacks or content thieves (which could be more easily engineered with the help of AI), and the need for increased server power in order to track more data for personalised advertising (Campbell et al., 2022).

Consumers experiencing disadvantages stemming from their finances, age, education, gender identity, race etc., may be excluded from fully taking part in an AI future – either because human agents would be unavailable to them, or because they would not be able to afford or use the technology to access AI (Letheren et al., 2020). Furthermore, AI has potential for errors or misinterpretations because they need more context or human help, which could lead to customer dissatisfaction, sense of alienation and disconnection. AI and chatbots are not human and cannot offer the same empathy and personal connection that human interaction can provide. Chatbots can be perceived as impersonal, leading to a lack of customer trust and loyalty (Cain et al., 2023).

Chatbots have a potential to be used in education as a supplement to traditional teaching methods. Unfortunately, they cannot provide the same level of support and guidance as human teachers. Additionally, they could malfunction or provide incorrect information, which could cause confusion and frustration for students. Moreover, it can negatively impact academic learning outcomes and decision-making. AI is often misused in order to complete assignments or take online exams in place of students. Another example of academic misconduct is plagiarism, such as copying text from online sources without proper attribution and using AI-powered writing assistants to rewrite text in an attempt to pass it off as a student's own work. Students no longer need to create original content, which can negatively affect their vocabulary development, among other educational aspects. Unnatural language prompts can negatively impact students' language evolution (Cain et al., 2023).

A set of clear ethical guidelines and standards for AI usage is desperately needed. Researchers, marketers, and others must receive education and/or training on ethical use of Artificial Intelligence and chatbots. Systems that detect and prevent unethical AI usage should be developed (Cain et al. 2023). We must keep in mind that actions have consequences in the world, and that AI reflects those actions (Letheren et al., 2020).

3. Methodology

We began our study by defining its theme. After a thorough literature review based on the methodology proposed by Remenyi (2013), we decided to explore the challenges and opportunities of Artificial Intelligence (AI), in the dynamic capability theory frame (in the current era of rapid technological change). Furthermore, how do people, as individuals and consumers, and organisations, as suppliers of products/services, perceive AI as a tool and a provider of value, or as a threat?

We conducted our research (from November 1, 2023, to November 15, 2023) through the Scopus and EBSCO databases, in order to find relevant documents for our study. The following search words and abbreviations were used in connection with the Boolean operators “AND”; “OR”: “Dynamic capability theory”, “Rapid technological change”, “Artificial Intelligence”, “AI”, “customers”, “consumers”, “dangers”, “threats”, “opportunities”, “research”. After sorting the documents, articles, books and conferences deemed as important for our work, we selected a total of 12 academic articles.

For further exploration of the subject, quantitative research (Saunders et al., 2019) was deemed necessary. Therefore, we created a survey, placed online in late 2023, through which 143 answers were collected. This quantitative data will support or refute the following hypotheses.

H0 (null hypothesis): There is no association between gender and being informed about AI.
H1 (alternate hypothesis): There is an association between gender and being informed about AI.
H2 (null hypothesis): There is no association between gender and being against AI.
H3 (alternate hypothesis): There is an association between gender and being against AI.

In addition, we wish to answer: Do Portuguese, Spanish, and Italian individuals align with their perception of technological change and development?

To reach a wider audience, we shared it through social media (a convenience sample - which is very popular in exploratory studies in business - though they warrant future more in-depth research (Bryman and Bell, 2015). Our survey consisted of twenty-two questions that firstly characterised respondents by demographic variables. Subsequently, they were inquired about their perspective and awareness of Artificial Intelligence, and how it affected them. In addition, they were asked how many electronic devices they use daily, and their level of dependence on them. Furthermore, we inquired the respondents on their stance regarding rapid and frequent technological changes. Lastly, they were asked about their perception on the main drivers behind technological development, in both the recent past and future, from an organisational standpoint. This survey was available for all types of users, in order to obtain a broader perspective.

In the next section we will analyse the answers to the survey, and a chi-square test (test of independence or of association) will also be performed (inferential statistics, where we infer knowledge from a sample - to see if statistically significant relationships exist) (Saunders & Cooper, 1993).

4. Results

4.1. Characterisation of the Sample

Regarding gender distribution, 49.7% of our survey participants identify as female, while 48.2% identify as male, and 2.1% as other. Their age range spans from 18 to 27 or more years old, with a notable concentration in the Generation Z demographic, primarily falling between 18 and 24 years old (Figure 1).

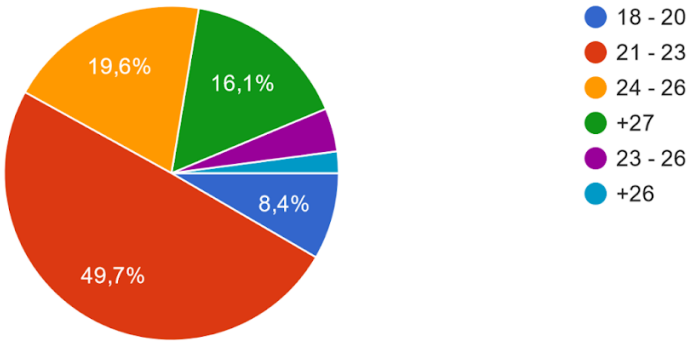

Figure 1 – Respondents by age

Source: Created by the authors

In addition, 30.1% of our respondents are Italian, and 25.9% are Portuguese, with the two nationalities combined accounting for most participants. Nonetheless, there are also respondents from Spain, Timor, Germany, France, Slovenia, Poland, Croatia, Turkey, Brazil, Indonesia, Austria, Hungary, Angola, Canada, the U.S.A, Romania, Panama, Mexico, the Netherlands, Belgium, Sweden and Lithuania. Concerning level of education, our sample ranges from High School to PhD. However, most of our respondents hold bachelor's degrees, as shown in Figure 2.

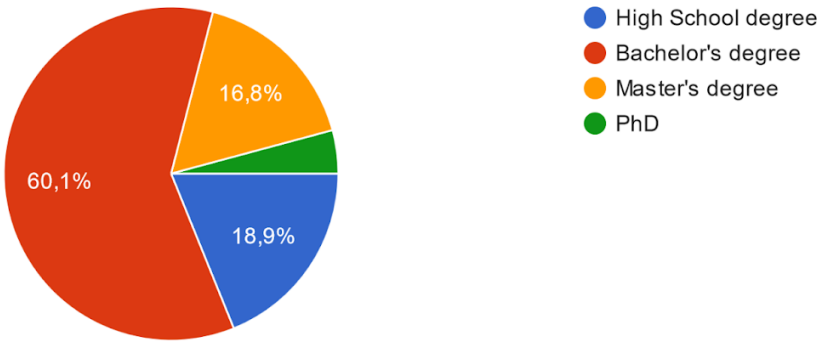

Figure 2 – Respondents by level of education

Source: Created by the authors

Furthermore, the large majority of respondents (84.6%) is currently enrolled in a university (Figure 3).

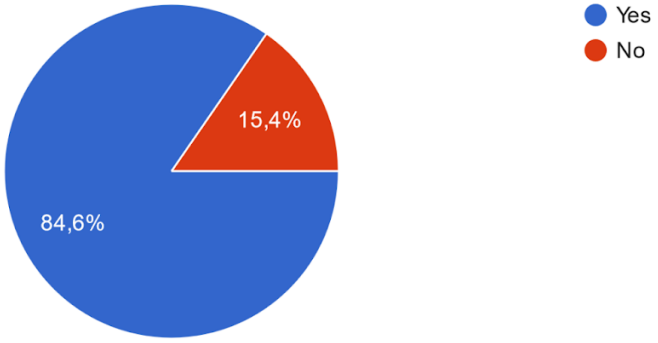

Figure 3 – Respondents by current university enrolment status

Source: Created by the authors

Moreover, 65% of our sample consists of individuals who are currently students as a sole occupation. The remaining 35% stated being a working student, an employee, a manager, a lecturer, a freelancer, a teacher, an administrator, unemployed, or retired, as displayed in Figure 4.

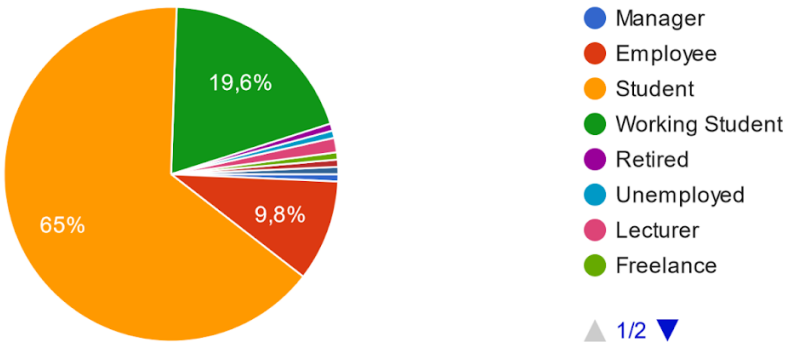

Figure 4 – Respondents by current occupation

Source: Created by the authors

Lastly, concerning both the respondents' current and future work fields, most responses pointed towards engineering (26.6%) and management (24.5%). Education and economics follow, comprising 10.5% and 8.4% of the responses, respectively. Furthermore, the remaining answers are very diverse, as shown in Figure 5.

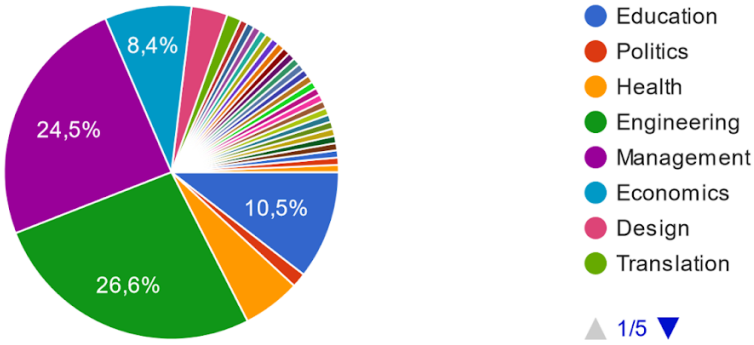

Figure 5 – Respondents by current and future work field

Source: Created by the authors

4.2. Cronbach's Alpha

An internal consistency analysis using Cronbach's Alpha Coefficient was conducted. This method measures the average correlation between questions and has, as an expected result, a value above 0.7 and below 0.9 (Da Hora et al., 2010).

The obtained alpha value considering all the Likert scale questions of the survey (7) was: (0.374). Furthermore, after removing the items with the lowest correlation value, the maximum alpha value achieved was (0.659), as shown in Table 1.

Table 1 – Cronbach's Alpha results

Consistency Statistics	
Cronbach's Alpha	**Number of Items**
0.374	7
0.659	3

Source: Created by the authors

The applicability of this method contemplates several assumptions to be considered valid, e.g. *"the survey must be applied to a significant and heterogeneous sample: When designing a questionnaire for experts, reliability cannot be internally gauged, because it is implied that experts tend to rather have the same opinion on the subject under discussion, decreasing the total variability of the survey and thus decreasing the alpha"* (Da Hora et al., 2010, p. 6).

The sample can be characterised by a predominance of Southern Europeans, who share many cultural aspects and values. In addition, most of the participants are a part of the same age group, Generation Z, which had an early exposure to technological devices. Thus, a very large percentage of our respondents is on a similar wavelength regarding the theme, decreasing the variability of the answers obtained, and consequently the Cronbach Alpha Coefficient.

4.3. Chi-Square test analyses

Only three survey respondents identified their gender as "other". Therefore, it was deemed necessary to exclude these participants when performing the chi-square tests (143-3=140), so as to maintain the data's statistical relevance. The prerequisites for the chi-square test were met albeit for a 2x2 contingency table the continuity correction had to be used. Table 2 summarizes the chi-square test results ("a negative value of Phi indicates that the variables are inversely related, or when one variable increases, the other decreases").

Table 2 – Chi-square results

Problem / Chi-square tests	**Continuity correction**	**Phi (2x2 table)**
Gender and being aware and informed about Artificial Intelligence and its applications.	0.006	-0.249
Gender and being against the use of Artificial Intelligence or similar tools.	0.480	N/A

Source: Created by the authors

The first chi-square test shows that males are apparently more aware and informed about Artificial Intelligence and its applications as compared to females. We concluded that there is an apparent association between an individual's gender and their awareness and knowledge regarding AI (see Tables 3, 4 and 5). Continuity correction p-value 0,006 < 0,05. This statistically significant association between the variables provides support for hypothesis 1 (H1).

*Table 3 – Cross-tabulation – What is your gender? * 3) I am very aware and informed about artificial intelligence and its applications*

			3) I am very aware and informed about artificial intelligence and its applications		
			Agree	Disagree	Total
What is your gender?	Female	Count	36	33	69
		Expected count	44.4	24.6	69
	Male	Count	54	17	71
		Expected count	45.6	25.4	71
Total		Count	90	50	140
		Expected count	90	50	140

Source: Created by the authors

Table 4 - Chi-square test - What is your gender? * 3) I am very aware and informed about artificial intelligence and its applications

	Value	**Degrees of freedom (df)**	**Asymptotic significance (Bilateral)**
Pearson Chi-square	8.693[a]	1	0.003
Continuity Correction[b]	7.684	1	0.006
Nº valid cases	140		

a. 0 cells (0%) expect a count less than 5. The minimum expected count is 24.64.

b. Computed only for a 2x2 table.

Source: Created by the authors

Table 5 - Symmetric measures - What is your gender? * 3) I am very aware and informed about Artificial Intelligence and its applications

	Value	Approximate significance
Phi (2x2 table)	-0.249	0.003
Nº of valid cases	140	

Source: Created by the authors

However, the second chi-square test shows that gender is independent of being for or against the use of Artificial Intelligence or similar tools. Continuity correction p-value 0,480 > 0,05. Therefore, there is apparently no statistically significant association between the variables (see Tables 6 and 7). Most of the survey respondents (73.6% approximately, excluding the three respondents who identified as "other" gender-wise) supports the usage of AI technology. This demonstrates that regardless of being male or female, most respondents support AI usage, providing support for hypothesis 2 (H2).

Table 6 – Cross-tabulation - What is your gender? * 1) I am against the use of Artificial Intelligence or similar tools

			1) I am against the use of artificial intelligence or similar tools		
			Agree	Disagree	Total
What is your gender?	Female	Count	17	52	69
		Expected count	14.8	54.2	69
	Male	Count	13	58	71
		Expected count	15.2	55.8	71
Total		Count	30	110	140
		Expected count	30	110	140

Source: Created by the authors

Table 7 – Chi-square test - What is your gender? * 1) I am against the use of artificial intelligence or similar tools

	Value	Degrees of freedom (df)	Asymptotic significance (Bilateral)
Pearson Chi-square	0.832[a]	1	0.362
Continuity Correction[b]	0.499	1	0.480
Nº valid cases	140		

a. 0 cells (0%) expect a count less than 5. The minimum expected count is 14.79.

b. Computed only for a 2x2 table.

Source: Created by the authors

4.4. Analysis of the survey results regarding the alignment in respect of technological change and development

In addition to the previous hypotheses, we intend to answer the question of whether or not Portuguese, Spanish, and Italian individuals align regarding their perception of technological change and development. Thus, we will analyse the survey questions and respective results that allow for a response to the additional question. This includes Questions "Technology - 1)", "Technology - 2)" and "Technology - 3)". Furthermore, the questions addressing both the sample's nationality and age range, previously shown (see 4.1 Characterisation of the sample), will be used as evidence in the statistics.

Question "Technology - 1)" inquires respondents on whether they are very informed and aware of the rapid technology change trend (see Figure 6). Approximately 83.7% of the Italians, 81.1% of the Portuguese, and 87.5% of the Spanish responded in agreement.

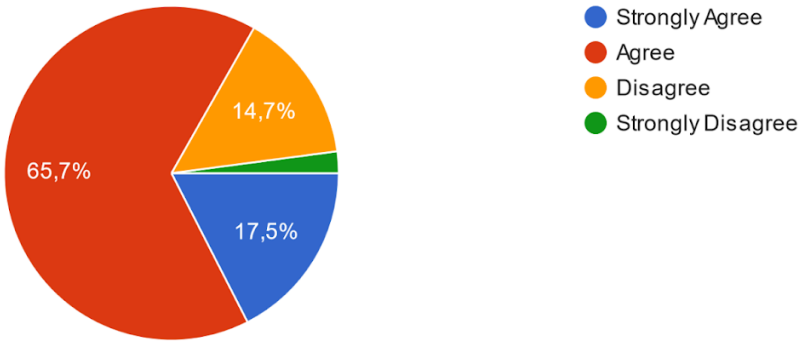

Figure 6 – Respondents on rapid technology change trends - knowledge and awareness

Source: Created by the authors

In the following question, "Technology - 2)", the respondents were asked if they find it easy to keep up with frequent technological change (see Figure 7). Approximately 83.7% of the Italians, 64.9% of the Portuguese, and 81.3% of the Spanish answered affirmatively.

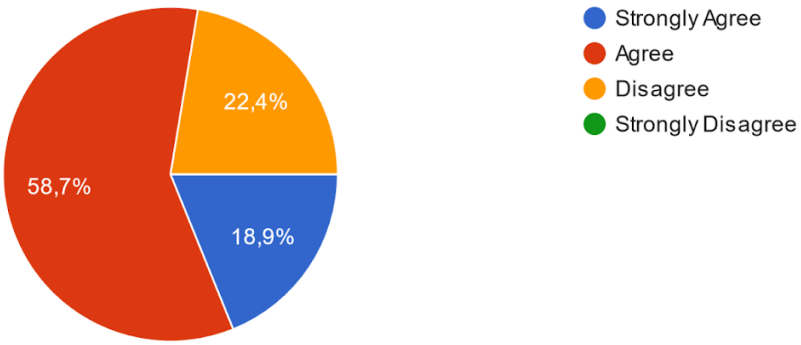

Figure 7 – Respondents on ease to keep up with frequent technological change

Source: Created by the authors

Last of all, in the question "Technology - 3)", respondents were inquired on whether or not technology development has made their lives easier (see Figure 8). Approximately 90.7% of the Italians, 97.3% of the Portuguese and 100% of the Spanish answered in agreement.

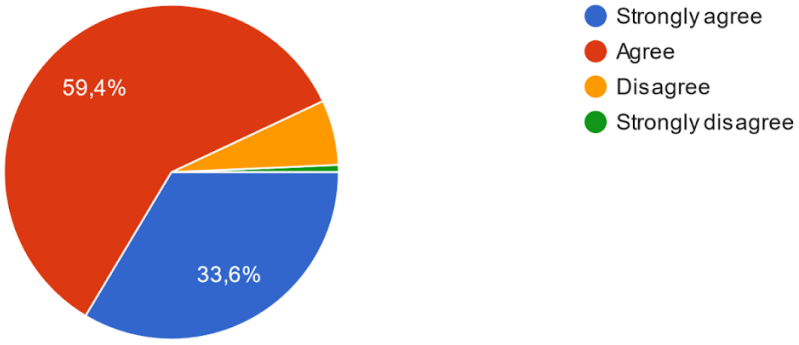

Figure 8 – Respondents on technology development facilitating their lives

Source: Created by the authors

5. Discussion

5.1 Are males more aware and informed of AI than females? Or are females more perfectionist concerning what is considered being aware and informed?

These are generalizations and perceptions that may not hold true universally, which causes different opinions. However, we perceive that most of the society has the same mindset. The perception that males are more informed or have more confidence in their knowledge may originate from societal norms/standards.

Males are told they can achieve great academic accomplishments, even if they, for instance, struggle in class. This motivating speech is also present in interpersonal relationships, when they struggle to make connections with other people. On the other hand, females are told differently, causing perhaps a lack of confidence. The attempt to meet very demanding societal standards and expectations may be the reason behind the female struggle with perfectionism.

Male individuals tend to not attribute as much importance to what others say and tend to not feel the need to be perfect - they are who they are. This is noticeable in our chi-square test. In the question "I am very aware and informed regarding Artificial Intelligence and its applications", each gender holds a very different perspective. In 71 males, 54 consider themselves to be aware of AI in general, which accounts for 76% of their answers. However, this belief is not as strong among the females. Only 52% are aware and informed of AI, meaning almost half of the female respondents do not consider themselves knowledgeable on this topic.

5.2 Cultural alignment between Portuguese, Spanish, and Italian individuals on their perception of technological change and development

Southern European nations share many cultural traits and lifestyles, which could be linked to similar geographical attributes and a common background. This can be confirmed by the survey responses, which made it evident that Portuguese, Italians, and Spaniards generally align on the questions we provided regarding technology. The only slight difference between the Portuguese opinions and the others' (Italians and Spanish ones) is visible in the different agreement rate on the second answer: "Technology - 2)". The respondents were asked if they find it easy to keep up with frequent technological change. Comparing the results, these show that approximately 83.7% of Italians, 64.9% of Portuguese, and 81.3% of Spanish answered affirmatively. That means a difference of 18.8% between Italians and Portuguese and a difference of 16.4% between Spaniards and Portuguese.

This could suggest that generally, Portuguese people adapt slower or with more effort to changes in technology, or that the Portuguese are less optimistic about their ability to adapt to new technologies. These findings presuppose keeping up with technological change throughout the ongoing development of technology in this century, confirming that they follow the growth and evolution of this ever-changing trend. This brought us back to Teece's Dynamic Capability theory, described as the ability to manage an organisation and the environment, in addition to structuring the organisation in an ongoing change (Teece et al., 1997). When the tendency is moving forward, people tend to float with the stream, to remain updated on the world surrounding them.

5.3 Technology as a modern lifestyle facilitator

It is observable in the survey's findings that a significant number of respondents agreed that technological development has greatly facilitated their day-to-day lives. In fact, approximately 93% of the individuals answered in agreement (see Figure 8). This can be explained by the constant introduction of newer technology, indicating and reflecting the public's wants and needs. As society's demands and requests increase globally, technological change initiatives from big tech companies constantly move forward. In doing so, organisations around the world change the quality of people's lives through modifications in several fields/sectors, such as communication, transportation, and healthcare. These innovative technological advances are therefore mostly perceived as substantial lifestyle facilitators.

5.4 Artificial Intelligence's future implications in society, the workplace, data security/collection, and politics

In this section some of the most quoted fears and concerns received via the survey's open-ended questions will be discussed. The reasons why the insights on the previously mentioned topics are generally aligned in a negative way could be explained by different factors, and it is important to further investigate the main reasons that shape a negative opinion towards AI, in future research. However, we perceive some of them to be: culture, the spreading of media sensationalism, and uncertainty towards the future due to rapid technological change and a lack of faith in the regulating organs.

The provided open questions were: "You agreed to the previous statement: I believe Artificial Intelligence will replace my work in the future. Can you specify why in a short sentence?" (28 answers); "Do you have any further information/comments or suggestions you would like to share?" (30 answers)

The first concern about AI that stood out was the fear of being replaced by AI machinery and software, with the most quoted jobs being in the fields of design/marketing (cited 6 times), programming (cited 4 times), translation (cited 2 times), and repetitive labour (cited twice). The main reasons, when specified, were because AI tools are faster (cited 4 times) and cheaper (cited 3 times).

The fear and unacceptance of a new, disrupting technology could be the leitmotif, since these respondents' opinion was focused on substitution in today's working activities by computers and robots. A new set of skills will probably be required by the next generation of workers, as many jobs will be out of fashion, and new ones will require collaboration between humans and AI. This calls for reconsideration, since some jobs will continue being supervised by humans, or will need to be performed by humans. Professions like lawyers, doctors, teachers and politicians require a level of ethical nuances that Artificial Intelligence could not achieve in the near future. There are also functions that will be difficult to substitute, given their completely personalised and complex nature, such as nurses, caregivers and hairdressers.

Perhaps being replaced by machines and computers in repetitive tasks could be a freedom act, in a way. As the industrial revolution freed horses, AI technology could free humans from several demanding types of work. There are multiple social implications that are involved in this scenario, which would manifest in the form of complex social and lifestyle adaptations. There is a big opportunity for AI technology to help society. However, it is likely that the global elites will benefit the most from it, and not the masses, who do not possess the resources to explore these new technologies to the fullest. Therefore, there is a considerable risk that AI implementation will augment the social differences between upper and lower classes.

6. Conclusions

There is an apparent association between an individual's gender and their level of knowledge and awareness of AI. As per our sample, males – also called the gender of "lost opportunity" by researchers in Portugal (less ambitious in academic terms, preferring to go to work sooner and being less perfectionist than their female counterparts; more content with the status quo... which favours them) – self-report higher AI knowledge and awareness than their female counterparts, which can perhaps be explained by a difference in self-confidence between genders, as well as meticulousness/perfectionism when approaching a subject. According to Pierre-Bravo (2018): "Madeleine Albright made history as America´s first female Secretary of State. But like many women, she has at times struggled to speak out confidently, especially in meetings where she's been surrounded entirely by men". Indeed, according to Albright: "It was intimidating... You listen carefully, think you are going to say something, and you think, 'No, it'll sound stupid.' And then you don't say it. And then some man says it and everybody thinks it's brilliant. And then you're mad at yourself for not saying anything." (cited in Pierre-Bravo, 2018). Albright has been credited for saying that there is no room in the job market for mediocre women (Pierre-Bravo, 2018). On the other hand, we have met many mediocre men in different roles in the work environment.

However, there is not an association between gender and one's stance regarding AI. Concerning being for/against AI, by analysing our sample's results, it is visible that most respondents, regardless of their gender, support the usage of AI or similar tools. This can be linked to how much technology facilitates modern lifestyles, in which most of our sample, from both genders, responded in agreement.

Finally, regarding the additional question, by cross-examining the data from our survey's "Questionnaire - Technology" section

with the three biggest sample groups nationality-wise, it was concluded that the perceptions of Portuguese, Italian, and Spanish respondents on technological change and development strongly align. The explanation for this may reside in the large number of similar cultural aspects and traits shared by these Southern European respondents, which could lead to a similar perspective on the theme. Albeit Portuguese respondents still self-reported greater difficulty (16.4% less able than the Spanish and 18.8% less able than the Italians) in keeping up with frequent technological change. This may be indicative of the Portuguese being humbler (please see Hofstede, 2001, for a discussion on masculinity versus femininity), more realistic, and not necessarily being less able or competent.

Limitations of this exploratory study include its rather small sample (143 answers) and its convenience nature. In future, more in-depth studies are warranted, to ascertain whether our study indeed points in the right direction. There is perhaps a link between what we found, regarding the lack of confidence by women in their own knowledge of AI, and impostor syndrome: "the persistent inability to believe that one's success is deserved or has been legitimately achieved as a result of one's own efforts or skills." (Oxford Languages).

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