

# Applying the Multidimensional Ethics Scale to a Microtasking Crowdsourcing scenario

A Master's Thesis submitted for the degree of  
“Master of Science”

supervised by  
PhD, MA, BSc (Hons) Professor Larry Stapleton

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## Affidavit

I, **ENG. FERNANDA PRIMO DE CARVALHO ALVES**, hereby declare

1. that I am the sole author of the present Master's Thesis, "APPLYING THE MULTIDIMENSIONAL ETHICS SCALE TO A MICROTASKING CROWDSOURCING SCENARIO", 77 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

Vienna, 29.03.2021

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Signature

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Supervised by PhD, MA, BSc (Hons) Professor Larry Stapleton  
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## Abstract

Many aspects have to be considered concerning the digital economy. Work through online platforms is increasingly stronger in the current global scenario. One of these types of work is known as Microtasking crowdsourcing. These platforms rely on Artificial Intelligence (AI), which provides full support for it. Task assignment and task recommendation are applications of this intelligence. Even though AI has proven to be an ally for this type of work, some ethical aspects emerge from this and have to be studied. The general objective of this thesis is to study the ethical judgment of individuals regarding the use of AI in these online platforms. For this purpose, a hypothetical scenario about Microtasking crowdsourcing through online platforms where there is a working relationship with AI, was created. For this, the Multidimensional Ethics Scale (MES) developed by Reidenbach and Robin (1990) was chosen, and a survey was applied (N=118). Results showed that participants tended to judge as unethical as per the (i) *Moral Equity* and (ii) *Relativistic* dimensions. For (iii) *Contractualism*, the individuals perceived as ethical. Furthermore, significant correlation (p-value = 0.022) was found between people's fear of computers and the perception of an unwritten contract being violated. The respondents also differ in their perception of an unspoken promise being violated (p-value = 0.033) and an unwritten contract being violated (p-value = 0.005) among their level of education. The participants' perception of justice (p-value = 0.019) and fairness (p-value = 0.026) diverge according to their company roles.

Key-words: Crowdsourcing, Microtasking, Artificial Intelligence, Digital Labour, Online Platforms, Digital Challenges, Ethical Aspects, Multidimensional Ethics Scale.

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## 1 INTRODUCTION

The demand for increasingly technological and innovative solutions for real-life business problems has been growing year by year. Therefore, it is crucial for companies to understand and be part of this digital society. There are various means that an organization can perform its tasks better, with the highest quality, and, additionally, take part of the digitized world. According to Berg et al (2018), for the International Labour Organization (ILO), the rise of digital labour platforms is considered to be one of the most outstanding transformations in the work field in the past decade.

Advances in technology will lead to changes in the workplace, modify the traditional employment relationship (Parry and Battista, 2019), and make organizations and businesses reflect about this transformation. According to Duell (2020) for the European Public Employment Services (PES Network), the COVID-19 breakout has been one of the contributing factors for the rapid transformation in the relation between employee and employer, and this crisis might create structural distortions in the labour market. Furthermore, these changes are also influencing the basic understanding of what labour is and the manner that the income could and should be obtained (Jäger et al, 2019). According to Huws et al (2016), in a survey from University of Hertfordshire, Crowdsourcing constitutes 10% or less of the main income from those who do this type of work.

The term Crowdsourcing was first coined by Jeff Howe in one edition of Wired Magazine in 2006 and defined as the act of a company or an institution to take a function once performed by employees and outsourcing it to an undefined network of people in the form of an open call (Howe, 2006). Not only that, but according to Durward et al (2016) the rise of digitalization has linked the economy with all other areas of our society at different levels, resulting in new forms of labour.

One type of Crowdsourcing is known as Microtasking, which can be shortly defined as breaking down the main task into smaller parts in order to make it easier for the crowd to perform them. Online platforms are tools to aid businesses in solving existing

problems. Pursuant to Difallah et al (2015) these serve as a virtual place where the workers, called the crowd, can and are willing to perform small tasks, and in respect to their work, the labourers obtain a reward. Even though Crowdsourcing has its benefits, it is important to consider the ethical issues that this type of work involves. Additionally, as several technologies can be applied to Crowdsourcing, people might also fear working in jobs that rely emphatically on different technologies, for instance, Artificial Intelligence (AI). Although technological development and computer intelligence have been presenting positive impacts in the lives of our society such as making our daily work easier, helping to automate various fields of work, and monitoring, it has likewise negative associated issues and ethical aspects that have to be considered.

In the subsequent subsections, the following points will be covered: definition of the problem to be studied, the goals that are expected to be achieved, which will be answered based on the main research question. Moreover, it will also explain the motivation for this research. Last but not least, the last subchapter of the introduction will explain how the present thesis was structured and will help with further guidance for the other sections.

### **1.1 Problem Statement**

Despite the fact that the Internet and its technologies seems to be omnipresent in our society, they enable the establishment of new forms of digital labour, which enhances the data processing abilities from the crowd (Poblet, Fitzpatrick and Chhetri, 2017). The rise of digital work as well as microtask Crowdsourcing will lead to significant challenges in the job market. Moreover, online platforms are already settled in market and are building up a new and digital future. Crowd workers uses these platforms to perform small tasks in order to receive, in most cases, monetary compensation for their work. However, one associated problem with providing tasks to an undefined crowd is the accuracy and reliability of the data produced by workers. Besides that, when tasks are assigned to an unknown mass of people, it is not possible to know their pre-skills and background to perform those specific tasks, as well as to infer if these persons will, indeed, be able to finish the task.

In addition, new trends on technology are present in our society in order to be helpful for real-life problems or tasks. One example of technology that is being used for

Crowdsourcing problems is AI, which makes it possible to improve data quality, lower the company costs and make the processes more efficient and digitalized. One usage of such a computer intelligence like that could be to monitor the tasks performed by the crowd and also allocate the correct activity to the right crowd worker, thus avoiding mistakes. The main concern regarding such platforms, and now with the usage of increasingly high technologies, is that it can either create the automation of digital labour exchanges or, in a near future, replace workers for a cheaper way of working.

The above-mentioned background serves as a basis for this master thesis. One has to take into consideration that, indeed, the world is moving towards technological relationships through the usage of platforms, and, besides that, computer intelligence is improving day by day. In this context, this master thesis will address the problem of ethical judgement of individuals towards a Microtasking job through online platforms, which is based on a working relation with AI. In academics, it has not yet been taken into consideration how ethic people judge this work. This problem will be tested and validated throughout a hypothetical scenario and a survey, created by the author.

## 1.2 Motivation

In the current scenario that the world is facing, online collaboration, specifically regarding the Crowdsourcing, is a method to integrate companies and workers into digital space. Moreover, it is also a way to share information, participate in debates, and even to provide those labourers small tasks as a way of work. In addition, new technologies enable this connection between people who want to work and companies who are searching for capable workers. It is important to not only take into consideration the internet, but also an applied technology such AI, which might help the companies to receive the most accurate and reliable work.

Based on the background above-mentioned, it is noticeable why this topic should be of utmost importance for companies. Crowdsourcing microtask is a valuable way breaking down activities of a project into smaller tasks. Moreover, these microtasks will be more manageable to be completed by the online workers (Amazon Mechanical Turk). Furthermore, with the Internet and the accessibility to microtask online platforms, researchers and professionals are heading towards paid Crowdsourcing to solve their data-oriented tasks that still require human input (Gadiraju et al, 2015).

One company that has a Crowdsourcing platform is Amazon, named Amazon Mechanical Turk (MTurk), where crowd workers from all over the world have the possibility to work on small and simple tasks in order to receive monetary compensation for it. At one hand, it can be implied that the motivation is also on behalf of workers, who can work remotely from their homes. On the other hand, organizations can also obtain advantage of these new platforms and technologies. They can reach on-demand and a considerable working force for the microtasks that have to be performed to complete the main goal. Furthermore, companies can integrate the results of the crowd work into their business process and systems.

Crowdsourcing and digital labour is not only an interest of organizations and workers. There is also the involvement of unions and government, in respect to regulatory issues. All the trends and new ways of work have an impact on organisation of work, more specifically on the relationship between employee and employer (De Stefano and Aloisi, 2018). As stated by Cantarella and Strozzi (2019), the possibility that online platforms economy grows in the future, is a reason why governments and social partners should play an active role in this area, by designing labour market institutions to ensure certain level of labour and social rights for the workers, like minimum wages, employment protection and health and safety regulations.

In 2017 the European Parliament adopted a text with a proposal to regulate the collaborative economy, including the labour platforms (2017/2003(INI)). It was noted by the Parliament that this area has substantially grown in recent years, with respect to users, transactions and revenues. Taking into consideration this matter, the communication of this adoption on a European agenda should represent a starting point to promote and regulate this sector (European Parliament, 2017).

Crowdsourcing and new trends in technology are important areas to have a deeper understanding due to the fact that there are higher chances that the future of work will be held all online. Furthermore, it is important to take a deep look at this topic due to regulatory issues. As mentioned above, workers and companies have interest in this area, the former because it can earn income and the latter because it can have on-demand work. Finally, unions and government, such as the European Parliament,

identified that this sector is in major expansion and might have its own interests to promote and regulate it.

### 1.3 Research Question and Aims

This master thesis has two research questions to be answered:

RQ1: *“What is people’s ethical judgement towards Microtasking Crowdsourcing scenario where Artificial Intelligence is applied?”*

RQ2: *“Do people’s ethical judgement towards a scenario differ according to groups?”*

In order to assure that the two questions above-mentioned are going to be answered, this thesis has two defined aims. The first goal is (I) to verify people’s ethical judgement in a Microtasking Crowdsourcing platform scenario, where Artificial Intelligence is applied. As its second goal, this master thesis aims (II) to evaluate how ethical people judge a scenario of working relationship with AI according to company role, level of education, age and fear of technology.

### 1.4 Thesis Structure

Chapter 2 is the literature review, and it is divided into nine subchapters, where the first eight have a contribution with related works to this master thesis, and the last one is a synthesis of the chapter. The subsequent chapter 3 explains the research process, where there is the detailed description of the methodological process used to conduct the analysis. Moreover, this chapter also contains the description of the Crowdsourcing scenario and the methodology used.

The final chapters are Chapter 4, Chapter 5 and Chapter 6. Chapter 4 reports, in details, the results of the study. Chapter 5 develops a further discussion about these results and describes the validation of the hypothesis. Lastly, in Chapter 6, a brief conclusion of the thesis is presented and future work in this area is proposed.

### 1.5 Hypotheses

The hypothesis for this master thesis is based on one of the subchapters of the literature review; subsection 2.9, which provides theoretical framework regarding ethics and

several applications of the Multidimensional Ethics Scale to understand and measure people's ethical judgement towards different situations.

The theoretical background on technology as it is applied to online platforms has already proved to be consistent and accurate. In other words, it is perceptible that there are several applications of AI within these platforms. However, there are not sufficient papers that take the effort of considering the perception of workers about how ethical these platforms are, and if the workers themselves fear when working with technologies. The hypothesis that this master thesis aims to test are presented in the subsequent paragraphs.

The first hypothesis will address the problem of ethical judgment of people when they are exposed to a Crowdsourcing scenario where the use of Artificial Intelligence is evident. In order to test this hypothesis, the Multidimensional Ethics Scale (MES) proposed by Reidenbach and Robin (1990) will be applied. The hypotheses are stated below:

H1: scenarios which involve working relationship with an important presence of AI are considered to be less ethical.

H2: individuals can be categorized within company role, age, level of education and fear of technology in relation to ethical judgement towards a scenario.

## **2 LITERATURE REVIEW**

This literature review intends to present the most important and related topics with microtask Crowdsourcing and its technologies, but more specifically AI. To begin with, the topic of digital labour will be presented as well as challenges and implications. After describing this basis, a brief history about Crowdsourcing will be described. The topic of platform economy will be presented as an introduction to the technological aspects. Following that, the author will present the main definitions of Crowdsourcing, and further classifications of it, focusing on Microtasking. The next topic that will be addressed is technology and the use of Microtasking platforms for Crowdsourcing. Finally, analogous papers on AI and its applications to the present topic will be evidenced. To conclude this section, a synthesis about the related topics will be presented.

## 2.1 Definition of Digital Labour

First, one will start with two definitions of Digital Labour, as stated by Fumagalli et al (2018). The first describes digital labour as a workforce of non-dependant contractors who work at their personal account and own risk for low pay and without any social security, as it is the case of some online platforms. In this first statement, the term refers to a classical way of working on the digital space, without any type or reduction of the rights of workers. As a second description, the authors have stated that digital labour also serves for the human activity, which some platforms use in order to obtain personal information and transform into big data. In regard to the second sense, the term implies an innovative way of working, that goes beyond the normal relationship between worker and employer.

Labour platforms permit those who are seeking for a job and companies that need someone to perform the tasks, to match. Employers hire workers who are willing to offer or to perform a task. This matching process is easier to be done by means of Software mechanisms that can manage a significant amount of available workforce (De Stefano and Aloisi, 2018). For Horton et al (2017), the internet-based platforms allow workers worldwide to connect with companies seeking for people to perform and complete tasks.

Horton (2010) has proposed a definition for Online Labour Market (OLM), as the following statement:

*“A definition of OLMs that captures the essential common features of all markets and yet distinguishes the markets from other examples of online work: a market where (1) labour is exchanged for money”, (2) the product of that labour is delivered “over a wire”, and (3) the allocation of labour and money is determined by a collection of buyers and sellers operating within a price system.”*

## 2.2 Challenges of Digital Labour

The traditional labour market has been in constant change due to the rise of digital work. Artecona and Chau (2017) affirm that this transformation will have some consequences for companies. They will have to reframe their employee and employer relations. This reframing might lead to a few issues regarding wages, job security and legal working conditions. As stated by Benson et al (2019), some online platforms, for

instance MTurk, TaskRabbit, Upwork, and Uber, have reduced their costs of searching, forming and terminating work arrangements. This is also a concern regarding the regulations that protect the workers. Furthermore, for De Stefano and Aloisi (2018), on one hand, the digital labour might help by increasing competitiveness and opportunities, on the other hand, several legal concerns have been raised on the rights of the employees and the non-compliance with the employment law standards.

The implications of digital labour are not particular to employer relations, but likewise concerning possible wrong classification of workers, made by the companies. Some online platforms classify their workers as independent contractors, and not employees themselves. According to Artecona and Chau (2017), this is called misclassification and it occurs when the work should be classified as a normal one, so-called standard, and it is encompassed as an alternative solution. On one hand, the problem regarding this matter is that if one is classified wrong, it can lead to a lack of or no legal right, social security and benefits. On the other hand, looking on the side of the company, the ones who classify its workers correctly can have disadvantages compared to the ones who classified wrongly.

Drahokoupil and Jepsen (2017), named as the digitalisation of the economy, in reference to the impact of information and communications technology and how it is building the world of goods and services. Furthermore, the authors also mentioned several aspects regarding this fast world technological evolution, and they are: digital labour platforms exchange, consumers are becoming producers, how mass production is moving towards micro-production, how new monopolies are emerging, and implications of Big Data and technologies for economic structures. It is likewise considered by them that these issues have further implications on society arrangement, ways of taxing, regulation of labour market, welfare states, and how trade unions can intermediate these new challenges.

Altenried (2020) states an issue regarding the low wages of crowd workers, according to ILO. One of the points made by the author is the very low wage related to Crowdsourcing, where according to Berg et al (2018) a worker earns US\$4.43 per hour when only the paid work is considered, and US\$3.29 per hour if unpaid hours are taken into account.

### 2.3 Platform Economy

Platform Economy can be defined as a set of economic activities that are fulfilled by means of digital platforms, it facilitates the work between platform workers and buyers of labour (Hauben et al 2020). Digital platforms do exist for several purposes, for instance, Google and Facebook, which not only enable its users to research whichever topic they seem fit, but also act as a social media, where it is possible to connect them to the wide world. Amazon is the most famous online platform in order to make purchases, and it is a virtual marketplace. It is apparent that the platform economy is changing aspects of the life of society, such as the way people make research, connect to new friends and purchase goods.

De Groen et al (2018) for Eurofound defined platform work as being a type of employment, which, through the usage of the internet and online platforms, enables organisations or people to access and contact other organisations and persons to solve problems or to provide services in order to receive monetary income. Furthermore, the authors have also pointed the main characteristics of this kind of work. (i) The head activity is broken into smaller ones, (ii) the services are on demand, (iii) there is a specific aim which is perform the designated tasks or solve problems, and (iv) there are three parties involved the online platform, the client and the worker.

According to Wisskirchen (2018), the platform economy is grouped in four areas, as demonstrated in Table 1.

<b>Group</b>	<b>Examples</b>
Social communications platform	Facebook, XING
Digital marketplace	eBay, Spotify, Netflix
Brokerage portals	Uber, Airbnb Lyft, BlaBlaCar
Crowdworking platforms	Amazon Mechanical Turk, Clickworker, Twago, 99Designs, UpWork.

Table 1: Platform economy examples (Wisskirchen, 2018)

For Moore et al (2018):

*“The platform economy relies on self-employed contracted labour and such workers on these platforms have no access to regular employment benefits such as health care*

*or maternity leave. Workers have very little legal protection either and platforms are designed to reduce employer liability.”*

Supporting the statement above-mentioned, the work of Hauben et al (2020) can be cited, where they have stated some associated problems with the platform economy and the platform workforce, for instance, the conditions of work and employment at these platforms can lead to a risk of precariousness, or in other words, work precarization. The authors also commented on other problems, it is not clear the type of employment of these workers, the payments are low and unstable, the working times are not regular as a routine, there is a lack of social protection for the platform labourers. Wisskirchen (2018) also considers the implications of platform economy as the fact that there is no legal relationship between worker and employer, however, the author mentioned that there are no obligations by any of the parts but the payment has to be provided after the task is completed.

#### **2.4 History of Crowdsourcing**

In 1714, the British Government was offering a prize called the Longitude Prize valued at £20,000. They were promoting this prize for the one who could help them solve a problem. The issue was to determine the longitude of a vessel at the sea and the British clockmaker John Harrison made a marine chronometer for the problem and won the prize (Smith, Ramos and Desouza, 2015). Moreover, in the year 1775, the French Academy of Sciences by means of the Crowdsourcing, until that time not yet coined, established an award of 2,400 livres for the one who could be able to discover the most cost-effective method of decomposing sea salt on a large scale (Smith, Ramos and Desouza, 2015). In 1879, an agreement with Oxford University Press and James Augustus Henry Murray was made to start the work of the New English Dictionary, by the time called the Oxford English Dictionary. The lexicographer had help from English-speaking readers, when he asked them to keep tracking new words and meanings of the existing words while they were also examining the past centuries of the English language development (Oxford English Dictionary).

A more modern example of the Crowdsourcing story was in 1916, at Planters Nut & Chocolate Company, which produces processed nuts and is symbolized by Mr. Peanut. A student Antonio Gentile submitted his drawing to the contest of the company for the

logo of the brand (Planters Nut & Chocolate Company). Similarly, to the British Government and the French Academy of Sciences, the car manufacturer Toyota has also promoted a contest for the redesign of its logo. They have received over 27,000 entries from the entire Japan in the year 1936 (Joshi, 2002 & Toyota Motor Corporation). In the year 1955, the premier of New South Wales state of Australia launched a contest to design a building for the Sydney Opera House. Among all the 233 entries from 32 countries, the winner of the £5,000-prize was the Danish architect Jørn Utzon (Joshi, 2002 & Sydney Opera House). Figure 1, created by the author, exhibits the Crowdsourcing history throughout the years, based on the above-mentioned background. Moreover, it is possible to perceive that since the beginning, although at the time it did not have a name yet, the examples demonstrated the basis and principles that are applied today for Crowdsourcing. It had a crowd, a task, a problem-solving process and compensation.

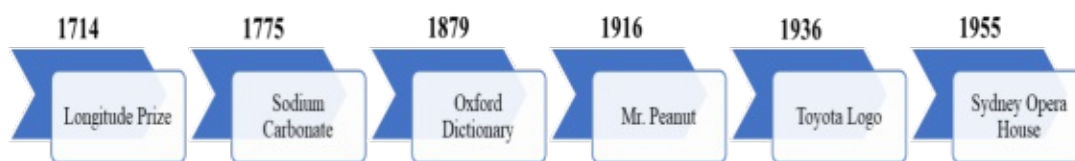


Figure 1: Crowdsourcing timeline over the years (created by the author)

## 2.5 Definition of Crowdsourcing

Although the concept of outsourcing tasks or problems to the crowd has been already applied before, as stated in the previous subchapter, the term Crowdsourcing itself was first coined by the journalist Jeff Howe in 2006, in an edition of the Wired magazine. The following definition was given by Howe to this term:

*“Crowdsourcing represents the act of a company or an institution taking a function once performed by employees and outsourcing it to an undefined and large network of people in the form of an open call (Howe, 2006).”*

For Brabham (2008) the term is an online and IT-mediated way for the crowd to complete tasks with problem-solving purposes, in a problem-solving model, because it enables a company that is confronted with a problem to enlarge the solver base by opening up this issue to an open online community. Some companies, government

agencies and non-profit incorporate the work from online communities into their daily processes. A Crowdsourcing process consists of a certain number of tasks, that involves resources not only within the company boundaries but also, and mainly, beyond it. Furthermore, these resources are mostly human participants and information technology (Geiger et al, 2012). Estellés-Arolas and Ladrón-de-Guevara (2012), came up with a unified definition for Crowdsourcing as it follows:

*“Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or company submits tasks for a group of persons with the most varied background and knowledge. The tasks can be of variable complexity, and modularity. The ones who want to participate and perform the tasks should bring their work, knowledge and experience. At one hand, the user will receive the satisfaction of a given type of need, this one can be economic, social recognition, or the development of individual skills. On the other hand, the crowdsourcer will obtain and utilize to their advantage what the user has brought.”*

Crowdsourcing is considered to be a manner for a company to obtain previously unattainable resources in order to construct a competitive advantage (Prpic´ et al, 2015). According to Dellermann et al (2020) businesses that apply Crowdsourcing benefit from the diverse and distinct crowd, which can provide the company creative and innovative solutions, as well as solving problems. However, for Kittur et al (2013), the crowd work has pros and cons. At one hand, there are pros mentioned by the authors which are the creation of new opportunities in order to obtain income, overcome the lack of experts in certain areas, for instance, Information Technology workers. On the other hand, there exist cons related to Crowdsourcing, such as low payments for crowd workers at online platforms, no benefits or worker protections. Furthermore, it can also displace some workers, and replace some works and jobs that require elevated skills with unskilled labourers.

There are at least three steps in Crowdsourcing: initializing, implementation and finalizing. To begin, during the initializing step, a task is provided by a requester who would be the employer in the traditional method. Moreover, this person has not only to provide the task but also to estimate the necessary workforce. However, before providing a task to the crowd, it is possible, if necessary, breaking down the main task

into smaller ones, called Microtasking, which can make the process of solving and performing them easier. Once the tasks were correctly designated to the workers, incentives must be outlined. As a second part of this process, there is the implementation, where the requester has to find and define a crowd for a certain activity. One way to achieve this is to use platforms such as MTurk or CrowdFlower. The last step is finalizing, which smaller steps have to be done in order to finish the solution. After all, with all the results and answers from the workers, one has to refine them. When this last process is completed, the responses are aggregated and submitted in order to find the correct and most accurate one, which is the final output (Chittilappilly et al, 2016).

## 2.6 Classification of Crowdsourcing

This emerging way of outsourcing the tasks, called Crowdsourcing, includes sub-classifications such as microtask, macrotasks, contests and crowdfunding (Toanca et al, 2014, p. 173). Lykourantzou et al (2019), defines macrotask as the type of task that can be independently performed with no support from who has requested it. Conversely, microtasks are small portions of work, which are part of a larger job, and that can be performed by the crowd (Brabham, 2008). When an artist or an entrepreneur has developed an idea and needs capital to bring up the idea to the market, it is called crowdfunding (Brabham, 2008).

There is more than one way in which the activities of Crowdsourcing can be classified. To begin with, (i) *Crowdsourcing contest*, which is mainly about a challenge or problem proposed by a contest designer to the crowd. Individuals from the crowd respond to the issue, showing their solutions. Based on the quality of them, the winners of the prize are determined. Another class for Crowdsourcing is called (ii) *Open calls with direct rewards*, and here the tasks are wider and the quality measures are not clearly defined and given to the participants. Furthermore, there are two ways where the ideas can be elected: either judged by a panel or by means of a voting by the crowd. The financial reward is given to the best ideas in form of cash or royalties. On the other hand, there is the (iii) *Open calls with indirect benefits*, in this case instead of financial reward, the contributors are benefited indirectly when the company implements their ideas. (iv) *Microtask*, which is also referred as Human Intelligence Tasks (HITs), are

easier for humans to conclude, but more difficult for computers. In this initiative, everyone gets equal compensation for performing the task (Panchal, 2015).

According to Hassan and Curry (2013), there are four categorizations of Crowdsourcing, (i) Microtask, (ii) Macrotask, (iii) Crowdfunding and (iv) Contest. The authors have created a table with the respective platforms for each category, as shown in Table 2.

Group	Platform
(i) Microtask	MTurk, Crowd Flower, Click Worker, Mobile-works
(ii) Macrotask	Innocentive, Quriky, Apache, Foundation
(iii) Crowdfunding	Kickstarters, Indiegogo, Seedups, Crowdrise
(iv) Contest	99designs, crowdSPRING, Kaggle, Innocentive

Table 2: Crowdsourcing categories and its platforms (Hassan and Curry, 2013)

## 2.7 Technology and Microtask Platforms

Microtask platforms are a web-based service that connects individuals, who want to work, with people that are offering tasks to be done. Usually, these tasks are taken from some major project and reduced to smaller parts, therefore distributing them to a considerable number of people around the globe. The tasks are performed by the crowd, who subscribe to a certain platform, and in exchange they receive monetary compensation.

Crowdsourcing is a practice that demands technology and Information Technology (IT). Besides that, it is also necessary to have people, the so-called the crowd, to work on the given tasks. Furthermore, online platforms might be an intermediate between people who want to work and earn some money with those who post the tasks to be accomplished. Modaresnezhad et al (2020) states that the advances in technology and internet-enabled environments led to progress in Crowdsourcing platforms. Moreover, several technological factors have ramped up this practice, such as global reach, interactivity and collaboration, increased speed due to Internet, anonymity and the usage of media from other communication modes.

Aside from the need of Internet and technology, there are several Crowdsourcing online platforms that might be helpful for this practice. There are the ones for generic

purposes like MTurk, oDesk, Freelancer, Crowdfunder, MobileWorks, ManPower, and there are platforms for specific knowledge, such as TopCoder, uTest and 99Designs (Kittur et al, 2013). Amazon's MTurk was launched in 2005, and it makes it easier for companies, who are seeking a workforce to perform tasks, to connect and outsource these tasks to the crowd (Modaresnezhad, 2020 & Amazon Mechanical Turk). For Schmidt (2017):

*“Digital platforms make the lives of millions of people easier and we can hardly imagine modern life without them any longer. Because they are so useful, important and omnipresent, a critical analysis of how they function is important. All the more so now that also labour markets are increasingly organised via digital platforms.”*

Hirth et al (2011) stated about the innovative Microworkers platform, which was launched in 2009. Within this platform, the users have one unique login and can be both a crowd worker and a requester. The activities and tasks at Microworkers are organized as jobs and campaigns. Furthermore, as a worker the user can earn income by performing microtasks that are available, and there is no limit to how many jobs a person can accept. The platform has a specified category for a group of workers who have special skills, thus they can perform different jobs than the others and earn more money.

The platform MTurk, launched at the end of 2005, is one of the most famous Crowdsourcing online platforms and differentiates requesters and workers, who are also called Turkers. The requester proposes the work as Human Intelligent Tasks (HITs), which are performed by the workforce. When a turker decides to work on a HIT, it is locked for a period of time, meaning that other workers are prohibited from performing this task. If the turker manages to successfully finish it on time, the activity is removed from the system. If not, it will stay available for others at the platform (Hirth et al, 2011). Figure 2, proposed by Ambati et al (2011), exhibits the process of MTurk Platform.



Figure 2: MTurk platform process (Ambati et al., 2011)

In an article by Altenried (2020) it is mentioned the principle behind the Amazon platform. In 2006 the CEO of the company, Jeff Bezos, announced Amazon Mechanical Turk at Massachusetts Institute of Technology (MIT) with the subsequent statement:

*“You have heard of software-as-a-service. Well, this is basically people-as-a-service.”*

Saxton et al (2013) likewise uses the example of Amazon MTurk to illustrate Crowdsourcing platforms. According to the authors, the platform is described by Amazon itself as an Artificial Intelligence online service, where Human Intelligence Tasks (HITs) can be executed. However, these tasks cannot be either duplicated or replaced by machines, but are easier and achievable by humans.

For Kucherbaev et al (2016), Crowdsourcing platforms have some associated limitations such as not all the tasks can be broken down into smaller ones, manual work and settings are still necessary for some platforms, and the support for structured work is limited. The authors have called this structured work as Crowdsourcing processes, because they have to be coordinated, taking into consideration several tasks, people involved, and operations. As mentioned by Drahokoupil and Jepsen (2017), labour platforms might have a high impact on the labour markets. One of them is to make it easier for new entries, called lowering barriers, and this can be achieved by cutting transaction costs. Moreover, platforms can elevate competition between workers, while also lowering the bargaining power and limited opportunity for skills development.

## 2.8 Artificial Intelligence in Crowdsourcing

Artificial Intelligence is an area of computer science and can be applied in several fields in diverse ways. Moreover, it is in constant growth due to the digitalization, and rapid advance of technological tools. One of the applications of this technology is Microtasking Crowdsourcing, which aids in task allocation, and task recommendation (Machado et al 2016; Moayedikia et al 2018; Yuen et al 2015; Safran et al 2017).

Allocating tasks in Crowdsourcing is a key point in order for the practice to happen. For microtasks platforms, the approach to distribute online tasks is called repeated labelling. However, some limitations linked to this practice do exist and might have an impact on the job quality and platform performance (Moayedikia et al, 2020). According to Cui et al (2017), there are algorithms for Crowdsourcing practices that focus on task matching to the suitable workers, and that takes into consideration some factors such as their skills, background, reputation, availability and current workload.

The theme of the article written by Machado et al (2016) states the problem of task assignment. First, the authors defined the process of Crowdsourcing and the main elements, the requester, the crowdsource platform and the crowd. The requester is someone who has a task that needs to be completed and, in order to do that, submits it to the crowd. Then, the crowdsource platform receives the task information from the requester and allocates it to the crowd. Last but not least, the third element is the crowd, which is involved within the process to create and formulate a solution to the problem or task.

There are some associated problems with Crowdsourcing, and one of these issues is to allocate the correct task, for the right person and at the right time. Considering this, Machado et al (2016) proposed the use of AI planning technology in order to assign the tasks for the crowd. In their work, they have applied and evaluated Planning Domain Definition Language (PDDL) for task allocation and concluded that the proposed algorithm can have benefits for the discussion contemplated. The authors also declared that their approach might enhance the assignment of Crowdsourcing tasks to a push model.

Moayedikia et al (2018) work was likewise related to task allocation, more specifically in microtask and with usage of an algorithm that they have proposed, which is called Learning Automata based Task assignment (LEATask). The idea of this AI-based technology is to overcome some problems associated with the allotment of the tasks to the crowd. The first associated issue is that all the tasks are allocated to workers, without measuring their adequacy to perform them. As a second issue, the authors have pointed out that from all the responses collected from the labourers, there is no measuring if it is adequate or not. Therefore, this algorithm works based on similarities in the performance of each worker.

In the paper of Moayedikia et al (2020), the shortcoming related to assigning tasks was addressed with the iterative Markov Chain Monte Carlo Task Assignment (MCMC-TA). The identified problem in microtask Crowdsourcing platforms case is how to detect a workforce with the highest quality, when the scheme for allocating the work is done in a sequence.

The MCMC-TA begins with a job that was offered by the job owner at a certain platform. As a second step, the ones who are interested in the task are asked some quality-control questions, thus the algorithm can assure the quality of the workers before they start the proposed work. The workers who do not answer the requested questions to ensure the quality, will not be taken into consideration for the job. Then, the quality index of the workers is estimated at the initialization step, and with this, some of them are chosen for the next stage, which is the Microtasking one. The first step of Microtasking is to, in fact, assign the tasks for the selected workers and, again, estimate their quality index. These indexes are employed to evaluate the prospect of certain workers to be suitable for the next iteration of task assignment. The last stage, called worker selection, considers all workers with the respective quality index and creates the shortlist of these ones for the Stage 1, Task Assignment. The proposed algorithm works in a dynamic way with iterations, it goes through the whole cycle as shown in Figure 3, until all the tasks are reached.

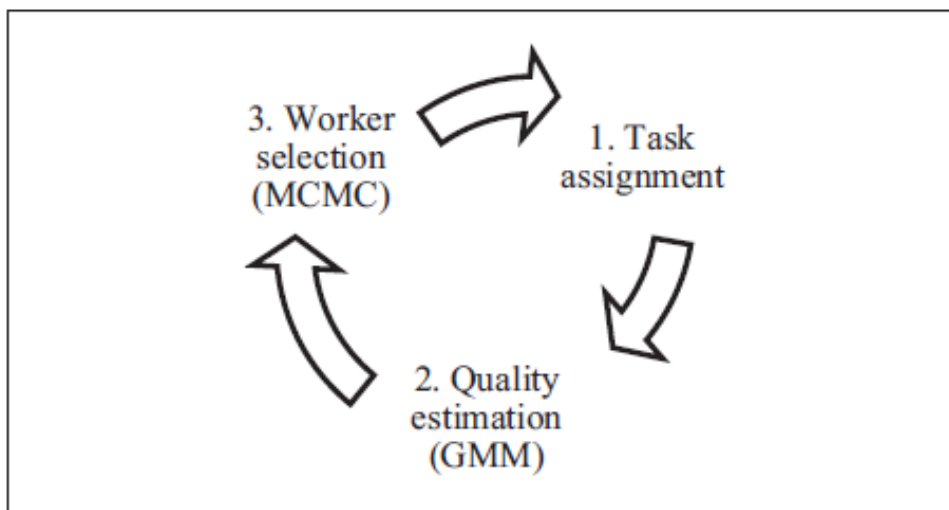


Figure 3: Steps MCMC-TA (Moayedikia et al, 2020)

Yuen et al (2015) discussed the issue of task recommendation for the crowd workers. According to the authors, this is a problem and, also, the workers have to spend a considerable amount of time to select a task. Moreover, the example provided by them shows that the number of available HITs for the crowd at MTurk was 80,000 on a daily average. Furthermore, two associated problems for task recommendation are also mentioned, for which the authors have proposed the TaskRec, a task recommendation system based on the probabilistic matrix factorization, to recommend tasks for workers in a dynamic way. The two main issues linked to this to be overcome are: lack of explicit ratings and the cold-start problem. The TaskRec Framework operates by recommending tasks to the crowd based on the historical performance of the workers and their task searching history.

Task recommendation system was also the main theme discussed in the work of Yuen et al (2012). In this paper, they have proposed a task recommendation framework for Crowdsourcing systems, which took into consideration the worker performance history and the history of task searching. Regarding worker performance history, it indicates how able the worker is to perform a certain task, based on the previous tasks that worker has already finished. In this system, the authors have included profile features such as saving information related to the date the worker created the account, total reward, and received qualifications. For the performance record, they have included data related to the number of browsed tasks, the number of selected tasks, the number of the tasks that were completed, the number of tasks that were accepted and the respective percentage. In reference to the task searching history of the worker,

Yuen et al have made some presumptions to measure if the crowd worker is interested in alike tasks, such as if the worker browsed the information of a task before, as well as if he selected the task. Another presumption is if she or he has accomplished the task, and if the requester has accepted the task already finished before by the worker. All of these might help in this system of task recommendation, because it is most likely that the worker is interested to work on a certain task, has preferences to work on similar tasks and also has the ability to actually perform the task.

As stated by Geiger et al (2014):

*“Current Crowdsourcing system does not address the alignment of the contributors and tasks. In most cases, the corresponding design features are limited to standard search functionality, task sorting, and filter mechanisms that are based on generic criteria such as thematic category, payment or date.”*

For Safran and Che (2017), in Crowdsourcing systems both requesters and workers have the same issues. The large amount of data and information, which are hard to find in the most accurate manner. This problem might be solved or minimized by real-time recommendation systems. At one hand, the workers want the best and most suitable tasks, with the best wage. On the other hand, the requesters aim to obtain the best workforce to complete the given tasks. To overcome these problems, the authors have proposed two real-time recommendation algorithms for Crowdsourcing systems, one is called TOP-K-T, in reference for task allocation and TOP-K-W, with the purpose of finding the best and most suitable worker for a given task.

The first algorithm, TOP-K-T was designed by the authors assuming that at certain Crowdsourcing systems, at any time, there are several tasks available, where each one has its own category, and a number of workers associated with the categories. Moreover, it was designed to match the most suitable *top-k* tasks for a worker at a real-time speed. Alternatively, the TOP-K-W algorithm tries to determine in the most accurate manner the *top-k* suitable laborers, taking into consideration their technical skills as well as if they are interested, to recommend to the requester in order to solicit them to work on the task.

For this thesis, it was created a scenario at section 3.1. about a microtask jobs through Crowdsourcing platforms with working relation with AI. This type of intelligence has been constantly evolving and its application is known in many fields. Therefore, it is apparent that several ethical issues might arise, especially when applied to Crowdsourcing online platforms. Furthermore, AI does not have a sense like humans have, for instance, distinguishing what is good or what is bad. In a Crowdsourcing platform, with the help of such technology, one has to be aware of it. In this case, the participants who are willing to do these jobs.

## 2.9 Ethical Aspects in Crowdsourcing

An ethical aspect might be defined as a system that compiles some principles. For Velasquez et al (1987) ethics are simply two things. Firstly, it is mentioned that ethics is based on well-founded standards of what the society would be most likely to do in life situations, taking into consideration what is right from what is wrong. Some examples presented by the authors, in terms of correct things, are: benefits to society, fairness, or specific virtues. On the other hand, they also state that the individual must withdraw from murder, stealing, and fraud. Secondly, ethics has to deal with the study and development of the ethical standards of the individual. This last argument is sustained by the fact that feelings, laws and social norms might go in another direction from what is considered to be ethics.

In every type of job, ethical aspects should be taken into consideration and Crowdsourcing online platforms should be no different. Moreover, this kind of work is usually done under poor work conditions and, besides that, the reward is low and uncertain. Therefore, ethics has to be accounted for. Standing and Standing (2018) classifies a few ethical issues in Crowdsourcing, based on case studies, as (i) economic, (ii) relational and (iii) knowledge implications. The first aspect, economic, should be when a company is looking forward to minimizing the financial risks involved and saving money; consequently, the firm can simply not use a generated idea and, additionally, businesses might not pay the appropriate rate according to the knowledge and skills of the participants. Regarding the relational, the authors mentioned that companies have to be specific and set out clear objectives about the task, otherwise people might be tricked to participate. The last ethical issue described by the authors, knowledge challenges, is when a company has access to an undefined number of

people's know-how. Therefore, if an idea is either recognised or rewarded, it can be considered as exploitation of the labourer, as participants in such a job also spend time and effort.

In regard to measuring people's ethical judgement and behaviour, there is a scale proposed by Reidenbach et al (1990) under the name *Multidimensional Ethics Scale* (MES). This scale was created in order to measure the individuals intend to act ethical when exposed to a scenario. When developing this scale, the authors have created three different scenarios, composed with different ethical dilemmas for their respondents to answer.

The first scale consisted originally of 33 items; however, it was reduced to eight items. The renewed scale consists of three dimensions that measures an ethical judgement and intention within different variables. The Dimension One is called a *broad-based moral equity dimension* and it consists of four items just/unjust; fair/unfair; acceptable/unacceptable to my family and morally right/not morally right. For Reidenbach et al (1990) this is the most complex of the three dimensions, and the authors suggested that this first dimension refers to individual's early training, back to childhood.

Dimension Two was named a *Relativistic Dimension*, and it is composed of two items traditionally acceptable/traditionally unacceptable. Reidenbach and Robin (1990) have stated "*This dimension seems to be more concerned with the guidelines, requirements, and parameters inherent in the social/cultural system than with individuals' considerations.*"

The third dimension is called a *Contractualism Dimension* and it comprises two items, violates/does not violate an unspoken promise and violates/does not violate an unwritten contract. In these items, notions of implicit obligations, contracts, duties and rules are present (Reidenbach et al, 1990).

Over the years, this scale was applied in different areas with the purpose of verify the extent of this scale, as proposed by the authors. Jones and Leonard (2016) have used this scale to measure an individual's ethical perception when they are exposed to different ethical situations regarding C2C e-commerce. The authors have hypothesized

four aspects and how each one of these would influence individuals to behave ethically according to five scenarios. The findings for this survey were Cronbach's alpha within a range 0.88 to 0.95. Moreover, the moral equity dimension had a greater influence in all scenarios, which led the researchers to conclude that a person will have less chance to act unethically when he/she has higher moral values.

The MES scale was applied in Jung (2009). In this work, the author wanted to study the Japanese's college students and its ethical judgement and behaviour intentions towards the approach of using three different scenarios which involved Information and Communication Technology (ICT) ethical associated problems. The internal consistency, Cronbach's alpha, was 0.83 for all dimensions. It was, likewise, found that the moral equity dimension presented significant results in influencing people's ethical judgement. Furthermore, in one of the proposed scenarios where there was plagiarism involved, the dimension about contractualism did not influence the respondent's ethical judgement. However, in the other scenario, where the issue was about software piracy the third dimension and its values about contractualism did influence the participants, because there was a clear contract and obligations that were set out.

## 2.10 Chapter Summary

Taking into consideration the background presented in the literature review, one can have a brief understanding of the digital labour market, how it is changing the way society used to know the labour market, and its challenges and implications. Moreover, even though the application of Crowdsourcing has been applied a long time ago, only in 2006 the term was coined by journalist Jeff Howe, representing a big step towards this field. The concept is in constant development and it might have several applications, especially with the evolution of technology, online platforms, and Artificial Intelligence. So, the term is developing, as well as the world of technology, which every day there is a new trend that might be helpful to our working daily lives. Another point worth talking about is that on the one hand technologies have positive aspects towards our society, on the other hand, they might have negative aspects and several issues to be taken into consideration.

It is likewise possible to notice that the digital economy has changed our society in some ways, connects with several people worldwide, works, and makes purchases. It is an aspect that is already intrinsic in nowadays life, with or without people's approval. The increasing development of IT resources, skilled labour to work in this development of new platforms, and the constant changes in the world such as pandemics, home office, remote work led the world to another state of thinking. Furthermore, it can also take to possible dispute human versus machines to work, which is called online labour exchange. To conclude, several problems will have to be taken into consideration if one wants to participate in this type of future work, for instance, legal regulations, labour rights, work surveillance, and ethical aspects related to Artificial Intelligence, like to what extent is this technology able to provide benefits or not for the future of online through platforms in Crowdsourcing.

### 3 RESEARCH PROCESS

#### 3.1 Introduction

To begin with, a process to conduct this master thesis was defined. This process, described in Figure 4, has five distinct steps, which each needs to be fully completed before advancing to the next.

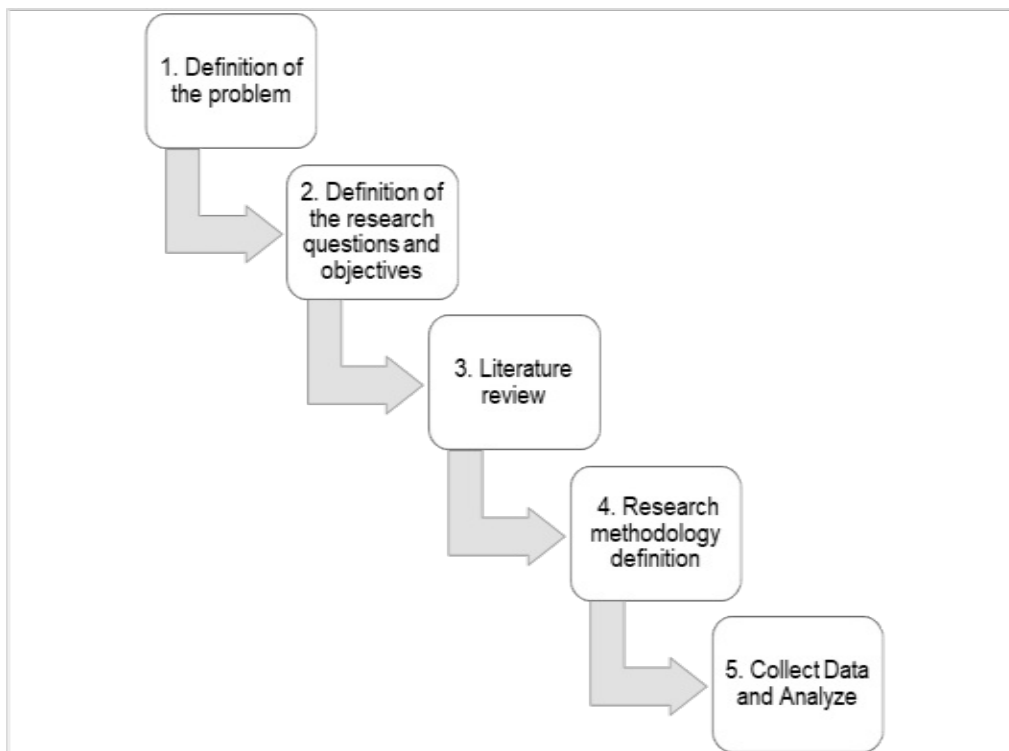


Figure 4: Research Process (created by the author)

Below is a description of all steps, with their purpose and results:

1. As it is possible to observe, the first step involved the definition of the problem. To achieve this, the area of interest of the author was taken into consideration, this being the use of Microtasking through Crowdsourcing online platforms. Then, articles about this subject were selected through research on various databases, including, but not limited to, Elsevier, Google Scholar, ScienceDirect, and Springer. It was identified that these Crowdsourcing platforms have ethics-associated issues and, to the best of our knowledge, there has not been extensive research related to the people's perceived ethics in relation to the workers who utilize these platforms.
2. After the conclusion of step 1, two research questions emerged regarding the research problem. Additionally, the author defined two objectives to respond to the research questions.
3. The third step was literature review. It has provided a theoretical framework for the case study. Several databases were utilized for this thesis as Elsevier, Google Scholar, ScienceDirect and Springer. Here, the basis for the master thesis was found. Relevant topics were searched, as history of crowdsourcing, classification of crowdsourcing, application of AI in crowdsourcing, ethical aspects and related works with digital economy.
4. First, in this step, the author set out to conceptualize a hypothetical scenario about crowdsourcing and work relation with AI. This scenario was the basis for this master thesis, and it was used to validate the hypotheses. In addition, the scales were defined according to what was intended to be measured; the participant's ethical judgement. The final sub-step was the survey application with an undefined network of people.
5. Finally, the data acquired through the survey was collected and analysed. The analysis was performed using SPSS and a set of defined statistical tests, (i) Kolmogorov-Smirnov and Shapiro-Wilk to test the normality of the dataset; (ii) Spearman's rank correlation to verify if there was an association between the variables, and (iii) Kruskal-Wallis H test, to understand if there was a difference between groups. In addition to the statistical tests, Box Plots were generated to understand the dataset distribution, the median, the quartiles and interquartile range.

### 3.2 Research Methodology

### 3.3 Scenario creation

The scenario about micro tasks job through Crowdsourcing online platforms and working relation with AI was created. This scenario was designed by the author, and an illustrative video was created and presented to the respondents. The video can be accessed through the QR Code in Figure 5.



Figure 5: QR Code scenario

The described scenario is in the text below.

*“Imagine that in a period of 5 years from now, you have decided to start working in a new kind of job, at home, by performing online tasks for technology companies. You decided this after learning that some companies and institutions take a function once performed by employees and outsource it to an undefined network of people in the form of an open call. This is called Crowdsourcing. One way of doing it is breaking down a main task in smaller parts, therefore it is easier for the crowd to perform them. After all, online platforms do exist in order to solve problems and to help in business issues.*

*These platforms use Artificial Intelligence for different purposes. At one hand, a platform might use Artificial Intelligence in order to help workers to find the most suitable task faster and more efficient. On the other hand, they also use artificial intelligence to monitor the progress and the quality of the task that is being performed by the worker. This intelligence will also be responsible to define when a task is completed, making sure that the worker only receives the reward when the task is done.*

*The company you started working as a crowd worker is the Amazon Mechanical Turk, the crowd sourcing platform powered by Amazon.*

*A certain day, you see a new task added to the platform, which has to be finished within two weeks. The company is developing a new product, and they need new ideas for it.*

*You have decided to participate and perform this task. When you accessed the platform, you noticed that five people, including you, are interested in doing this assignment. The Artificial Intelligence, which is responsible for the pre-selection of the candidates, approves four participants. You and the other workers start to work on the task for two weeks. For this work, it is mandatory to send the progress of the task each two days, and the platform returns with feedback, based on the information sent by the labourer. By the end of the first week, you see that the platform has eliminated one of the candidates, because Artificial Intelligence has identified that this one has copied a pre-existing idea from the same company.*

*Now, there are three candidates left for this task. Near the deadline, only two ideas remained, because the Artificial Intelligence has identified that one candidate's idea was not 100% completed, a few requirements were missing. At the very end, it is only you and another candidate, and both of you have fully completed the task. The platform analyses and chooses yours as the winner's idea. Therefore, you are the one who is rewarded."*

The purpose of the above-described scenario was to provide a situation which was the closest resemblance to the real world in a near future, more precisely, 5 years from now. Additionally, the scenario intended to provide a real-life situation, where people are performing tasks and having to go through a pre-selection process. Therefore, participants would have ease to image themselves in this scenario.

### **3.4 Definition of Scales**

The scales were defined according to the research questions and goals that the researcher wanted to achieve. The first research question involves ethical judgment; therefore, the Multidimensional Ethics Scale (MES) developed by Reidenbach and Robin (1990) was applied, and it is illustrated in Appendix C.

This scale consists of three different ethical dimensions. Each one measures people's ethical judgment, and behaviour, according to eight items. The first one is *Moral Equity*, and four items comprise this dimension, with a combination of three

philosophies (Nguyen and Biderman, 2008), (a) justice (just, fair); relativism (acceptable to family), and deontology (morally right). The *Relativism Dimension* evaluates people's perception of goodness and badness according to the social and cultural system they are located in, and it has two items, (a) culturally acceptable, and (b) traditionally acceptable. The third one is *Contractualism Dimension* and it is composed of two items (a) violates an unspoken promise and (b) violates an unwritten contract, and it concerns the notion of what is right or wrong. According to Nguyen and Biderman (2008), this dimension focused on the perception of assumed contracts that exist between people and society.

This scale was used in studies to measure ethical judgments and behaviours intentions towards proposed scenarios, involving ethical aspects for the sample to judge (Jung, 2009; Jones and Leonard, 2016; Gupta, 2010; Sheppard and Fennell, 2008). As the hypotheses of this thesis intend to understand the sample judgment towards a hypothetical scenario, the MES was chosen due to previous applications and it was proved to be reliable. In the initial studies about MES (Reidenbach and Robin, 1990), it was proved to have relevant internal consistency among the variables, using the Cronbach's alpha (Cronbach, 1951). The Cronbach's alpha in the original study from 1990 ranged between 0.71 and 0.92, concluding a high degree of internal reliability, thus, the dimensions are measuring the same construct, which is ethical judgment and behaviour intentions.

Additionally, the short Computer Anxiety Scale (Lester et al, 2005), Appendix D, was chosen to make an association with people's ethical judgment. It is a 6-item scale, and this requires a Likert-type response. It consists of six statements, and it aims to measure the fear of technology. For Lester et al (2005) this scale is suitable for researches when the researchers intend to measure people's computer anxiety shortly.

### 3.5 Survey application

After the definition of the scales, the survey was applied through an online platform, Google Forms. The first section of the survey available to the participants consisted of a brief cover letter, Appendix A, containing general information. The duration of the questionnaire was approximately 15 minutes, including the instructional video with the proposed scenario and the questions. Besides pre-existing scales, this survey also

had a demographic section, Appendix B. Furthermore, the last question was open for respondents to write the first word that came into their minds when they think about the scenario.

In total, 118 participants had responded to this survey, which was carried out in the period from January 19th, 2021, to February 12th, 2021. The initial target was 100 persons, to have higher reliability. Therefore, the number of individuals was higher than expected. Moreover, the author sent the survey to the crowd to achieve several groups of people as they differ in age groups, educational backgrounds, company roles, and years of experience. This purpose was to not bias the research to a specific group but to obtain enriching data from different groups.

The survey was applied based on the scenario about micro tasks jobs through Crowdsourcing online platforms. The idea was to propose to the participants that they visualize themselves in this situation and, based on what was explained, make their ethical judgment according to the MES scale to test the hypotheses.

### **3.6 Data Collection**

The survey was conducted, resulting in significant data collected from the 118 participants. After the last day of the survey, the data was processed through the statistics Software IBM SPSS. The data produced substantial and relevant results because the scales used are present in literature and were applied before in different articles for the same purposes.

Before proceeding to the data analysis, the data was processed. There was a filter question, Q1, and eight respondents were disregarded since they have answered the alternative “Never worked”. Thus, resulting in 166 valid answers. This question disregarded the ones who checked this option, because in this research it was only taken into consideration the ones who are either working at the present or have previous work experience.

Furthermore, some other respondents were disregarded, more specifically 27; thus, resulting in 139 valid responses. In addition to that, 21 answers were removed from the analysis because these persons have answered the survey duplicated. Resulting in 118 valid responses for further investigation and discussions.

### 3.7 Data Analysis

The first step for data processing was to group the participant's information. The participants age was not categorized, instead of, it was calculated the mean and standard deviation.

The level of education was divided into three groups, as illustrated in Table 3. Respondents who answered High School or Technical College were categorized in the group 0. The individuals who responded the option Bachelor falls into category 1. The participants who have master's degree, MBA, Ph.D. or have written any other type of post-graduation, were grouped in category 2.

Categorization	Groups
0	High School (or equivalent)
1	Bachelor (or equivalent)
2	Post-Graduation

Table 3: Level of education groups

The field of work was categorized into three groups, according to Table 4.

Categorization	Groups
0	Exact Sciences
1	Human Sciences
2	Biological Sciences

Table 4: Field of work groups

The author grouped the participants according to their company roles, Table 5. The participants who have answered intern/trainee, analyst or have written an entry level job in the option "Other". The mid-level was categorized as 1, according to participant's responses. The top management level was that persons who have answered CEO, Director, Manager/Head of Department, Coordinator/Supervisor.

Categorization	Groups
0	Entry Level
1	Mid-Level
2	Top Management

Table 5: Company role groups

After the group's categorization, the data was processed to SPSS Software. There, it was verified if there were questions missing responses. If there was one, this was disregarded from the analysis. The raw data was treated, and further analysis was conducted.

The first analysis was to figure out if they followed a normal distribution; therefore, the author performed two statistical tests. The first one was Kolmogorov-Smirnov, and the second was the Shapiro-Wilk. These tests provided information about whether the dataset distribution follows the Gaussian distribution. These were tested under the following hypothesis:

*H0: the dataset is normally distributed ( $p - value > 0.05$ )*

*H1: the dataset is not normally distributed ( $p - value < 0.05$ )*

The measurement of central tendency used was the median, as the dataset did not follow a normal distribution. After that, the boxplot was created to illustrate the data distribution. This first analysis was to explain what is occurring with the collected data, and to analyse for which side of the scales there was the tendency of responses. This is helpful to understand the data and formulate a conclusion in the light of the hypotheses answering the research questions.

The Cronbach's alpha was calculated for the three dimensions between its own variables. This is a measure of internal consistency and reliability for the survey. It was verified on previous literature that this value was calculated. Moreover, the authors of this scale also calculated this alpha. Therefore, it was appropriate to calculate for this thesis.

The second part of the analysis was to establish relationships between variables. Spearman's correlation test was chosen to test the association between the variables from this scale. The goal of this analysis was to verify whether significant correlations existed within the variables from the dimensions. The hypothesis for this correlation test was:

*H0: there no significant association between A and B ( $\alpha > 0.05$ )*

*H1: there is significant association between A and B ( $\alpha < 0.05$ )*

Besides that, the Spearman's correlation test was also used to verify possible correlation between fear of computer, which was measured through CAS, and the variables from MES. In order to proceed with this analysis, the author summed the scores of CAS and created a new variable in SPSS named "Fear of computer".

Then, the Kruskal Wallis test was performed to identify if there was a difference in people's ethical judgment towards the scenario according to the groups company role, age, level of education, and fear of technology. It was tested the following general hypothesis for the groups:

*H0: the distribution X is the same across Y categories ( $\alpha > 0.05$ ).*

*H1: the distribution X is different across Y categories ( $\alpha < 0.05$ ).*

## 4 RESULTS

In this chapter the results will be presented. They are decomposed in eight subchapters. The raw data necessary to do this research is available in the QR Code in Appendix F.

### 4.1 Demographic variables

The participants (n=118) age average was 36.86 (SD= 12.096). The categories to be shown are level of education, the field of work, and company role. This data is presented in Table 6.

Variable	Category	Percent
Level of Education	High School	10.2%
	Bachelor	37.3%
	Post-Graduation	52.5%
Field of Work	Exact Sciences	69.5%
	Human Sciences	25.4%
	Biological Sciences	5.1%
Company Role	Entry level	39.8%
	Mid-level	22%
	Top Management	38.1%

Table 6: Sample demographic characteristics

## 4.2 Multidimensional Ethics Scale Results

Table 7 states the three Dimensions and, respective, the variables which respondents were faced with.

Dimensions	Variables
MORAL EQUITY DIMENSION (I)	<i>Justice</i>
	<i>Fairness</i>
	<i>Moral</i>
	<i>Family acceptance</i>
RELATIVISTIC DIMENSION (II)	<i>Tradition acceptance</i>
	<i>Cultural acceptance</i>
CONTRACTUALISM DIMENSION (III)	<i>Violates an Unspoken Promise</i>
	<i>Violates an Unwritten Contract</i>

Table 7: Multidimensional Ethics Scale dimensions

## 4.3 Ethical judgment

The Box Plot illustrated in Chart 1 indicates relevant information about the data variability, the skewness, and the median for each variable. Where 1 = Ethical, 4 = Neutral and 7 = Unethical.

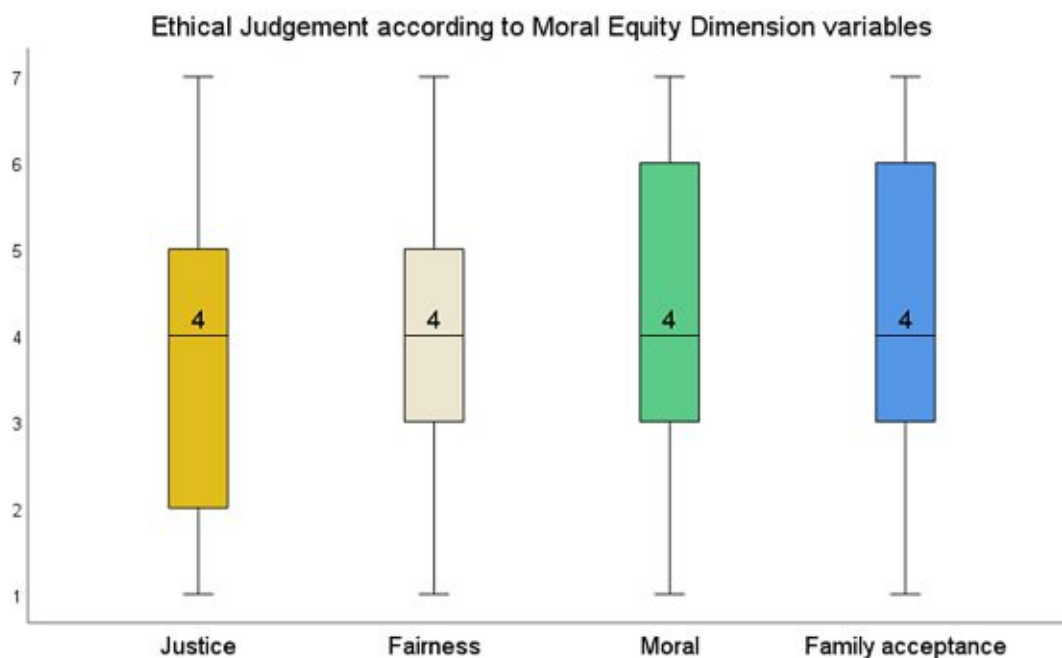


Chart 1: Box-Plot for Justice, Fairness, Moral and Family acceptance

Even though these variables are similar in the median, their boxes differ. For Just distribution, represented in the brown box, it can be assumed that the ethical

judgment of the participants, according to this concept, tends to the unjust side, which is unethical. The same applies to *Fairness* about the tendency towards the consideration of an unfair scenario. *Moral* and *Family acceptance* have an equal tendency as the other two variables, towards not moral and not acceptable to family sides of the scale.

The Box Plot, in Chart 2, provides information about the distribution of the data for *Tradition Acceptance* and *Culture Acceptance*. It can be concluded, based on the evidence illustrated in Chart 2 that both datasets have an equal median of 5, therefore they are similar. The purple box has less variability of data when comparing to the brown box. Nonetheless, the results from Box Plot are that the respondents perceive the scenario as being traditionally unacceptable and culturally unacceptable, leading to the highest values of the Likert scale.

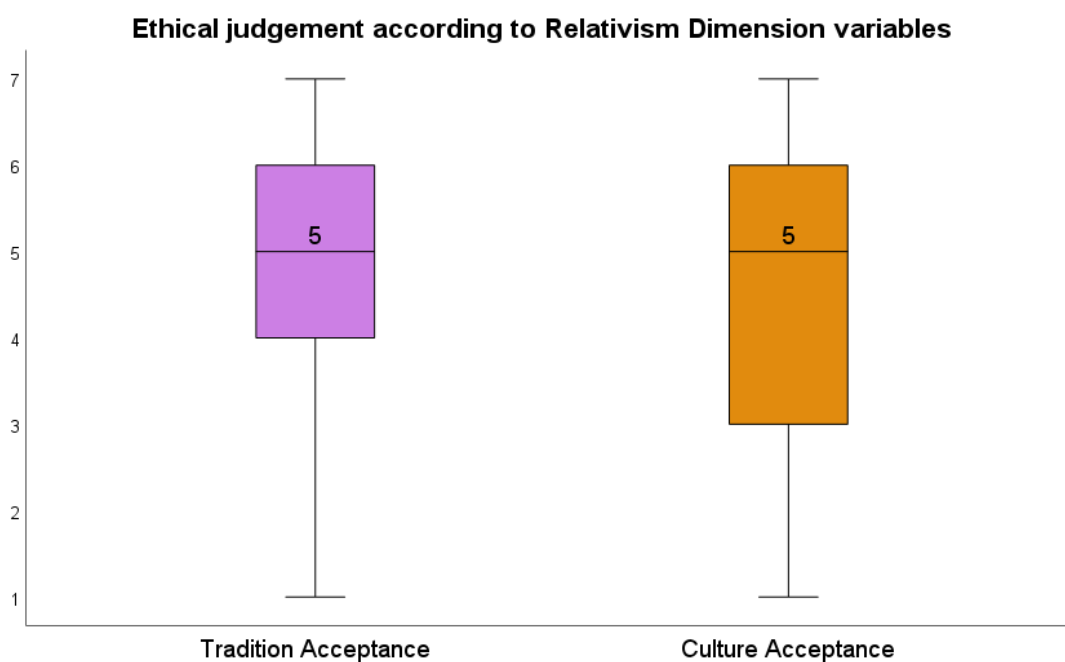


Chart 2: Box-Plot for Tradition acceptance and Culture acceptance

The Box Plot, in Chart 3, provides information about the distribution of the data for *Unspoken Promise* and *Unwritten Contract*. It can be concluded, based on the illustrated evidence in Chart 3, that both datasets have an equal median of 3, therefore they are similar. Nonetheless, the results from Box Plot are that the respondents perceive that the proposed scenario did not violate either an unspoken promise or an unwritten contract.

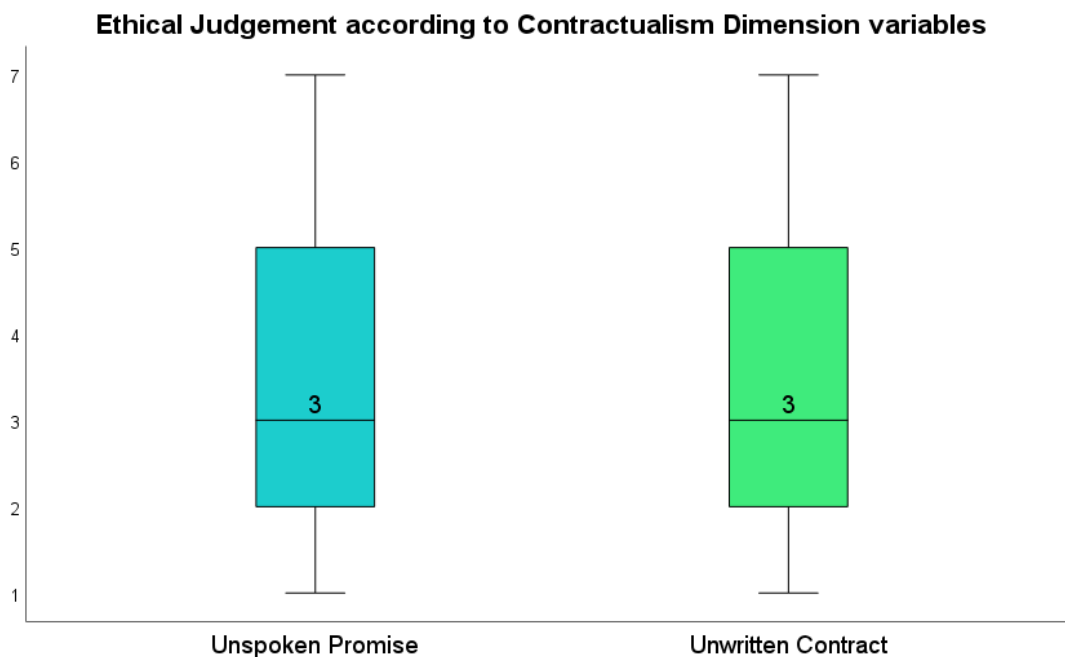


Chart 3: Box-Plot for unspoken promise and unwritten contract

#### 4.4 Correlation between MES variables

It was found correlations within the variables of this scale, and the main Table is at Appendix E. In order to verify and understand the correlations, the Spearman correlation test was carried out, as described in section 3.7.

Table 8 illustrates the Spearman's coefficient of correlation between the variables from the first dimension.

The pair *Justice-Fairness* had a  $\rho=0.839$ . This indicates a strong positive correlation between these variables. This means that, the higher the tendency for the participants to judge the scenario as unjust, the more likely it is for them to consider as unfair, and vice-versa.

Regarding *Justice - Moral* the  $\rho=0.751$ . Meaning that there is a strong and positive, correlation between these variables. To summarise, the higher the propensity for the respondents to believe that the scenario is Just/Unjust the higher the propensity they think it is Morally Right/Not Morally Right.

Correlations	Spearman coefficient ( $\rho$ )	p-value
<i>Justice-Fairness</i>	0.839	0.000
<i>Justice-Moral</i>	0.751	0.000
<i>Justice-Family acceptance</i>	0.625	0.000
<i>Fairness-Moral</i>	0.751	0.000
<i>Fairness-Family acceptance</i>	0.658	0.000
<i>Moral-Family acceptance</i>	0.654	0.000

Table 8: Correlation between variables from Dimension I

Looking at *Justice – Family Acceptance* Spearman’s correlation coefficient is 0.625. This indicates a strong and positive correlation. From this result, it can be suggested that the higher tendency for people to believe the scenario is Just/Unjust, the more they think it is Acceptable to Family/Not Acceptable to Family.

About *Fairness - Moral* the  $\rho$  coefficient=0.751, therefore, there is a strong and positive correlation. Thus, there is a higher propensity for those who agree that the scenario is Fair/Unfair to have a higher tendency to, likewise, believe that it is Morally right/Not Morally right.

The correlation for *Fairness – Family acceptance* is  $\rho=0.658$ , “Strong” and positive. It can be concluded that there is a higher propensity for the respondents who agree that the scenario is “Fair/Unfair” to have a higher tendency to believe that it is likewise Acceptable to Family/Not Acceptable to Family.

For the correlation between the variables *Moral – Family acceptance*, the  $\rho=0.654$ , meaning that the Spearman’s correlation coefficient is positive. Moreover, it falls into the range as “Strong”. It can be suggested that the higher susceptibility for the participants who considered that this scenario is Morally Right/Not Morally Right to have a higher tendency to believe that it is Acceptable to Family/Not Acceptable to Family.

Table 9 presents the Spearman's coefficient of correlation between the variables *Tradition acceptance* and *Cultural acceptance*, which composes the second dimension.

Correlations	Spearman coefficient ( $\rho$ )	p-value
Tradition acceptance- Cultural acceptance	0.729	0.000

Table 9: Correlation between variables from Dimension II

According to Table 10, the  $\rho=0.729$ . Therefore; it is possible to conclude that there is a strong and positive correlation. This means that the higher the propensity for the participants to agree that the scenario is Traditionally Acceptable/Traditionally Unacceptable, the higher the tendency for them to agree that it is Culturally Acceptable/Culturally Unacceptable.

Table 10 presents the Spearman's coefficient of correlation between the variables *Violation of unspoken promise* and *Violation of an unwritten contract*, which composes the third dimension.

Correlations	Spearman coefficient ( $\rho$ )	p-value
Violation of an unspoken promise-Violation of an unwritten contract	0.613	0.000

Table 10: Correlation from variables of Dimension III

The  $\rho=0.613$ , resulting in a conclusion of a strong and positive correlation among these variables. In sum, the higher the propensity for the respondents to believe that the scenario Violates an Unspoken Promise/Does not Violate an Unspoken Promise, the higher the tendency for them to agree that it Violates an Unwritten Contract/Does not Violate an Unwritten Contract.

#### 4.5 Cronbach's Alpha

This coefficient is used to identify if the scale which was used is reliable and internally consistent. Table 11 illustrates Cronbach's alpha values and the level of consistency for each range.

Value of $\alpha$	Level of Consistency
$\alpha \geq 0.9$	Excellent
$\alpha \geq 0.8$	Good
$\alpha \geq 0.7$	Acceptable
$\alpha \geq 0.6$	Questionable
$\alpha \geq 0.5$	Poor

Table 11: Cronbach's alpha range

The Cronbach's  $\alpha$  for the first dimension was 0.909. It falls into the range of "Excellent". For the second dimension was 0.847, falling into the range of "Good". The third dimension had a value of 0.772, which is "Acceptable".

#### 4.6 Ethical judgment and sample categorization

Here, the results regarding the association between MES variables and demographic variables are presented.

##### 4.6.1 Violation of an unwritten contract and fear of computer correlation

The researchers found significant correlation between *Violation of an unwritten contract* and the *Fear of computer*. The  $\rho = 0.211$ , and the significance was 0.022, the results are in Table 12. For the other ethical variables, there was no correlation with fear of computer.

Variables	Correlation	p-value
Violation of an unwritten contract – Fear of computer	$\rho = 0.211$	0.022

Table 12: Spearman's correlation test for Violation of an Unwritten contract and fear of computer

##### 4.6.2 Level of Education

It is possible to visualize in Chart 4, that the median differs among these three groups from the category Education. Moreover, when analysing the boxes, it can be stated that people's perception of a violation of an unspoken promise, for the High School (or equivalent) and Bachelor (or equivalent) groups, is shifted to the left side of the Likert scale, in other words, the scenario does not violate an unspoken promise. However, the persons categorized in the Post-Graduation have a different understanding of the situation. They comprehend that an unspoken promise is being violated.

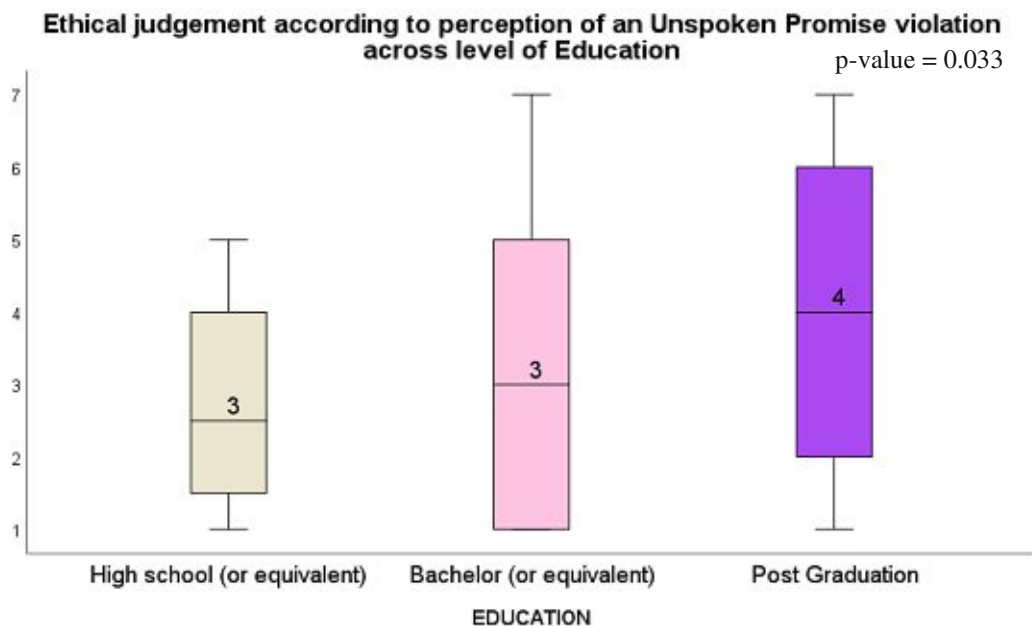


Chart 4: Box-Plots for perception of violation of an unspoken promise between education levels

The Box Plots illustrated in Chart 5 provides sufficient information that people's perception about ethics differs within the education levels.

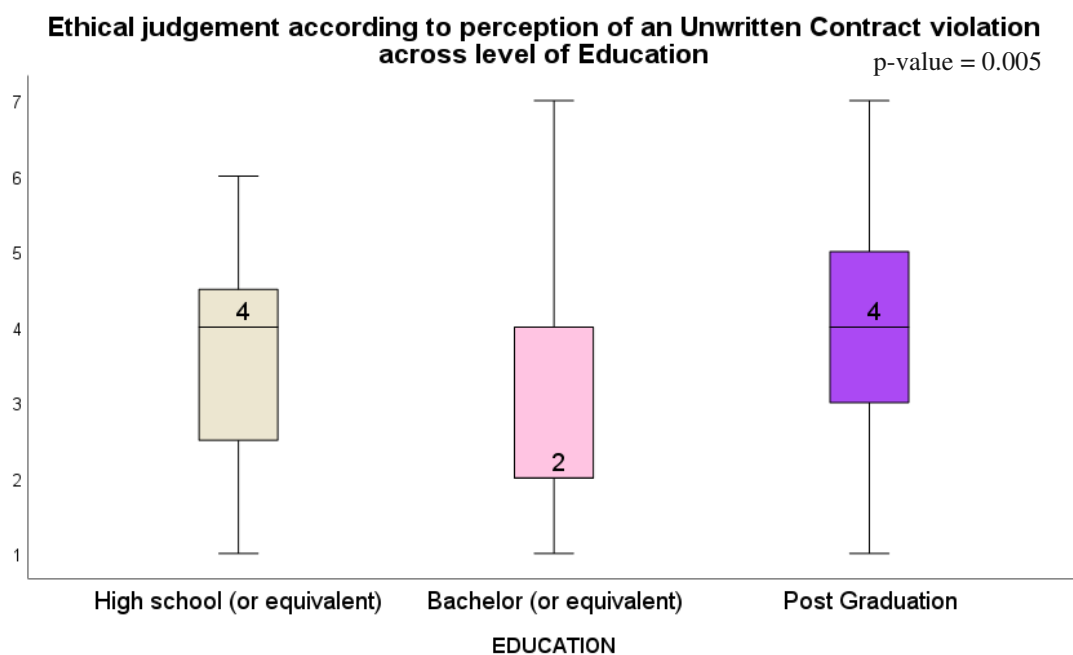


Chart 5: Box-Plots for perception of violation of an unwritten contract between education levels

It is possible to visualize that the median differs among these three groups from the category Education. Moreover, when analysing the boxes, it can be stated that people's perception of a violation of an unwritten contract, for the Bachelor (or equivalent), it is towards the lowest values of the Likert scale, which represents ethical. The persons

categorized in the Post-Graduation have a different understanding of the situation. They comprehend that an unspoken promise is being violated. The individuals from the High School (or equivalent) group and Post-Graduation have a different perspective. The author did not find any other significant correlation for an unspoken promise.

#### 4.6.3. Company role

There is sufficient evidence to say that there is a statistically significant difference across the company roles categories. There is a difference of how people think about *Justice* when comparing the entry level, mid-level and top management. This fact is illustrated in Chart 6, where there is the box plot for Entry Level, Mid-Level and Top Management. It is possible to see that the Top Management group, in dark blue, believe towards a Just Scenario.

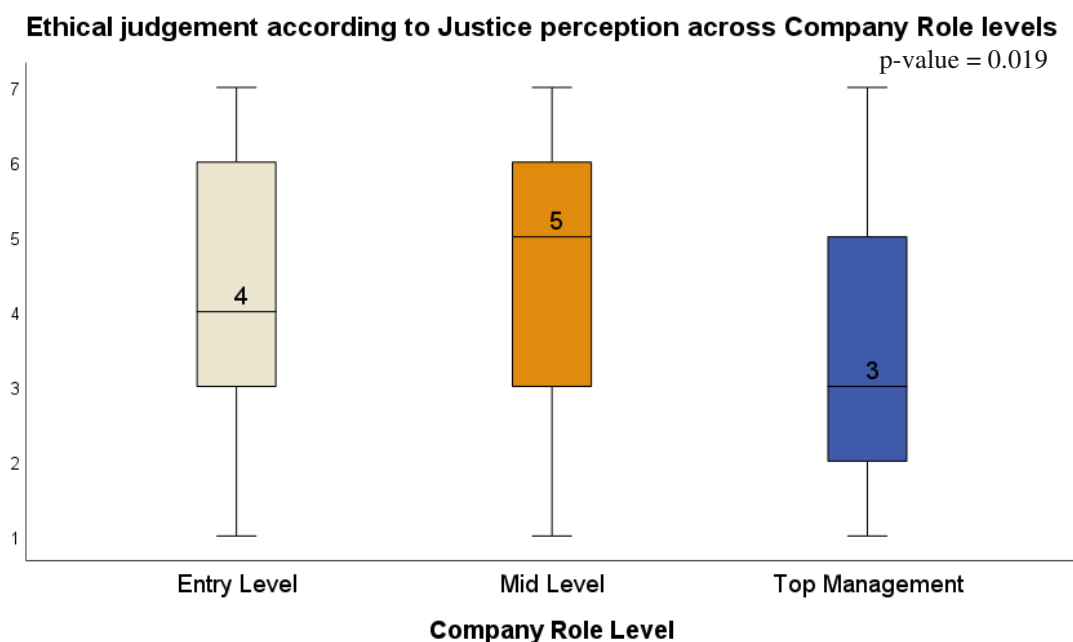


Chart 6: Box-Plots for perception of justice between company role levels

There is sufficient evidence to say that there is a statistically significant difference across the company roles categories. There is a difference of how people think about *Fairness* when comparing the entry level, mid-level and top management.

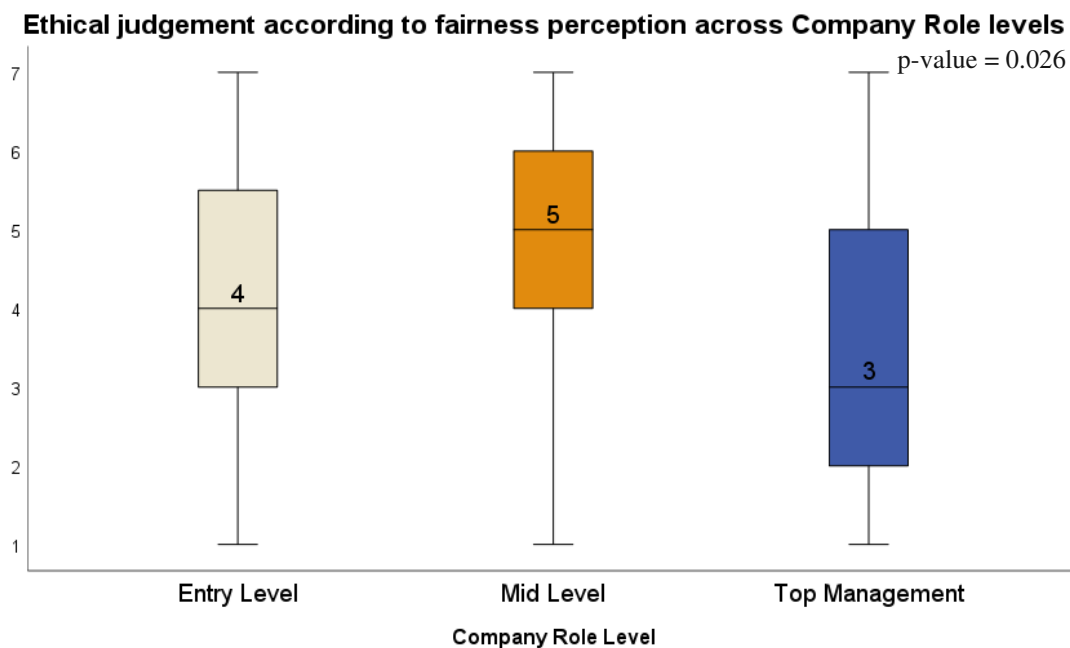


Chart 7: Box-Plots for perception of fairness between company role levels

The section 4.4 provided relevant information to test H2. As it seeks for correlation and differences of perceptions within a group. First, it was performed a Spearman correlation to verify the association between fear of technology and perception of a violation of an unwritten contract. After that, the Kruskal-Wallis H test was conducted in order to search for differences between the people's perception of ethics when considering justice and fairness concepts among three groups of company role. Moreover, this same test was conducted to understand if there was a difference about the individual's perception of an unspoken promise and an unwritten contract being violated and the education levels.

#### 4.7 Cloud of Words

The last question of the survey was an open one, and it was asked for the participants to express themselves in one word what came to their minds when they think about the Crowdsourcing scenario. Although it required only one word, some participants might have misunderstood the context of the question, and have responded in a form of a phrase. Furthermore, one of them had to be disregarded for this analysis, because it did not answer properly for a Cloud of Words analysis.

Therefore, having said that, before presenting the cloud of words, the phrases from a few respondents will be shown and interpreted, according to the author's knowledge.

The phrases are written below, and one does not know who wrote these statements, thus, protecting the data from the participant. Even though these are only statements written by a few people from a sample of 118 respondents, it is quite relevant as this survey is about technology and human beings are being interviewed. The significance of these three people's statements might be a warning about the future in technology, or, at least, a starting point to think about this issue.

**Statement 1:** *“Hard to answer as it looks like the questions are very polar in nature, we as humans are almost planets within our own universe.”*

The first statement must be considered and analysed alone, because it does not show any similarity with statements 2 and 3. As statement 1 does not provide clear evidence about technology itself, the interpretation is on account of the author. One possible clarification for this phrase would be that we as humans are very small persons when we consider the technological possibilities, we have among us. In other words, society has so many options of technology nowadays, and humans are reduced to nothing when compared to this overwhelmed technological world that one is living in.

**Statement 2:** *“I think it is unfair, unreasonable, because of two things: 1- Someone worked 99% but got nothing, 2- Only AI judgment.”*

**Statement 3:** *“Unless I am extremely desperate, I would not work in such a scenario. Workers need to be rewarded for every hour of effort they put in.”*

When reading statements 2 and 3, it is possible to see the similarity of both, even though it was written by different persons. Both agreed that the other candidates in the proposed scenario should have received the monetary income for their work. Furthermore, this scenario might be considered, for these respondents, not fair and not reasonable. Moreover, both statements are not positive when thinking about the scenario. It might be the case that when there is a strong presence of technology such as Artificial Intelligence, people do not see it as a very positive aspect.

In the case of the proposed scenario, AI makes all the judgment. There is no place for humans to make this. Therefore, it can be concluded that (i) even though it is an online Crowdsourcing platform, on the other side of the screen, we are still dealing with a person; (ii) only Artificial Intelligence judgment might not be the fairest; (iii) other four participants in the hypothetical scenario have worked, however, only one have

received the reward; thus, resulting in not equally consideration of the hours that others have spent to try to do this task.

In order to give an overview about the words that people wrote the most when thinking about the Crowdsourcing scenario, a cloud of words was made by using Word Art. This is presented in Appendix E, and it is possible to be seen that the majority of the respondents thought about “Future”, as a first word of response to this scenario, as it is the bigger word in the cloud. When one looks, the second one is “Unfair”, which might be somehow related with the statements. “Exploitation” would be in third place of this word ranking. The limitation when using a cloud of words is that there is no possibility to do a statistical analysis.

Making a short analysis with the three most written words (i) Future; (ii) Unfair and (iii) Exploitation, it is possible to conclude that most people think that this, indeed, the future of most companies, however, it can be unfair with those workers who has also spent their time and effort in doing the task. Additionally, for “Exploitation”, it is possible to make correlation with “Unfair”, because as five participants have worked in this task at the Crowdsourcing scenario, but not all of them were rewarded, some people have considered this scenario as an exploitation of the labourers.

## 5 DISCUSSION

### 5.1 Introduction

In this chapter, a discussion of the results previously presented in Chapter 4 is performed. The results from the survey were only presented in Chapter 4 but not confronted with the research questions R1 and R2.

RQ1: *“What is people’s ethical judgement towards Microtasking Crowdsourcing scenario where Artificial Intelligence is applied?”*

RQ2: *“Do people’s ethical judgement towards a scenario differ according to groups?”*

### 5.2. Research findings RQ1

RQ1: *“What is people’s ethical judgement towards Microtasking Crowdsourcing scenario where Artificial Intelligence is applied?”*

The objective for this question was (I) to verify people's ethical judgement in a Microtasking Crowdsourcing platform scenario, where Artificial Intelligence is applied.

RQ1 can be explained by the Multidimensional Ethics Scale and its findings. An ethical judgement is based on three dimensions, each composed of different variables, which measures ethics from different perspectives. Each of the three dimensions measures ethics in different perspectives, with the corresponding variables. Therefore, the respondent's ethical judgement had to be separately analysed according to the three dimensions and their distinct variables. The findings for the first dimension are presented in Table 13.

Dimension	Variables	Median
Moral Equity Dimension (I)	<i>Justice</i>	4
	<i>Fairness</i>	4
	<i>Moral</i>	4
	<i>Acceptance to family</i>	4

Table 13: Descriptive statistics for Dimension I

Each variable from the Moral Equity dimension presented 4 as median, meaning that they are similar. In Chart 1, subchapter 4.4., the box plots for these variables, *Justice*, *Fairness*, *Moral* and *Acceptance to family*, provided information that the participants tended to judge the scenario towards the unethical side of the scale (1=ethical; 7=unethical).

Dimension (I) deal with goodness, justice, rightness, and fairness and, additionally, concerning acceptance to family. Therefore, this result can be explained because these aspects are the ones an individual learns since the childhood, at home, when family instructs and explains to distinguish the good and the bad, the wrong and the right (Reidenbach and Robin, 1990). The Moral Equity Dimension involves intrinsic aspects inherent to a particular person. Therefore, it can be suggested that the respondents, when exposed to this scenario, believed that it was not right or either that not all crowd workers were being treated equally, that they might have suffered a disadvantage by the AI.

Regarding the correlations between the variables of the first dimension, the results found are illustrated in Table 14.

<b>Correlation pair</b>	<b>Spearman correlation (<math>\rho</math>)</b>
<i>Justice-Fairness</i>	0.839
<i>Justice-Moral</i>	0.751
<i>Justice-Acceptance to family</i>	0.625
<i>Fairness-Moral</i>	0.751
<i>Fairness- Acceptance to family</i>	0.658
<i>Moral-Acceptance to family</i>	0.654

Table 14: Spearman correlation results for Dimension I

Analysing the data provided in Table 14 shows that these variables vary within a range from 0.625 to 0.839 of Spearman's correlation coefficient. They are highly and positively correlated with each other. This was an expected result, since these variables encompass various aspects which are intrinsic to human beings. These variables are the ones that help individuals to form their ethical judgement based on the initial guidance and mentoring we receive from the early stage of our lives.

Therefore, one reason to explain the strong correlation among these variables and the ethical judgement of the participants according to the proposed scenario is that they believe that the described Microtasking job was unethical consistent with their inherent values. In a deeper sense, an assumption that can be made is that as in the scenario there was a major existence of AI judgments, the participants believed that it was not ethical when they remembered the values they were taught. Perhaps, the ethical and correct way for them would be to have less interference of this technology, because the crowd workers suffered as only AI was evaluating their work and progress.

The internal consistency, or Cronbach's alpha, for the Moral Equity Dimension was  $\alpha = 0.909$ . This value indicates that the four variables from this dimension measure the same construct, and there is an excellent internal consistency as  $\alpha \geq 0.9$ .

The findings for descriptive statistics about the second dimension are presented in Table 15. The Relativistic Dimension is related to the social and cultural system a person is infused with.

Variables	Median
<i>Traditionally Acceptance</i>	5
<i>Culturally Acceptance</i>	5

Table 15: Descriptive statistics for Dimension II

The variable *Traditionally acceptance* presented a median of 5, which means that respondents have the tendency to judge this type of job as not traditionally acceptable. One reason that could explain this fact is that people tend to believe that a job is considered tradition when there is less interference of AI, because in the case of the proposed scenario, this intelligence was responsible from the beginning of crowd workers pre-selection and to measure and control their task progress. Furthermore, another reason for this traditionally unacceptable judgement is that the participants are not yet ready for a Microtasking job through online platforms, because they expect that a job has to be done within a physical company.

Participants' judgement for the variable *Culturally acceptance* was similar to *Traditionally acceptance*. The data presented in Table 15 leads to the conclusion that the dataset of responses is shifted to the right side of this Likert scale. Therefore, participants judged this scenario as culturally not acceptable. There are a few explanations for this fact to happen. The first one would be that the respondents work in conventional companies, where the corporate culture is robust and relevant, and the values and guidelines that govern this system are based on this company's culture. Therefore, the Microtasking work based on online platforms is not culturally acceptable according to what the participants are used to know about jobs and traditional companies. Another reason that could explain the participant's agreement towards traditional unacceptable is that they are habituated to work in a company, where they have contact with other people and their tasks are yet analysed by a human, therefore, as the scenario proposed a higher presence of AI, and just AI judgement regarding the crowd workers task, the participants considered this type of work as not traditionally acceptable.

In regard to the correlations between the variables of the second dimension, it was found according to what is illustrated in Table 16. These two variables are highly and positively correlated. This means that there is a tendency among the respondents who

considered the Microtasking scenario to be not traditionally acceptable, that these same persons believe that it is likewise not culturally acceptable. This means that these two aspects are highly correlated when participants needed to form their ethical judgement regarding the scenario.

Correlation pair	Spearman correlation ( $\rho$ )
<i>Traditionally Acceptance- Culturally Acceptance</i>	0.729

Table 16: Spearman correlation results for Dimension II

It can be, therefore, concluded that, as both variables are positively correlated, the participants considered both when performing their ethical judgement. Moreover, considering this dimension, it can be indicated that they judged the proposed scenario of Microtasking through online platforms as unethical.

The internal consistency, or Cronbach's alpha, for the Relativistic Dimension was  $\alpha = 0.847$ . This value indicates that the two variables from this dimension measure the same construct, and there is good internal consistency as  $\alpha \geq 0.8$ .

The findings for descriptive statistics about the third dimension are presented in Table 17. The Contractualism Dimension is related to the concept of the contract that exists between persons and companies.

Variables	Median
Violates an Unspoken Promise	3
Violates an Unwritten Contract	3

Table 17: Descriptive statistics for Dimension III

The variable *Violation of an unspoken promise* presented a median of 3, and a positive skewness, which means that respondents have the tendency to believe that this kind of job does not violate an unspoken promise. Therefore, there was a common response among the participants that, according to this variable, the proposed scenario tends to be ethical. One reason to explain this is that the participants believed that this is a modern type of job, and no promise was made in this scenario, which led them to agree that it did not occur a violation of an unspoken promise.

Variable *Violation of an unwritten contract*, likewise, has a median of 3. Therefore, there is a tendency of perception among the participants that this job does not violate an unwritten contract. The first reason to interpret this fact is that the respondents have the understanding that the Microtasking job proposed in the Crowdsourcing scenario was in a sense a contest, where you perform a task once in a while and no contract is formed.

The internal consistency, or Cronbach's alpha, for the Contractualism Dimension was  $\alpha = 0.772$ . This value indicates that the two variables from this dimension measure the same construct, and there is an acceptable internal consistency as  $\alpha \geq 0.7$ .

Regarding the correlations between the variables of the third dimension, it was found according to what is illustrated in Table 18. These two variables are highly and positively correlated. This means that there is a tendency among the respondents who considered that the Microtasking scenario did not violate an unspoken promise, to believe that did not violate an unspoken promise. These two aspects are highly correlated when participants needed to make their ethical judgement regarding the scenario.

Correlation pair	Spearman correlation ( $\rho$ )
Violates an Unspoken Promise-Violation of an Unwritten contract	0.613

Table 18: Spearman correlation results for Dimension III

It can be suggested that, when the participants made their ethical judgement taking into consideration these two variables, they considered them to the same extent. Thus, it can be suggested that the participants judged the scenario, according to these two variables from the contractualism dimension, as ethical. It was the only dimension where respondents judged towards ethics (1= ethical; 7= unethical). They believed that an unspoken promise and an unwritten contract were not broken. In the case of this Microtasking job, the crowd workers agreed to participate and perform the proposed task, however, no contract or promise was made. Even though this is a fact, perhaps the participants did not take into account that it could be a matter of obligation,

implicit, that the task requesters comply with proportional reward to the ones who had invested their time and effort in completing this task. This leads room for a counter question, shouldn't the participants perceive an implicit obligation on the part of the requester? Moreover, if on the task description was written a statement regarding who would be responsible for judging the crowd workers' tasks, in this case AI; would the participants comprehend differently?

### 5.1.1 Hypothesis 1

The hypothesis 1 is stated below:

H1: scenarios which involve working relationship with an important presence of AI are considered to be less ethical.

This hypothesis was partially accepted. The results encountered and presented in subchapter 4.3 provided sufficient information to affirm that, for Moral Equity and Relativistic dimensions, individuals consider the scenario to be less ethical. However, the results for Contractualism dimension differ. Here, the respondents judged the scenario as more ethical.

## 5.2 Research findings RQ2

RQ2: *“Do people’s ethical judgement towards a scenario differ according to groups?”*

The objective for this question was to evaluate how ethical people judge a scenario of working relationship with AI according to company role, level of education, age and fear of technology.

A statistically significant correlation was found between the two variables from the first dimension and the participant's company role. The Kruskal-Wallis results are presented in Table 19.

Dimensions	Variables	Kruskal-Wallis Test	Variable
Moral Equity	Justice	Sig. 0.019	Company Role
Dimension (I)	Fairness	Sig. 0.026	Company Role

Table 19: Kruskal-Wallis test results for Justice and Fairness and Company Role

There was a significant difference, respective sig. 0.019 for Justice and 0.026 for fairness, between the three-company roles (Entry Level, Mid-Level and Top Management), and their perception for *justice* and *fairness*. The median for the Top Management was 3, for the Mid-Level was 5 and for the Entry Level was 4. A few reasons can explain this difference of perception among these groups.

The first one, the Top Management group evaluated the proposed scenario towards the just and fair side. The first one, people occupying senior positions cannot perceive the scenario as being something bad or wrong, because it is most likely that they would not be affected as there are fewer chances they would participate in this type of job. Therefore, they tend to evaluate as ethical.

The second, the Mid-Level group perceived this scenario as unjust and unfair. One explanation for this to have happened is that these persons felt that the participants from the scenario were not being equally treated. In other words, they could imagine themselves on the crowd worker's side and believed that some of them were affected by the AI. Moreover, as they are the persons who, usually, thinking in a company environment, execute the tasks, they could perceive that it was neither fair nor just with the crowd workers who have worked in the task and did not receive monetary income.

The third one is for the Entry-Level group. Individuals from this group might still uncertain what could happen if they participate in this type of job. Moreover, if this would affect them somehow. For not having sufficient work experience, they are not sure about the goodness or badness of the circumstances.

There is a significant difference between the levels of education of the participants and their perception of *violation of an unspoken promise* and *violation of an unwritten contract* towards the proposed scenario, Table 20. It was proven statistically through Kruskal-Wallis at a significance level of 0.033 for the first one, and 0.005 for the second.

Dimensions	Variables	Kruskal-Wallis Test	Correlated variable
Contractualism Dimension (III)	Violation of an Unspoken Promise	Sig. 0.033	Level of Education
	Violation of an Unwritten Contract	Sig. 0.005	Level of Education

Table 20: Kruskal-Wallis test results for Violation of an unspoken promise and unwritten contract, and level of education

Regarding the perception of an unspoken promise being violated, the High School (or equivalent) pondered that the proposed scenario does not violate an unspoken promise, thus, leading towards the ethical side of the scale. One reason to explain this fact is that for being beginner students, they would know when a promise was made, they are used to school life, therefore, they would identify if something was violated or not. They believe that no one can be harmed, because there was no violation of a promise.

On the other hand, in concerning the perception of violation of an *unwritten contract*, the participants which are in the High School (or equivalent) category had a distinguish understanding. There was a tendency that they believed that an unwritten contract was being violated. Perhaps for not having sufficient notion about a working life, they can interpret it like this.

The Bachelor (or equivalent) group had the understanding that, for this scenario, *an unspoken promise* and *an unwritten contract* were not being violated. A possible explanation for this would be that they believe in the technology and in the platform, perhaps because they are used to do this type of entry job and consider that an unspoken promise and unwritten contract were not being violated.

The Post graduates comprehend differently than the other two groups. They believed towards the side that an *unspoken promise* was violated. They can have a better notion about associated problems with this type of work, for having completed a post-graduation level of education, they can perceive that there might be something implicit related to this type of work which involves technology. Perhaps when doing their post-grad studies, they went through a situation where nothing was said at the beginning, but then someone was affected and suffered consequences.

Table 21 provides information regarding the correlation between the fear of technology and a violation of an unwritten contract.

Dimensions	Variables	Correlated with	Spearman correlation ( $\rho$ )
Contractualism Dimension (III)	Violation of an Unwritten Contract	Fear of Technology	+0.211 Sig. 0.022

Table 21: Spearman correlation result between fear of technology and violation of an unwritten contract

Among the participants, the more a person has fear of technology, then the higher this person's perception about the violation of an unwritten contract. A weak ( $\rho= 0.211$ ), however, statistically significant (Sig. 0.022), association between fear and perception of violation of an unwritten contract was found.

This result can be interpreted by the fact that a person who has fear of technology either may not have daily contact with technology or if they have contact, they tend to avoid technology by any means, because there is a lack of trust of these persons in technology. Therefore, they assume that they have to be protected from this harm in a way, because it is something they try to avoid and have fear. Consequently, they believe in the premise that an unwritten contract is being violated.

### 5.2.1 Hypothesis 2

The hypothesis 2 is stated below:

H2: individuals can be categorized within company role, age, level of education and fear of technology in relation to ethical judgement towards a scenario.

This hypothesis was accepted. The results encountered and presented in subchapter 4.6 provided sufficient information to affirm that individuals can be categorized within company role, level of education and fear of technology.

## 6 CONCLUSION AND FUTURE WORK

### 6.1 Introduction

The purpose of this study was to provide a better understanding of an individual's ethical judgement towards a Microtasking job performed through online platforms. Therefore, it contributed with relevant data on this aspect, because previous literature

only took into consideration the ethical aspects that can emerge with this type of job, but did not investigate the person's point of view. Moreover, within the dimensions, internal consistency was found as Cronbach's alpha was calculated.

## 6.2 Research Objectives

The research objectives defined in subchapter 1.3, in the introduction section were met.

The first aim was (I) to verify people's ethical judgement in a Microtasking Crowdsourcing platform scenario, where Artificial Intelligence is applied. It was achieved through the results presented in subchapter 4.3 from the Results section. Therefore, it leads to the understanding that participants judged the scenario as not ethical according to *Moral Equity* and *Relativistic* dimensions. Furthermore, for the *Contractualism* dimension, the respondents perceived it as more ethical.

The second aim was (II) to evaluate how ethical people judge a scenario of working relationship with AI according to company role, level of education, age and fear of technology. This goal was achieved according to the results presented in subchapter 4.6. The participants differed in their ethical judgment within company role, level of education and fear of technology.

## 6.3 Broad implications

In respect to academic theory, this thesis provided relevant information about the ethical judgment of the individuals. This is relevant because these are the persons who would be more inclined to perform this type of job, therefore, it is rather important to understand how they perceive a crowdsourcing scenario.

Furthermore, this study proved the different perceptions of ethics within groups. This is an important implication to reflect about this type of job. If there were different aspects with the usage of AI, e.g., the degree to which AI is used to assess the progress of the performed tasks, perhaps the participants would have a different judgment towards the scenario. This is something to be taken into consideration as a professional practice, with Human Resources (HR) focus.

This demonstrates that not every individual when exposed to a scenario where AI plays an important role, has the same thinking.

## 6.4 Future work

It is recommended to conceive another two scenarios, involving different ethical dilemmas, and assess them. Moreover, these scenarios should be applied with different samples, therefore, it would be possible to analyse and measure the differences between them.

## 6.5 Summary

It was found that for the Moral Equity Dimension (I) and Relativism Dimension (II), the two first dimensions, the respondents have the tendency to judge the scenario as unethical. Some assumptions regarding this result would be that in general, people are not yet ready for this type of work. It can be a mistake to use AI on a large scale as, in some cases, its usage might actually harm people involved in this type of work. Perhaps if the platform, proposed in the scenario, did not only employ AI as the only means of selecting and evaluating the workers, but rather have a human perform this with the help of an AI, people would have a different perception. Because in this case, AI is not what determines if workers are selected and evaluates their work, but instead is only used as a tool to help a human execute these tasks. However, the contractualism dimension (III) proved to differ from the others. For both variables of this dimension, the participants judged the scenario towards ethics.

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## List of Abbreviations

AI: Artificial Intelligence

CAS: Computer Anxiety Scale

C2C: Consumer-to-consumer

HITs: Human Intelligence Tasks

HR: Human Resources

ILO: International Labour Organisation

IT: Information Technology

MES: Multidimensional Ethics Scale

MIT: Massachusetts Institute of Technology

MTurk: Mechanical Turk

OLM: Online Labour Market

PES: Public Employees Services

SD: Standard Deviation

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## Appendix A: Covering letter of the survey

Dear respondent,

You are being invited to participate in a research project regarding Crowdsourcing. Here below are all necessary information about this research. Your collaboration in this study will be of great value.

1. Study objective:

- The study objective is to evaluate ethical aspects about artificial intelligence and Crowdsourcing in a hypothetical scenario.

2. Procedures:

- You will be invited to answer some questions, including 2 (two) scales and one free question about the scenario which will be presented. The expected time to answer all the questions is approximately 15 minutes.

3. Possible risks:

- Some questions or the hypothetical scenario may be uncomfortable for you, but you have the option to not answer the question or abandon the survey.

4. Benefits of participating of this study: there are no direct benefit of participating of this study.

5. Voluntariness: the participation of this study is totally free.

6. Costing: there is no monetary reward for participating of this study, and it is free of costs for you.

7. Privacy: the researchers are committed in maintaining the confidentiality of the personal data of participants. All information obtained might be published for scientific purposes, with data being presented grouped, without the identification of the individuals who participated of the study.

The contact researcher is Fernanda Primo de Carvalho Alves, who is pursuing the master's degree in Engineering Management at the Vienna University of Technology (TU Wien). This survey is in order to validate this thesis.

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## Appendix B: Demographic questions

Q1. What is your work status?

- Currently working.
- Not currently working, but have worked before.
- Never worked.

Q2. What is your age? Please, write just the number (ex.: 25)

Q3. What is your highest completed education?

- 7 High School.
- 8 Bachelor's Degree.
- 9 Master's Degree.
- 10 Master of Business Administration (MBA).
- 11 Ph.D.
- 12 Other:

Q4. Which is your field of work?

- Agriculture, Food and Natural Resources
- Architecture and Construction
- Arts, Audio/Video Technology and Communications
- Business Management and Administration
- Education and Training
- Finance
- Government and Public Administration
- Health Science
- Hospitality and Tourism
- Human Services
- Information and Technology
- Law, Public Safety, Corrections and Security
- Manufacturing
- Marketing, Sales and Service
- Science, Technology, Engineering and Mathematics
- Transportation, Distribution and Logistics
- Other:

Q5. How many years of work experience do you have?

- Less than 5 years
- From 5 to 10 years
- From 10 to 15 years
- From 15 years to 20 years
- From 20 years to 25 years
- More than 25 years

Q6. What is your role at the company you work for?

\*If you are not currently working, but you used to work, please select your last role.

- Intern/Trainee
- Analyst
- Coordinator/Supervisor
- Manager/Head of department

- Director
- CEO
- Company Owner
- Self-employed
- Other:

## Appendix C: Multidimensional Ethics Scale

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### Construct 1 – The Broad-based Moral Equity Construct

Just – – – – – Unjust  
 Fair – – – – – Unfair  
 Morally Right – – – – – Not Morally Right  
 Acceptable to my Family – – – – – Not Acceptable to my Family

### Construct 2 – The Relativist Construct

Culturally Acceptable – – – – – Culturally Unacceptable  
 Traditionally Acceptable – – – – – Traditionally Unacceptable

### Construct 3 – The Social Contract Construct

Violates an Unspoken Promise – – – – – Does not Violate an Unspoken Promise  
 Violates an Unwritten Contract – – – – – Does not Violate an Unwritten Contract

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Authors: Reidenbach and Robin (1990)

## Appendix D: Computer Anxiety Scale

D. LESTER, *ET AL.*

### APPENDIX

#### THE SCALE

For each item, indicate your opinion by circling one answer:

- SA: strongly agree,
- A: agree,
- MA: mildly agree,
- MD: mildly disagree,
- D: disagree,
- SD: strongly disagree.

I feel confident and relaxed while working on a computer.\*  
The harder I work at learning computers the more confused I get.  
I have sometimes thought that I am too old to learn about computers.  
I have sometimes thought "Computers don't like me."  
I always have problems working on computers.  
I can usually manage to solve computer problems by myself.\*

---

\* Reverse scored.



## Appendix F: Raw Data

