Technology Impact in the Work Environment:
The Perception of Early Career Employees in Brazil

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ABSTRACT:

In this paper, we discuss some issues associated to the technological development and its effect on human beings, particularly in the realm of work. While some show a certain "techno-optimism" towards such changes, highlighting their supposed numerous benefits – people getting apart from heavy, "dirty", repetitive jobs, or having extended access to information – others see a high risk of humans being replaced with machines even in tasks requiring creativity and socio-emotional skills, an expansion of the "information panopticon" and the society taken into a sort of "techno-feudalism", with some happy "overlords" and most people relegated to the role of "superfluous serfs". We carried out a survey with early career employees to explore their perception about some current and future consequences of automation on their personal and professional lives. Results pointed out to some degree of consciousness among respondents about the gradual replacement of some human tasks with computerized systems, even though this group did not feel particularly threatened themselves as the perceived risks were chiefly associated to manual or routine work rather than to managerial or creativity-related jobs.

Keywords: artificial intelligence; working environment; automation-driven stress; information panopticon; early career employees.

1. INTRODUCTION

Since the Industrial Revolution, there have been several discussions about the relations between men and machines in the working environment. Along time, technological advancement has posed some changes to that relation, being, perhaps, the increasing degree of job automation one of the most impactful. Our objective, then is to bring some reflections about this topic, which has been raising much controversy not only among scholars, but also in the society and particularly worker groups. All in all, there are those who believe that technology carries a promise of a better life to a large extent; in an opposite direction, some groups see that discourse as a siren song, showing a considerable degree of skepticism about the announced benefits that the this "computerization of life" may impart to people. Therefore, our interest is,

further to fostering an academic discussion on these issues, observing to what extent such concerns find echo in segments of the society.

In next section, the theoretical background, we depict some panorama of how technology has advanced into different areas of human life, showing also some perspectives in the further development of that man-machine relation. We also discuss people's association with technology, identifying, to some degree, an increase of stress in the working environment, with some examples from Brazil, and then we present the concept of "information panopticon" as a phenomenon not yet fully grasped by most internet users. Next, we present the methodology adopted in this paper, including the research instruments, the data collection and analysis procedures. After that, we move on to the discussion and analysis of the empirical piece of research. At last, we follow with our conclusions and suggestions for further investigation. As an exploratory paper, this study aims to raise questions of relevant research interest rather than to provide answers, hoping to find fertile room for discussion, improvement and opportunities to develop some larger and impactful empirical research later on.

2. THEORETICAL BACKGROUND

2.1 Technology inexorable march towards men's jobs

Some reflections on the challenges posed by technology to the society in the last 30 years are presented by Lin, Abney and Bekey (2011). For these authors, computers led to the weakening or even the complete disappearance of some businesses, like the replacement of typewriting machines by word-processors, accountants by spreadsheets, artists by graphic-design applications, and local street stores by virtual stores. Rather than adopting a pessimistic position about such changes, the authors claim for some pondering about the positive and negative effects which could, to some extent, help us reflect upon the emergence of artificial intelligence. As they put it (p.943) "if the evolution of the robotics industry is analogous to that of computers, then we can expect important social and ethical challenges to rise from robotics as well and attending to them sooner rather than later will likely help mitigate those negative consequences".

A possible social impact of the robotics revolution would be a massive job dismissal, no matter the status of the workforce, giving way to more efficient automation processes and perhaps a legion of jobless workers. They draw attention to the fact that, at present (Lin, Abney and Bekey, 2011, p.945), "approximately 1 out of 25 workers in Japan is a robot". Thus, just as traditional retailers have been constantly losing ground to "e-tailers", human workers might be overcome by "roboworkers". To this point, another current view states that fighting against this change would be moving backwards; that such challenge should rather be considered as an opportunity for people to drive their efforts to more relevant activities that, in theory, could lead to improved personal and financial compensation; and, finally, that the robot-related industry could also drive the opening new job positions. On the other hand, they point out (p.947) that "theory and efficiency provide little consolation for the human worker who needs a job to feed her or his family".

A further risk they raise is that of security, as robots could be turned against people by hackers in cybercrimes similarly to what happens currently with the invasion of bank accounts in computers or smartphones. An additional concern relates to privacy, with robots intruding into people's lives doing unauthorized records of their daily habits which could be remotely accessed by other people, thereby acting as an extended and more powerful version of the surveillance cameras currently spread throughout large cities. Another related apprehension is that of technology dependence, which can somehow get the society more vulnerable. In that sense, further to losing their jobs, people may happen to lose abilities and skills towards certain tasks now carried out by machines – be it a complicated surgery or a simple domestic activity.

Based on solid documentation, Susskind and Susskind (2015) carried out a review of various traditional working functions and professions that may undergo some transformation because of technology advancement. For these authors, the exponential growth of information technology, the advent of Big Data, and the availability of strong computerized software applications will sooner or later break the protective and almost monopolist status of traditional professions such as those of lawyers, journalists, architects, healthcare workers, educators, management taxation consultants, and even religion leaders. Being so, they advocate technology is getting more and more into all work sectors so that no profession is completely safe. On the other hand, they also emphasize, as a possible generic benefit, the fact that the very same technology might help spread out to a larger group some pieces of knowledge that used to be restricted to a few people.

Supported by a report of the U.S. Council of Economic Advisers, McAfee and Brynjolfsson (2016), state that "83 percent of jobs paying less than $20 per hour could be automated", showing the fragile situation of blue collars' jobs in that country. For these authors, such a negative prospect requires new policies that may allow for the benefits of technology development while seeking to guarantee the population's income, a balance that is not easy to achieve. In their words (McAfee and Brynjolfsson, 2016, p.140), "the wrong interventions will hurt the economic prospects of millions of people around the world and leave them losing a race against the machines, while the right ones will give them the best chance of keeping up as technology speeds forward". They claim there is no ready formula to go for it, but overall see the technology change through a positive lens. So instead of racing *against* the machines, people should strive to race *together with* them, even though they do not state clear by which mechanisms such "partnership" should be made possible.

Artificial intelligence should be put at service to help save human lives, claims Arkin (2015). That author suggests that robots could be developed to replace soldiers fighting in war conflicts, being thereby able to reduce civilian casualties. What he apparently lacks to cover is the fact that, while a war of robots against men might reduce deaths on the machine owners' part, it could have them increase proportionally on the opposite side, i.e. of men fighting in the war with traditional weapons, their bodies upfront. To this point, Rees (2015, p. 26) alerts that "throughout history our ancestors have confronted risks: pestilence, storms, earthquakes and human-induced disasters. But this century is different. It's the first when one species, ours, can determine the planet's future, threaten our civilization and jeopardize the existence of future generations".

Van Wynsberghe and Robbins (2018, p.1) propose that AI robots might be given a more important role, going father than just performing ordinary operational tasks. For these authors, robots could be enriched with moral reasoning capabilities, becoming artificial moral agents (AMAs). They also advocate that "such machines are better moral reasoners than humans and building these machines would lead to a better understanding of human morality, [but] the stakes in this debate are high because moral robots would make demands on society".

That "techno-optimism" has also found some opposers. Ford (2015) advocates that the steady economic scenario, or "the economic Goldilocks period" is already gone, and more so

in some developed countries. As he put it, (p.xi), "in the US, the symbiotic relationship between increasing productivity and raising wages began to dissolve in the 1970s. As of 2013, a typical production or nonsupervisory worker earned about 13 percent less than in 1973 (after adjusting for inflation), even as productivity rose by 107 percent and the costs of housing, education, and healthcare have soared". An example he uses to illustrate that transformation is a comparison between General Motors and Google in which, with values adjusted for inflation, General Motors employed 840,000 workers and realized a profit of about 11 billion dollars in 1979, while Google earned a profit of 14 billion dollars with less than 38,000 employees, in 2012. As a side factor, he highlights that in 1950 over 33% of the working class in the US were unionized, versus 7% in 2010. While the nature of the jobs has been changed, he sustains that some of the benefits acquired at the time may be credited to the power negotiation of such institutions. He then identifies six trends related to the transformation driven by technology, which are as follows: 1. stagnant wages; 2. a relation of workers' low labour share to corporations' high profit share; 3. low job creation, extended jobless recovery, and high long-term unemployment. 4.rising inequality between "the rich and everyone else"; 5. lower income and underemployment for early graduates; 6. job market polarization and part-time jobs. (Ford, 2015).

The blue collars are not the only ones to be affected by the technological revolution: white collars jobs are also at stake. For this author, the increasing practice of offshoring by moving knowledge-related jobs to lower-wage countries, or the adoption of an algorithm to correct and grade written essays, are cutting down qualified professionals' jobs. More and more companies, like Google, sing the mantra that "all people decisions are based on data and analytics", thereby using algorithms and the like in their decisions to hire, evaluate, promote and dismiss people. Although internet does offer some work opportunities, they sound more like a siren song, being relatively reduced and unequal in comparison to a more traditional company job, since the income driven from internet work activities tends to convey an excluding logic, or "a winner-take-all distribution". (Ford, 2015)

Therefore, the combination man-technology, as Ford (2015) sees it, may sound not as pleasant as some believe, and it is sometimes viewed more like an opposition. The radicalization of the process, with machines replacing human work to a high level, could ultimately lead to what the calls techno-feudalism, portraying a myriad of high quality products and services to a happy few, or some rich elite; however, different from the Middle-Age feudalism, in which the

peasants were needed to work in the land, in this scenario the serfs would be somewhat superfluous. Besides, as he emphasizes, "machines do not consume".

2.2 Technology and stress in the work environment

The challenges imposed by technology, with machines direct or indirectly taking humans' position in performing working activities, allows to consider an association with stress. For Trevisan (2014), the emergence of technology at work first attracts people's attention as a positive phenomenon, leading, after a while, to a disappointment feeling, which in turn can be linked to adding some degree of stress in the work environment.

The resistance to the introduction of new technologies into the labour world is also seen as a stress element. In part, that reluctance results from sluggish regulatory processes aiming to protect the status quo of certain professional activities, thereby causing a considerable degree of uncertainty about effective implementation. The unions' movements and the political lobbies against the adoption of new technologies face up to the reality that regulatory and protective pressures may, if much, just slow down the automation process of certain professional activities, but they cannot close it out. The lengthy agony undergone by some occupations and functions at stake for the technology advancement is also a stress factor, as pointed out by Cruz (2014). Another aspect connected with stress in the work environment driven by the rise of new technologies is the perception that there are no borders for automation any longer, even in occupations that require a degree of reasoning and creativity. The employer realises that he or she cannot get away from technology, even when moving out to a business that is somewhat behind in the automation process.

For Standage (2016), some studies on the effect of AI (artificial intelligence) at companies have shown how the vanishing of the frontier limits for advance of new technologies into the traditional occupations lead to stress, since the affected people are left with no solid legal or emotional defence mechanisms. The pressure put on people to acquire new skills that may enable them to cope with new technologies adds further tension to the relationship, given the quick obsolescence of production structures that should go through automation processes for maximization of efficiency, not only in industry, but also in service sectors (Standage, 2016). The stress at work starts with the perception that without relevant competencies one cannot get along with new technologies, a feeling that grows gradually as the employee

understands that, given the technological amplified scale, the process for assimilation of new competences is continuous and never-ending.

Paschoal and Tamayo (2004), based on the study by Glowinkowski and Cooper (1987), have identified the weight of stress factors related to career, including the fluctuations connected with job (in)stability as well as the fear to lose a position for technological change in the corporate environment. For these authors, the perception of instability in the jobs available and the increase of automation are stressing factors for employees in view of the direct impact they have on their career development perspectives. (Paschoal; Tamayo, 2004, p. 46).

2.3 People's relation with technology

In the Brazilian context, it is quite possible to hypothesize that the new technology-driven businesses may threaten the survival of traditional jobs in various sectors of economic activity. Different occupations undergo strong competition not only from productive automation, but also with IT tools replacing them by carrying out core professional tasks and activities that were exclusive to such occupations. There is no barrier to that expansion, not even educational: having a university degree does not grant any protection to confront the reality of the technological advancements over current jobs (Trevisan, 2014). A study from Oxford University estimated that as much as 47% of human occupations might go through some degree of technological transformation within a decade (Frey and Osborne, 2017). These authors' central question was not to determine which professions and tasks were protected from the increasing technology scale, but rather the reasons supporting that change and the speed for replacement of humans with machines at work. In fact, their study aimed to explain the technical standardization driving the advances in computer engineering that can be applied to the labour world, allowing to inquire which human tasks were considered key targets for the machines to replace effectively, versus activities the machines could just take over.

That question was tackled by two scholars from the Massachusetts Institute of Technology, who highlighted the role played by routine in a considerable portion of the human tasks (Autor; Price, 2013). In this study, the concept of routine was twofold. First, the routine cognitive tasks, such as coding and classifying, which are common activities in any office or service provider, and second, the routine manual tasks found in any production line. For Autor and Price (2013), the automation process would target just the routine tasks that are bound to

be replaced by computerized standards, in view that the non-routine tasks that require problem solving with use of intuition, persuasion and creativity would be protected as skills that could hardly be performed by automation. However, Frey and Osborne (2017) study revealed that this barrier of non-routine tasks has already been surpassed. They advocated that even non-routine jobs requiring some degree of analytical flexibility for problem solution and demanding interaction with other agents are no longer immune from the robotics advancements. To reach that conclusion, they examined the nature of human tasks, looking for the development of algorithms able to assimilate and repeat the standardization required for activities that should ask for flexibilization rather than just routine.

The furthest point reached in that scale of flexibility task domination has occurred, according to Frey and Osborne (2017), with the phenomenon of Big Data. Numerous tasks that until then asked for a human assessment and decision making would be, with manipulation of Big Data, carried out by standardization. The tools within Big Data capture and assimilate the trends for the solution of a certain task and then go through the same path whenever it is needed again. The self-driving car is an example of a relatively simple process of storing data cumulatively (of streets, traffic lights, and irregular objects on the way), spotting trends and making decisions autonomously such as to break, move on, speed up or stop the car. A wide range of non-routine tasks, like reading a medical report, writing a contract, doing credit analysis, or recruiting people would ultimately follow the same standardized pattern of the self-driving car.

From that possibility of identifying the standards required of a given task, Frey and Osborne (2017) raised a list of 903 occupations from the US Department of Labour and identified that 702 of them could be standardized. The association of the patterns for each of the activities with the technical capabilities of Big Data determined the speed with which each task would be replaced by a corresponding standardized algorithm. With that calculation, Frey and Osborne (2017) reached the conclusion that about 47% of such occupations had could potentially be replaced in approximately ten years.

2.4 Technology and reduction of working time in Brazil

After the Brazilian Constitution of 1988, which established a maximum limit of 8 hours daily and 44 hours weekly for working, there has been evidence on reduction of formal working

time. However, analyzing official figures (IBGE) that show a dropping in the number of people working over 45 hours weekly – from 43.9%, in 2001 to 33.6%, in 2009 – Campos, from IPEA, has carried out a survey with 4,000 respondents, revealing that, effectively, working time has not been reduced, since 45% of people stated that the portion of their time dedicated to work has actually been increased, with negative effects over the other dimensions of their lives, such as the time spent at home and with family, activities with friends, religious events, education, leisure and sports activities, or political events. (Campos, 2012).

For this author, the divergent results of his research in contrast to the official statistics are given by the change in the nature of working, whose temporal limits have become subtler, so that working and no-working time crosslines are diluted and cannot be picked by broad figures, but emerged strongly in the qualitative study. Some signs of that penetration of working into the leisure time is what he calls 1) remote working or "teleworking", with use of smartphones, tablets, laptops, computers, etc.; 2) people that remain in readiness or on the watch to respond to any call from the employer; 3) people that should be trained or qualified, wherever they are, to perform work-related activities.

One of the direct consequences of the working time intrusion into free time is the fact that only 20% of people manage to do another regular activity during the week besides working – and those who can cope with it, use at most one hour per day (Campos, 2012). He questions the myth of technology as a promise of democratization of information and of a leisure enabler which would overall contribute to more freedom and to the full exercise of citizenship. As he put it, technology can spare time for work execution, but it simultaneously invades people's everyday life and their free time, as shown by the above examples. One of the problems is precisely the time lacuna between real life and regulation of changes by the authorities, since technology moves and is transformed at a high speed, in a pace that the state, who should regulate such activities, is hardly able to keep up.

Further to the social effects of the work penetration into people's leisure time, there are also harmful effects to their health. Campos (2012), using data from the Ministries of Health and Social Security, pointed out that in the last decade there was an expressive growth of work absences driven by psychical disturbances – depression, panic, stress, anxiety – in fact, "mental health" is the item that has raised mostly in the leave request forms, and to some extent the cause can be credited to the free time invasion. He adds that companies can accelerate the

working rhythm, generating extra tension to employees, which corroborates the fact that currently the official working time is just one possible dimension of analysis.

Regardless, an important aspect revealed by the survey is that, despite the problems brought by the work extension – tiredness, stress, psychic harm to individual and his or her family – only 20% of the respondents consider changing jobs, feeling relatively happy at their current work. The author raises the question on the effectiveness of working hours reduction, its replacement by palliative actions such as compensatory time off and he claims the need for a debate not only on the government sphere, but also with other important social actors to discuss how to solve that tricky time equation so people can manage to include, in 24 hours and in a balanced manner, the working time, the physio-biological pause, the commuting time (a great villain, particularly in large cities), as well as some time to spend in social activities.

Cardoso (2007) carried out a comparison of working hours reduction at Volkswagen in Brazil and France and concluded that in both countries there has been a process of automation of the operations, and at the same time, more work to be done in less time by the workers, which led to an additional level of stress and an invasion of their free time, since some people would need to carry work to do at home, beyond the company's time and gate limits. In that regard, Custodio (2012) advocates that the social time is marked and controlled according to the working time, which leads to some rationalization of other moments of life. For this author, the time that dominantly prevails is that of the machines, whose owners are the "masters of time" so that the use of automation and all technology advancement applied to production has not been converted into people's emancipation. Her reflection remits

> **" to the principles of the new organization for working force management, which is based on the dissemination of the flexibilization ideology overall: the production is flexible because the market is unstable; the working force is flexible because they must be constantly adapted to the use of new technology and to the idea of the minimum factory; the labor legislation is flexible because each one must be his self-manager; time is flexible because freedom is subjective; however, only two items cannot be flexible: capital accumulation and profit".** (Custodio, 2012, p.104)

The two studies capture some real dimension of the changes we are going through. Their view translates a relative traditional thought opposing man and machine as a consequence of the Industrial Revolution transformation, like that claimed by Lafargue (2011), for whom the machine has perfected and expedited men's work, however that improvement has not been translated into more resting time for workers, but rather as a sort of competition and a demonstration of men's weakness, which to some extent has been further enhanced by technology development. In a more recent study, Han (2015) provocatively raises the topic about the current society as a burnout society that apparently has adopted the machine speed and timing in their day-by-day activities. In that perspective, we would now live in overconnected times in which the factory, once associated with the image of a prison (Foucault, 1995), has now given place to smart office towers, banks, airports, fitness studios, shopping malls and genetic labs, conveying a full spectrum of overproduction, overperformance, and overcommunication. Paradoxically, this frenetic rhythm of activity would be leading people to be reduced to *animal laborans*, mere working animals with restricted capacity to have a contemplative, deep, and sometimes necessary, negative feeling towards certain situations, since the primary objective is always to keep going (Han, 2015).

2.5 The "Information Panopticon"

Despite the benefit of connectivity in people's lives, the "other side of the coin" would be an increasingly use of the "information panopticon" (Zuboff, 1988). That author describes in detail the setting of company at which the activities and tasks of a group of employees were determined, controlled and evaluated no more by their supervisors in person, but remotely by the system, and, as a result, it led to a high degree of impersonality in the working relations, culminating in the dismissal of some employees because they did not hit the service targets established by the system. In a recent study, the same scholar observed the amplified reach of that surveillance mechanism, which she calls "Big Other" and, through powerful data collection and manipulation, now covers not only the working environment, but every human stance, being enough just to be online, like the approach carried out by Google. Moreover, she alerts (Zuboff, 2015, p.85) for the "institutionalizing logic of accumulation that produces hyperscale assemblages of objective and subjective data about individuals and their habitats for the purposes of knowing, controlling, and modifying behavior to produce new varieties of commodification, monetization, and control".

Similarly, Gouveia Júnior (2015) recognizes the benefits of the high level of resources made possible through the web 2.0 in Brazil, thereby fostering a cooperative culture by individuals that are open to develop and share meaningful content. In this sense, the power to generate and share information stops being "divine", or restricted to a few, and literally gain critical mass. However, the same author highlights the fact that large internet companies are increasingly carrying out a complex hidden surveillance of user habits, thus somewhat reducing the effect of the common power of individuals since there is a much stronger power "above" monitoring and storing all such cyber activities. For Han (2017), this approach is by far more sophisticated and efficient than the society under permanent control as conceived by Orwell's Big Brother concept, since it acquired the features of a "digital panopticon" through internet, smartphones, and Google Glass, apparently conveying limitless access to massive information and "free" communication power to those that fully adhere to the "system", but implying, at the same time, that they inadvertently disclose every single step of their lives for permanent scrutiny. Different than Orwell's Cold War-associated regime, however, the neoliberal system is translated by friendliness: instead of being prohibitive, protective or repressive, it is overall prospective, permissive and projective. (Han, 2017).

In view of those reflections, we could suggest that people are not fully aware of the turmoil in which they are immersed, and they tend to see this as normal, a reflection of the *Zeitgeist*, intrinsic to "modern times". In fact, it is undeniable the acceleration of the day-by-day activities promoted by technology advance, and it is also patent the acceptance of that rhythm by the people as they seem not to perceive the negative impact to their health and the harmful consequences to their social life. Therefore, considering that a relation between employees' stress and uncertainty and the incorporation of technology in the working environment is plausible, we will seek to identify if people have consciousness about that relation.

3. METHODOLOGY

With the aim of capturing the perceptions related to uncertainty in the working environment and its associations with technology, a descriptive research, by means of a survey, was done with students from the last year of a bachelor's business management course in a private university in the city of São Paulo. The descriptive research seeks to raise opinions attitudes and beliefs in a certain group (Gil, 2008), which meets with our main objective in this

study, and the survey was carried out through the submission of a standardized questionnaire which was later tabulated and then treated quantitatively.

The approach to the people and the data collections followed an application schedule elaborated previously with the professors giving the lectures to the different groups of students, so that all of them could be reached for. Once agreed upon the dates and times available in each class, the researchers showed up in the lecture rooms and applied the questionnaires to ensure the highest number of respondents as possible. Being so, it was a convenience non-probability sampling, whose results cannot be generalized (Selltiz et al., 1974).

For operationalization of the survey, we created statements to be graded by means of a 5-point Likert scale. The starting point for these statements was Paschoal and Tamayo's (2004) scale that has been long proven and tested to measure stress perception at work. In this study, we elaborated 9 new items, using as a base the concepts raised by Autor and Price (2013) and Frey and Osborne (2017), related to the possible effects of technology over careers at present and in the future. Our objective, with this, was to understand to what extent young adult workers were aware of the changes imposed by technology into their personal and professional lives. Taking into consideration that there was only one construct, the results were analysed by each of the statements separately.

4. RESEARCH RESULTS AND ANALYSIS

The average age of the respondents, of 103 students in total, was 23 years old, with a standard deviation of 3,41. The highest age was 45 years, and the lowest, 19. As for their gender, about 76% of the total were male, and 24% female. The majority (84,5%) was working at the time, distributed along the following business sectors: 36,9% in the service sector; 26,2% in the industrial sector; 20,4% in the retail sector; and 16,5% were in other sectors, or they did not inform it. Table 1 shows a summary of the results:

Table 1 – Mean and standard deviation of the statements about technology perception at work

Perceptions of the Effects Technology in the Working Environment	Gen Mn	Gen SD	F Mn	F SD	M Mn	M* SD
I believe the positions of a manual nature will be replaced with the use of new technologies very quickly.	4,03	1,00	4,18	0,92	3,98	1,03
I believe the positions of a routine nature will be replaced with the use of new technologies very quickly.	3,83	1,00	3,85	0,86	3,82	1,05
I believe the positions of a technical nature will be replaced with the use of new technologies very quickly.	3,34	0,99	3,70	0,99	3,22	0,97
I feel pressured about the permanent training needs for the use of new technologies to perform my professional duties.	2,88	1,36	2,77	1,57	2,92	1,29
The introduction of new technologies in my profession makes me anxious about my future career.	2,24	1,27	2,07	1,26	2,30	1,27
I feel troubled about the high volume of information from computer programmes I receive at work every day.	2,24	1,20	2,22	1,31	2,25	1,17
I believe the positions of a managerial nature will be replaced with the use of new technologies very quickly.	2,12	1,08	2,29	1,13	2,06	1,06
I believe the positions that require socio-emotional skills will be replaced with the use of new technologies very quickly.	1,87	1,19	1,74	1,05	1,92	1,24
I believe the positions that require creativity will be replaced with the use of new technologies very quickly.	1,77	1,09	1,85	1,02	1,75	1,12

* Mn = mean; SD = standard deviation; Gen = general; F = female; M = male

Source: the authors

The results show a relative high perception about the possible replacement risks of manual tasks by technology-driven ones (mean: 4,03; standard deviation: 1,0). It is followed closely by the relative perception about the possibility of replacement of routine tasks with the use of new technologies (mean: 3,38; standard deviation 1,00).

On the opposite side, there is a relatively low perception that positions requiring creativity carried out by humans will be replaced quickly using new technologies (mean: 1,77; standard deviation 1,09). This perception is followed narrowly by the one about the replacement of positions demanding socio-emotional skills (mean: 1,87; standard deviation 1,19).

Another relevant contrast refers to the respondents' perception about the impact of new technologies over positions of both technical and managerial nature. They believe technical positions may be more at stake (mean: 3,34; standard deviation 0,99) than managerial positions (mean: 2,12; standard deviation 1,08).

In an intermediate position come the more personal-related statements: the one referring to the pressure for learning new technology-related skills (mean: 2,88; standard deviation 1,36), and two other referring to a degree of anxiety to the impact of technology in the future career (mean: 2,24; standard deviation 1,20), and concern about the high volume of computer generated information at work (mean: 2,24; standard deviation 1,20).

As for the gender, the results did not show significant differences in the perceptions of the aggregated sample versus the male and female samples when analysed separately.

5. CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

In the scope of our proposition, we discussed about technology and some of its impact over people's lives. There are "mixed feelings" about the human-machine relation (Nomura et al, 2015), in which, on the one hand, some see these technology advances on service to mankind, while others, to a certain extent, see machines and artificial intelligence as a threat, particular in the working environment, where at times that relation are seen as unfair, with machines and technology replacing men as workforce as well as entering, unnoticed and uninvited, into other instances of human life. Analogously to the challenges imposed by the Industrial Revolution,

which led to the diminishing of artisan labor in the 19th century, and in the last 30 years with the computer and internet popularization causing the partial or complete loss of many businesses and their related jobs, the current technology revolution is very likely to bring about deep changes in the society. This time however it seems, as claimed by some scholars, that it might have incommensurate effects, such as a massive job dismissal and human workforce replaced with a pack of "roboworkers"; a disproportionate autonomy of the machines; and an increase of technology dependence that may cause reduction or the complete loss of some human skills.

A different, and perhaps, more optimistic view would state that since Negroponte (1996), with the proposition of media convergence, the economy of connectivity has generated a distinct process of work flexibility – quite different, for instance, from the reengineering logic proposal which was popular some decades ago (Davenport & Short, 1990). In this sense, the present technology-driven flexibility would generate new types of employees, with people giving another sense to their life in a way that differs radically from the mechanic of work centrality that has oriented the baby boomer generation. Today, other working possibilities seem to be more loose and creative, attracting adults from low to middle age. The new positions reflect the materialization of the idea of a job converted into some independent and profitable business. Uber seems to be a relatively known example, but the reality of business models using connectivity has gone beyond the transportation sector, for instance with the new financial service dynamics provided by the "fintechs", online start-ups that offer a platform for financial services such as international money transfer, mobile payment an asset management as an alternative to the traditional banking system (Darolles, 2016). These groups apparently do not conceive technology as an enemy, but rather as an ally.

We can clearly see that besides being able to release people from performing certain activities, allowing them to dispose of their time in a different way, technology also facilitated the communication between individuals, wherever they are. In this sense, the technological progress made people instantly available to each other by mobile phones, internet, and then by the combination of both though the smartphones, which enabled shortening distances and bringing people together in virtual gatherings, having a nearly limitless reach. Nevertheless, the intricate ethical issue is that people are not made aware that, by staying permanently connected "freely", some scholars claim there could also be a massive use of the information or digital

panopticon by third parties – human or robots – so this connected people would inadvertently be "producing evidence" that might be used against them, with no established regulation to protect their rights. At the eyes of the "minimum state", which claims the market precedence above all, as the stone-graved neoliberal book reads, this is perhaps simply a full exercise of individuality and freedom. These queries, connected with the intricate man-machine relation and their consequences, appear to be a fertile path for additional research.

The field study allowed us to confirm our supposition that some of these topics, although tangible, have not reached breadth and depth as they are relatively "green", at least in Brazil. The issues are controversial and require further investigation to reach some maturity. The sample, of young students, perhaps lack some critical engagement to the subject. The fact that most of them were millennials may have made a difference in their perceptions as well. For further research, we feel encouraged to test the scale with a larger, more significant portion of the employees comprising varied demographics like age, socio-economical level, and position within a company hierarchy, (blues and white collars in a factory or managerial and operational employees in an office, for instance). That would help also to refine the items of the survey, making it overall more robust.

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