Revista Pensamento Contemporâneo em Administração

HIGHER EDUCATION AND TECHNOLOGY: PROPOSAL FOR A WCPI

FORMAÇAO SUPERIOR E TECNOLOGIA: PROPOSTA DE UM IPCM

Recebido em 19.07.2021 Aprovado em 16.11.2021
Avaliado pelo sistema double blind review
DOI: https://doi.org/10.12712/rpca.v15i4.50920

Danilo Nunes
PUC-SP – Pontifícia Universidade Católica de São Paulo, Brasil
professordanilonunes@gmail.com
000-0002-5663-3750

Jerônimo Henrique Portes
PUC-SP – Pontifícia Universidade Católica de São Paulo, Brasil
jeronimo.portes@bol.com.br
0000-0002-8413-6014

Siméia de Azevedo Santos
PUC-SP – Pontifícia Universidade Católica de São Paulo, Brasil
sazevedotreinamentos@gmail.com
0000-0001-9815-390X

Leonardo Nelmi Trevisan
PUC-SP – Pontifícia Universidade Católica de São Paulo, Brasil
lntrevisan@pucsp.br
0000-0002-0914-3679

Abstract

Technology has accelerated the process of change, giving rise to new ways of working. This study seeks to explore the perspectives of careers by relating them to university backgrounds and new technologies, based on women's perception. The research was applied in the first cycles of 7 undergraduate courses, with 148 respondent students. The results indicate na optimistic view regarding the future of the woman's career, but there are contrasts, such as the degree of knowledge of some technical terms. From the results, a proposal for the Women's Career Perception Index – WCPI was developed.
Keywords: Career. Technology. Women.

Resumo

A tecnologia tem acelerado o processo de mudanças fazendo com que surjam novas formas de trabalho. Neste estudo busca-se explorar as perspectivas das carreiras relacionando-as com as formações universitárias e com as novas tecnologias, a partir da percepção feminina. A pesquisa foi aplicada nos primeiros ciclos de 7 cursos de graduação, com 148 alunas respondentes. Os resultados sinalizam uma visão otimista quanto ao futuro da carreira da mulher, mas há contraposições como, por exemplo, o grau de conhecimento de alguns termos técnicos. A partir dos resultados elaborou-se uma proposta de Índice de Percepção de Carreira da Mulher – IPCM.
Palavras-chave: Carreira. Tecnologia. Mulher

Introduction

Human beings constantly face changes and evolutions at work, and technology has been speeding up this process, increasing the potential for growth and large-scale transformations.

This growing technological advancement has been altering the way business unfolds in the world and directly influencing the emergence of new ways to work, as well as threatening the already existing professions

Rifkin (1995) was already bringing awareness to the risks imposed on jobs in the future, by stating that entrepreneurs show clear preference in increasing productivity through investments in capital assets and avoiding creating new job positions. It is worth mentioning that Bridges (1994) highlights the automatization matter as a factor which was influencing the disappearance of the 1980s expanded employment created by mass production, creation of organizations with sophisticated and departmentalized structures and the expansion of the public sector.

However, for most of the population, the changes happen in a very gradual manner. One of the reasons is that the resources from technological advancements are not available for all societies in an even way. Nevertheless, even the most manual labor in the world's most remote places can be impacted due to the technologies, be it by local technological advancements, by outsourcing with inferior prices or by robotized production. These factors are some of the ones which influence the job opportunities available in each community.

Based on this scenario, the goal of this very research was to explore career perspectives related to university education and new technologies, from the female perception, resulting in the proposal for the creation of the Women's Career Perception Index – WCPI.

The results are relevant for the understanding of how women perceive their careers considering higher education and technological advancements, because they can contribute to a more critical understanding of future scenarios and ensure immediate actions for the construction of safer or less uncertain paths.

This article starts with this introduction, followed by a review of literature exploring themes such as careers and the automatization process, the main occupation fields for women in the work market and the role played by higher education in building a career. Next there is a description of the methodological process that guided the field research with 148 students, starting different courses on a learning center in the Baixada Santista. Therefore, the participants comply with the guidelines set for this article and the selection of the institution was due to accessibility for the researchers. The survey was answered under direct supervision of the authors, being composed of ten objective questions and one open question.

The analyses were presented, as well as the discussion of the results and, after those, the final considerations were built, highlighting the points that supported the goal of this research, in addition to the limitations of the study and suggestions for not only the follow-up of the perception index, but also new proposals for further comparing the researched theme.

Literature Review

Organizational functions, when defining strategies aimed at autonomy, action capabilities and skill development, provide, perhaps unintentionally, but indirectly, means of affirmation and unequal identity, when the supposed treatment of equality between people prevails, emphasizing that human theories systematically state that there are behavioral differences between people (Nunes, Santos and Fukunaga, 2020).

People need to encourage and be encouraged to self-identify, as this leads them to know, understand and analyze their results, generating an awareness that gives meaning to the rationality of their actions,

choices and definition of goals. But this path makes no sense without accepting that it will indeed guide the paths that lead to the individual construct. One of the ways is to understand the transformations that exist in the formation of the labor market.

Barbosa Filho (2012) states that young people in Brazil are taking longer to start working, as it suggests that they are dedicating more time to study, so when they arrive, they already do so with a wider range of knowledge, even if theoretical, this being one of the great challenges of Brazilian education.

Based on the study by Schwartz (1992), the author shows that the values of individuals in different contexts, which lead us to different organizational profiles, must be analyzed taking into account three fundamental aspects: how people's priority values are affected for their social experiences; how these same values affect their behavior and their choices and, finally, how social structures can contribute or influence the definition of these values, due to different cultures. They show that knowledge of these aspects helps us to understand the bases that structure the formation of a group, thus providing us with a better analysis of the different strategies that support the organization of collective work (Nunes, Santos and Fukunaga, 2020).

Schwartz (1992), in a survey carried out with university students, which is in line with this study, contributes to the understanding of the formation of contemporary groups, establishing some values that young people take into account when constructing their work identity.

Nunes, Santos and Fukunaga (2020) addressed this construction emphasizing that the first value is the concern with self-improvement and personal achievement, the motivational value of achievement is evidenced when success and personal self-fulfillment are portrayed through the demonstration of skills according to established social norms. The second value is defined as being open to change and valuing self-sufficiency, evidencing, among others, the sense of freedom, creativity and independence in choosing one's goals. They highlight security as the third value, with a predominance of harmony, social stability, interpersonal and intrapersonal relationships.

Careers and the automatization process

Some of the authors who study work sociology and the implication of new technologies on men and women's activities, like Kergoat (1984), Cockburn (1985) and Hirata (1988), have, in their studies, evidenced the work performed by women in the industrial sector in general, which are services that are in their majority still very manual, repetitive and even alienating, even though they are in the technological sector.

The study of work sociology shows that even three decades after the beginning of these researches the situation in a cellphone industry which makes smartphones, for example, was almost the same: technology advanced and cellphones became a way of portable and relevant communication, enabling sales and services provided online, but the workers who operate the production flow, in the vast majority, according to data from the research conducted by Leite and Guimarães (2013), around 60% of the total workers in the sector work in activities that are absolutely mechanical, repetitive and manual, the kind of function which can be standardized and, therefore, automatized, as quoted in studies by Brynjolfsson & McAfee (2014).

In an overview presented by Oliveira (2013) with some occupations that will become more relevant in the future, there is a suggestion that many of them will be a combination of activities of more than one field of knowledge, which also reconfigures some opportunities of redesigning professions and careers.The coming of Artificial Intelligence will expedite the transformation process and the speed of the impact in social and economic spheres, in public policies and in the resignificance of work, demanding more complex knowledge and, often, a certain capacity for interpreting information that comes from more than one field of knowledge.

Surveys from 2015 indicate that the work performed by people will be endorsed by computerized routines, therefore, the work performed by the worker needs to bring more to the table, that is, to be less routine and automatized (Institute for the future, 2015).

Technological evolution suggests a major alteration in the way we work, indicating new profiles of professionals and, consequently, new occupations for the future. According to Edgell (2012), the worker of knowledge is characterized by multiple abilities and a demand for bigger intellectual capabilities to the detriment of the need to use physical force.However, even while promoting autonomy and empowerment, these tendencies indicate the exclusion of less qualified professionals, unstable environments, pressure and stress motivated by high competitivity.

In his recent study on the forth industrial revolution and the impacts it may have on employment, Schwab (2016) emphasizes that we can have two perception fields on the work market: workers who will find new jobs with the technology triggering a new era of prosperity, or those who believe there will be a new social and political armaggedon, creating, this way, a solid unemployment scale.

His main argument when defending the first perception is that human desires and needs are infinite, therefore, technology must also be inserted in this scale of needs becoming a true supply process which is also infinitive. He defends the idea that there will always be work for everyone, except during the historical moments of recession. But it is necessary, above all else, to learn to change.

Basing himself on the research conducted at Oxford Martim School by Carl Benedikt Frey and Michael Osborne, among others, Schwab (2016), defends that employment will increase for creative and high paying positions and for low paying manual occupations, but will decrease for repetitive and routine labor.

In this study, the authors signal a few occupations that will be more or less prone to automation.

Table 01: Occupations that are highly likely to become automated

Occupation	Probability
Telemarketing operators	0,99
Responsible for tax calculations	0,99
Insurance evaluators, automobile damages	0,98
Referees, judges and other sport professionals	0,98
Legal secretaries	0,98
Hosts and hostesses for restaurants, lounges and cafés	0,97
Real estate agents	0,97
Agricultural labor	0,97
Secretaries and administrative assistants, except for legal, medical and executive	0,96
Deliverers and messengers	0,94

Source: Schwab, 2016, p.45.

Table 02: Occupations that are less likely to become automated

Occupation	Probability
Social workers dealing with substance abuse and mental health	0,0031
Choreographers	0,0040
Doctors and surgeons	0,0042
Psychologists	0,0043
Human resources manager	0.0055
Computer systems analysts	0,0065
Anthropologists and archeologists	0,0077
Marine engineers and naval architects	0,0100
Sales manager	0,0130
Directors	0,0150

Source: Schwab, 2016, p.45.

By signaling this tendency, the author shows that the impacts on the market and work locations virtually all over the world are inevitable, but this is very far from being a new war, now between men and machines. We need to understand that the fusion of technologies, whether digital, physical or biological, needs to be used to increase employment and human cognition, therefore, it is necessary to review the management models demanding from leaders a strong participation in preparing a labor force that can comprehend machines that are more capable, connected and intelligent.

Main fields of occupation for women in the work market

Researches on the matter of gender segregation at work is not something so recent in the academy, in Brazil, because there are authors who have dedicated their work to this subject for a long time.Bruschini (1994) developed a research, in which he highlighted women's participation in the work market in the 1970's, 80's and beginning of the 90's. He stressed that women's participation in professional environments was crescent, however, there were some gaps that differed male and female jobs, in which women usually would dedicate themselves to low-paying activities, and when they did perform leading positions the wage difference would be maintained, and this scenario is sustained by Hirata (1988).

Many are the factors that have influenced the gender division at work, and still do, such as culture, legislation, prejudice tied to domestic roles, motherhood and care provided by women, among others already studied in the academy (Bruschini, 1994; Leite & Guimarães, 2015; Hirata, 1988; Lobo, 1991).

For the goals of this study, which seeks to understand the impacts of technological evolution on women's role in the work market, and in what way can they be perceived in relation to gender inequality on the new career scenarios, the biggest focus is on types and characteristics of predominant occupations among women.

Throughout time, the differences are maintained, Hirata (2002) alerts that female work has continued to show differences when compared to male. Even with the increase in women's participation, with the advent of globalization inequality manifests itself through vulnerable and precarious jobs. More recent studies point to the same direction, Leite and Guimarães (2015) confirm Hirata's (1988) conclusions in an article that observed the implications of new information technologies on women's work on the electro electronic sector. The study shows female participation in functions that have less cognitive requirements, in activities that are absolutely manual and repetitive, in which women have little access to technology, converging with Cockburn (1985) who describes male appropriation over technology to the detriment of women's role in such context.

Recent global research conducted by the International Labor Organization – ILO –, with data from 2017, shows the percentage of labor force and unemployment divided by gender, according to table 03 below, considering that:

1) the job/population relation expresses the number of people employed as a percentual of the total population in active age, separated by gender;
2) the unemployment rate, which represents the number of unemployed people as a percentage of the total number of the work force and
3) the wage gap between men and women calculated as a difference between men's average yield and women's average yield, expressed in percentage of men's average yield.

Table 03: Work force and unemployment rates by gender

North and Central America					
Canada		United States		Panama	
Job-population relation, men	65.4%	Job-population relation, men	66.0%	Job-population relation, men	74.9%
Job-population relation, women	57.9%	Job-population relation, women	54.0%	Job-population relation, women	47.7%
Unemployment rate, men	6.8%	Unemployment rate, men	4.4%	Unemployment rate, men	4.0%
Unemployment rate, women	5.9%	Unemployment rate, women	4.3%	Unemployment rate, women	6.1%
Wage gap between genders	-	Wage gap between genders	-	Wage gap between genders	4.4%
South America					
Brazil		Argentina		Peru	
Job-population relation, men	64.6%	Job-population relation, men	67.4%	Job-population relation, men	74.4%
Job-population relation, women	45.0%	Job-population relation, women	42.8%	Job-population relation, women	57.8%
Unemployment rate, men	11.3%	Unemployment rate, men	6.2%	Unemployment rate, men	6.0%
Unemployment rate, women	14.7%	Unemployment rate, women	8.2%	Unemployment rate, women	7.5%
Wage gap between genders	16.0%	Wage gap between genders	-3.6%	Wage gap between genders	20.5%
Africa					
South Africa		Angola		Nigeria	
Job-population relation, men	46.9%	Job-population relation, men	74.4%	Job-population relation, men	56.7%
Job-population relation, women	34.4%	Job-population relation, women	69.1%	Job-population relation, women	50.0%
Unemployment rate, men	25.5%	Unemployment rate, men	7.0%	Unemployment rate, men	4.0%
Unemployment rate, women	29.5%	Unemployment rate, women	7.7%	Unemployment rate, women	3.4%
Wage gap between genders	-	Wage gap between genders	-	Wage gap between genders	-
Asia					
Saudi Arabia		Japan		India	
Job-population relation, men	75.5%	Job-population relation, men	68.4%	Job-population relation, men	77.2%
Job-population relation, women	16.8%	Job-population relation, women	49.8%	Job-population relation, women	22.5%
Unemployment rate, men	2.5%	Unemployment rate, men	3.0%	Unemployment rate, men	2.4%
Unemployment rate, women	21.1%	Unemployment rate, women	2.7%	Unemployment rate, women	3.7%
Wage gap between genders	-	Wage gap between genders	-	Wage gap between genders	-
Europe					
Portugal		United Kingdom		Spain	
Job-population relation, men	59.1%	Job-population relation, men	65.2%	Job-population relation, men	53.9%
Job-population relation, women	49.0%	Job-population relation, women	55.3%	Job-population relation, women	42.6%
Unemployment rate, men	8.4%	Unemployment rate, men	4.4%	Unemployment rate, men	15.7%
Unemployment rate, women	9.4%	Unemployment rate, women	4.2%	Unemployment rate, women	19.0%
Wage gap between genders	14.9%	Wage gap between genders	20.6%	Wage gap between genders	12.5%

Source:Adapted from International Labour Institute, data from 2017. www.ilo.org.

It is clear that, out of the 15 countries that were randomly selected based on data availability, in just one third of them the unemployment rate among economically active women is slightly smaller, that is, in two thirds of the sample women, who already represent a smaller percentage in comparison to men when considering the entire economically active population, still suffer more with the unemployment rate.

Furthermore, when comparing by gender, women also suffer much more with the wage gap, making up to 20% less than a man in a similar position. In the sample used for this research, Argentina showed results of female positions making slightly more. Watching this global movement and the cultural aspects that compose these differences can be important subjects for future studies.

Still according to the ILO data base (2017), there is the very relevant matter of informal employment. Around two billion people in the world are on the informal economy, mostly in emerging and developing countries. And, although this index is composed of more men than women, seeing as men represent around 63% of these workers, women are more present in informal markets of low and medium income and are in a more vulnerable situation.

Observing studies conducted by Piasna and Drahokoupil (2017) who started from data analysis about the European labor force and market, it is expected that the digitalization process will impact both men and women's work in different ways due to gender differences in tasks' contents, even within the same occupations.

Still according to the conclusions reached by the same study, it is confirmed that the technological change, interacting with other factors, such as population ageing, has caused deep changes in the work market, but the traditional gender inequalities continue to be reassured in the new work world, that is, the gender relations in new ways of work and employment interact with the old inequalities in the work place that are related to gender discrimination and the unequal division of responsibilities of care and domestic work. The numbers presented on the ILO - International Labour Organization research with 2017 data confirm this scenario (ILO, 2017).

Higher education in forming careers

It is very clear to us that the world is and has been in an uninterrupted process of changes, so it is natural that we affirm that the idea of building a career for our whole life becomes, if not fragile, a little obsolete.

The automation evidenced by revolution4.0 linked to artificial intelligence should decimate many jobs in the next few years, but it is possible to affirm that new and many other professions should also emerge. A question that seems timely is to check how this whole process of changes in higher education institutes is being built or reassessed, which, by nature, is supposed to shape professionals that can meet the work market's demands. That is also one of the goals, if not the main goal, of those who seek a higher education.

However, what is clear on table 04 below is that this tendency is not seen in an explicit manner, or on the expected speed.

Table 04: The 10 classroom courses with more entrants in Brazil's private institutions

YEAR 2012	YEAR 2013	YEAR 2014	YEAR 2015
Business Management	Law	Law	Law
Law	Business Management	Business Management	Business Management
Civil Engineering	Civil Engineering	Civil Engineering	Civil Engineering
Accounting Sciences	Pedagogy	Nursing	Nursing
Pedagogy	Accounting Sciences	Pedagogy	Accounting Sciences
Nursing	Nursing	Accounting Sciences	Psychology
HR Management	HR Management	Psychology	Pedagogy
Psychology	HR Management	HR Management	Physical Therapy
Production Engineering	Production Engineering	Production Engineering	Architecture
Physical Therapy	Architecture	Physical Therapy	Physical Education

Source: Semesp, 2017.

Basically, there were no alterations in the offer of courses in the studied period, that is, teaching institutions are shaping professionals for the future years, understanding that the professions that exist nowadays will meet these demands.

But the worrying scenario does not lie solely on the offer on the institutions' part, but it can also be seen when the active subject is the candidate himself, that is, he who seeks instruction that will (or would) give him a bigger opportunity on the work market, according to what we can see on the recent table 05:

Table 05: Most searched courses (or fields) on the Internet

aug. 14th until jan. 15th	aug. 15th until jan. 16th	aug. 16th until jan. 17th
Medicine	Medicine	Medicine
Law	Law	Law
Psychology	Psychology	Psychology
Engineering	Engineering	Odontology
Business Management	Odontology	Nursing
Odontology	Business Management	Business Management
Architecture	Nursing	Engineering
Nursing	Architecture	Physical Therapy
Physical Therapy	Physical Therapy	Pedagogy
Pedagogy	Pedagogy	Architecture

Source: Semesp, 2017

It seems that there is a slight accommodation between supply and demand, that is, there is search for instruction and career construction based on what is traditional and historically offered. But if there is going to be significant change, and the elaboration of this article strongly leans towards that direction, we need to rethink this whole process and the entry into a higher education course is one of the paths, at least so far, for those who seek building a career, or will there be changes in this context as well? Judging by the suggestion of this study, this data gets more relevant, because 58.6% of the participants who took the Enem exam in 2017, which is the main gateway for private higher education in Brazil, are female (www.brasil.gov).

It is still important to highlight that the fact that the percentage of women with complete high school education, that is, the public who is able and can potentially enter higher education, is 33.7% against 29.4% of men. If we relate this number to the percentage of those who already have a higher education degree, we will have 60.5% for women and 46.0% for men. It is clear that the female public is larger when compared to the male, whether it's those who are able to enter higher education courses or those who already have a higher education degree.

Methods

Research was conducted involving students from different courses, both classroom and online, in a teaching institute in the Baixada Santista, having as basic condition their status of entry students, that is, they needed to be in the first term of their courses. A few classes were selected, achieving a total of 160 students. Following the criteria mentioned above, 148 students were considered, which represents around 93% of the target public. The option was to do the survey with entry students (freshmen), since there is an intention to keep up with these students until the end of their courses, as they gather concepts, theories and practices associated with the focus of this study proposal.

Therefore, the participants comply with the guidelines set for this article and the selection of the institution was due to accessibility for the researchers. The survey was answered under direct

supervision of the authors, being composed of ten objective questions and one open question. As a survey guidance, it was reported:

This questionnaire is destined to the study of new Career scenarios, specifically focused on female gender. The goal is to gather information that can supply the researchers with data that can help understand the perception entry students on a higher education course have in relation to the developed expectations for professional practice.

Verified and tabulated data will be used in this research, respecting the anonymity of the participants.

The questions were answered based on the concept set forth by London and Stumph (1982), who define a career as sequences of occupied positions and work performed throughout a person's life, as well as considering the participant's individual aspirations.

The answers followed the scale of value 01 when the question did not seem relevant and so on, gradually, until value 05 when there was strong relevance.

This research can be classified as exploratory, with the goal of bringing more comprehension to the previously mentioned phenomenon of determining women's perception regarding the career perspectives and the descriptive approach, which has the purpose of checking the occurrence of a phenomenon on the studied population.

Regarding the approach to the problem, this research can be classified as quantitative, since that is the indicated method in cases where it is necessary to know the extent of the studied object, identifying the level of knowledge and opinions about the problem (Gonçalves and Meirelles, 2004).

From analyzing the literature, the goals and the problem overview, the use of the survey as a data collection instrument was defined and the data were later tabulated through the MiniTab software that assembled the information that sustain the data analysis.

The composition of the Women's Career Perception Index – WCPI

To determine the index, components that could explain the studied variables were created, corresponding to the researched questions. After verified, they were multiplied proportionally to its collaboration following the equation below:

WCPI = (0,277*'CP1N') + (0,166*'CP2N') + (0,119*'CP3N') + (0,087*'CP4N') + (0,075*'CP5N') + (0,070*'CP6N') + (0,061*'CP7N') + (0,059*'CP8N') + (0,048*'CP9N') + (0,039*'CP10N')

Table 06: Analyzing the components for creating the Index
Analyzing the Main Components: P1N; P2N; P3N; P4N; ... P9N; P10N
Auto-analysis (Eigenvalues and Eigenvectors) of the Correlation Matrix

Eigenvalue	2,7689	1,6559	1,1933	0,869	0,7504	0,697	0,6095	0,5852	0,4817	0,3891
Proportion	0,277	0,166	0,119	0,087	0,075	0,07	0,061	0,059	0,048	0,039,
Accumulated	0,277	0,442	0,562	0,649	0,724	0,793	0,854	0,913	0,961	1
Eigenvector										
Variable	CP1	CP2	CP3	CP4	CP5	CP6	CP7	CP8	CP9	CP10
P1N	0,242	0,47	-0,387	-0,027	0,174	0,125	0,026	0,419	0,475	-0,35
P2N	0,286	0,499	0,152	0,161	0,015	0,121	0,177	-0,444	-0,461	-0,405
P3N	0,378	0,413	0,235	0,058	0,049	0,08	0,016	0,171	-0,032	0,767
P4N	0,403	-0,005	-0,043	-0,296	-0,049	-0,647	-0,031	-0,448	0,353	0,026
P5N	0,297	-0,329	0,087	-0,136	0,676	0,436	-0,236	-0,253	0,105	-0,008
P6N	0,365	-0,123	0,402	0,121	-0,262	-0,1	-0,624	0,343	-0,086	-0,286
P7N	0,202	-0,14	-0,644	0,445	0,196	-0,273	-0,209	0,04	-0,388	0,135
P8N	0,306	-0,353	0,269	0,217	0,204	-0,22	0,664	0,333	-0,024	-0,138
P9N	0,322	-0,26	-0,186	0,35	-0,547	0,435	0,137	-0,25	0,311	0,068
P10N	0,309	-0,154	-0,281	-0,694	-0,244	0,179	0,135	0,2	-0,413	0,002

Source: Created by the authors, Minitab

After that, the data base normalization occurred, attributing a new scale (0 to 100) so that all variables can be expressed by the same pattern. In this paper the Min-Max Normalization was used, which is based on the minimum and maximum observed values. This method conserves the relationship between the values of the original data.

The equation used for the database normalization was:

((c4-MIN(c4))/(MAX(c4)-MIN(c4))*100), where: c4 refers to the column of data which were normalized by the Min-Max Method, generating the WCPI

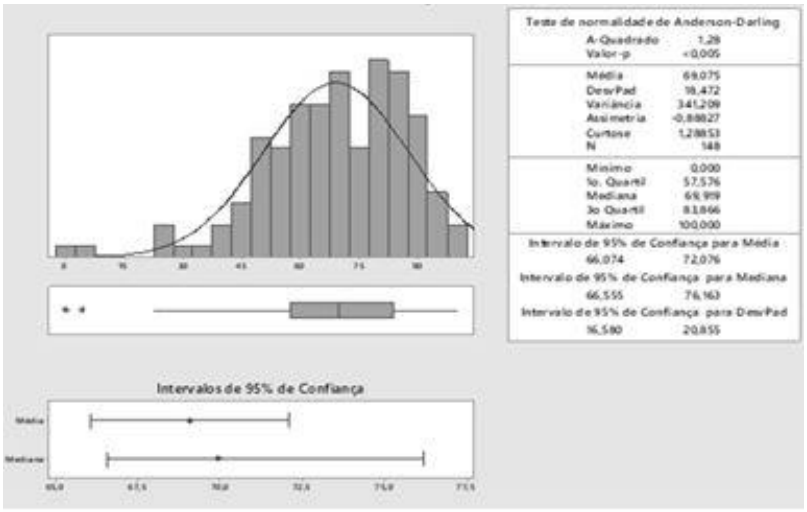

Figure 01: Summary report for WCPI
Source: Extracted by MiniTab.

Result Analysis

To understand the profile of the participants, they were asked their age group and 64 students (43%) are up to 24 years old; 20 (14%) are between 25 and 30 years old, 57 (39%) are over 30 years old and 7 (4%) did not answer. There is a balance between the younger participants (up to 24 years old) and the ones over 25 years old (53%).

Another profile that was explored was if they had already finished another higher education course and only 7 participants (5%) said yes, that is, most of the participants are having their first contact with higher education.

They were also inquired about their marital status and 45 students (30%) said they are married, 6 (4%) are in common-law marriage, 81 (55%) are single, 9 said they have other types of relationship (6%) and 7 (5%) did not answer this question. Single women are the majority, but it is somehow proportional to the other groups.

In regards to children, 64 (43%) said yes and 78 (53%) do not have children, considering that 6 (4%) did not answer.

In regards to employment, 67 (45%) work in private companies, 21 (14%) in public companies, 21 (14%) are freelancers, 33 (22%) are currently unemployed and 6 (5%) did not answer.There is a percentage if not desired, but significant nonetheless for the proposal of this research that 73% of the participant public is active within the work market, still considering the hypothesis that the remaining participants have already been employed in a time period previous to this research, therefore, with identity with what this research proposes.

The results from the researched questions are as seen on table 07 below:

Table 07: Mean, Median and Standard Deviation of the questions

Questions	N	Mean	S.Dev.	Median	IC of 95%
Q1: Is a higher education course enough for the development of your career?	148	78,55	26,73	100,00	(74,05; 83,05)
Q2: Is your current course ensuring better career opportunities?	148	84,01	24,43	100,00	(79,51; 88,51)
Q3: Is your course of choice keeping up with the technological advancement process?	148	81,42	20,23	75,00	(76,92; 85,92)
Q4: Is your career of choice going to suffer major alterations in the coming years?	148	70,61	25,54	75,00	(66,11; 75,11)
Q5: Will careers that exist today disappear in the coming years?	148	45,1	32,3	50,00	(40,60; 49,60)
Q6: Is there perspective for change in careers due to automation and new technologies?	148	76,69	25,2	75,00	(72,19; 81,19)
Q7: What is your degree of knowledge on, for example, Big Data, Machine Learning and Revolution4.0?	148	29,22	27,57	25,00	(24,72; 33,72)
Q8: In the coming years, will tasks that today are performed by humans be substituted by robots?	148	56,08	30,11	50,00	(51,58; 60,58)
Q9: Can this possibility reflect directly in your career?	148	56,59	31,46	50,00	(52,09; 61,09)
Q10: Will women's participation, in your career, be altered when comparing the current scenario and the future?	148	66,89	32,89	75,00	(62,39; 71,39)

Source: created by the authors

A considerable number of women, around 51%, strongly believe that a higher education course is enough for the development of their careers. However, isolating these participants, the mean of knowledge on terms such as "Big Data" and "Revolution4.0" is of 2.4 on a scale from 1 to 5. The mean of the answers on knowledge about change perspective in careers due to automation in this same group was of 4.1, on that same scale.

There is an understanding and a general perception over the tendencies to robot automation. From the sample, only 8% of the participants do not believe or agree very little with this.

These results indicate consistency with the theoretical references of this study, with regard to future opportunities, especially with the scenarios built from the movement of the fourth industrial revolution, by highlighting that the generation of new jobs will be fed, predominantly, with technology taking over the protagonist role of this context.

It was verified that the research does not have relevant alterations when we look at the population of married women with children and the single women without children, that is, the fact that women have other domestic attributions and/or more dedication to the family does not show significant opinion change regarding the career perception.

It is important to highlight that 64% of women understand that their degree of knowledge on, for instance, Big Data, Machine Learning and Revolution 4.0 is not very relevant and 61% of women believe that women's participation will be altered when comparing the current scenario and the future. This tendency is reassured when observing that 76% of women understand that the careers that exist nowadays will disappear in the coming years.

Stands out that the perception of the future market highlighted above is weakened when these last indicators are observed, that is, possible scenarios are glimpsed, but the paths to be followed, based on some existing technologies, appear less intensely, as well as the degree of comfort, why not say comfort, in depositing in higher education a status of importance that it even has, but not in a unique

way.

This statement gains strength based on the approach defended by Edgell (2012) when verifying that knowledge of new technologies is one of the main factors for the reconfiguration of new jobs.

With the goal of observing the participants' outlook concerning future scenarios, an open question was inserted in the questionnaire: What are the best career perspectives for the future?

Open question 11

code	main subject - cluster	amount	%
1	stability/public career	7	5
2	equal opportunities among genders	12	8
3	qualification and continued studies	20	13
4	innovation and technology as bigger opportunities	20	13
5	personal accomplishments, among related others	43	30
6	conservative or retrograde stance	6	4
7	Others / did not answer	40	27

Source: created by the authors

From the total, 30% believe that the best career opportunities are where they feel accomplished, both professionally and personally, contemplating motivational career concepts based on individual characteristics, as it was first proposed by London (1983); 13% believe that innovations and the technological sector will be good career perspectives; 13% believe that continuous qualification and continued studies will bring better perspectives; 8% believe that equal opportunities and salaries among the same opportunities should exist for all genders and that this will bring about good career expectations; 5% seek stability, actually naming public employment as a good alternative; 4% adopted a conservative or even retrograde stance before technological advancements.

Final Considerations

Human beings face changes and evolutions at work, and technology has been increasing the speed in which this process occurs. This growing technological advancement has been directly altering and influencing the emergence of new ways to work, raising concerns regarding to which extent do these new scenarios threaten the already existing professions, prioritizing occupations most common for women in this study. The goal is to explore career perspectives relating them to university education and new technologies, from the female perception. Schwab (2016) emphasizes that we can have two fields of perception in the work market: workers who will find new jobs with the technology or those who believe there will be a new social and political armageddon.

A survey containing 10 questions with answers following the *Likert* scale structure with a 1 to 5 range and one open question was answered by 148 women in the first term of 7 different courses in an University in the Baixada Santista, a metropolitan area located on the coast of the state of São Paulo, in Brazil.

From the results, a proposal for the Women's Career Perception Index – WCPI – was created based on higher education and technological advancements. The analyses signal an optimistic view of the future of women's careers but are opposed in some analyses, for example when the depth of knowledge of certain technical terms is explored, such as Machine Learning, Big Data and Industry 4.0.

There is a bet in higher education as a crucial factor of career development with the perspective of personal accomplishments, better career opportunities and an interest on obtaining higher qualification.

The goal of this research was to explore career perspectives relating them to university education and new technologies, from the female perception. Proposing to create a perception index that creates a

relation between these factors allows us to identify what women believe are the best and most relevant career opportunities.

From the results, we call attention to the relevance of personal satisfaction on the general results, especially on the open question. Virtually a third of the answers showed characteristics related to personal accomplishment as a career opportunity determiner, as it was proposed by London's studies (1983).

It is also important to note the level of general perception on the tendencies towards automation and its impacts on career opportunities, directly identified on question 6 of the survey, with a tabulated mean of 76.69.

There is a bet on higher education courses as a determining factor for career development, a small portion clearly understands that continuous learning is an important factor for career development opportunities. In any case, this information can be used together with market trends mapping in order to identify new education opportunities, proposals for updating more traditional courses or even opening an agenda for the creations of new courses.

It is understood that the main point of this study is reflected in the existing dichotomy in the opinion of the surveyed public, that is, there is a comfortable clarity in the perception of future job generation scenarios, but there is not, with the same intensity, a closer look precise as to the knowledge and skills needed for a more effective way.

The present paper has some sample limitations, seeing as it was based on entry-level students (freshmen) and factors such as maturity and professional experience, which could alter the index, were not considered.

Besides, it is a regional sample, with the population of a single university in the Baixada Santista. We cannot evaluate a possible approach by city or region, where the index with companies in more industrialized locations, for example, could bring a bigger perception of studied themes such as: Revolution 4.0, Big Data and Machine Learning.

The same applies to a sample with a public from the technology field, which could again help gain an even wider perception.

The study also presents limitations regarding theory, seeing as it is a very contemporary theme, which can have other scenarios of technology in the work environment and careers.

The conducted research helps to understand women's profile on the work market, being able to reinforce their worry about the future of their careers, in which is clear the connection with personal accomplishment, better career opportunities, interest for a better qualification and continued studies.

As an opportunity, we see the possibility of conducting the same study with the male public, with the same profile (entry-level students on a higher education course, on the same location of the previous sample), to be able to evaluate the career perception index between genders.

So that our index is even more consistent, the research could be periodically repeated, or even with the same participants in time, as a way of creating study scenarios, through which it will be possible to evaluate their evolution.

It is further recommended for this research that the results of the qualitative answers are used, evaluating also what is value for the male and female careers, approaching Schein's (1980) concept of career Anchors, in which it will be possible to periodically evaluate the evolution of this profile with generations and gender.

References

Barbosa Filho. de H. (2012). O jovem no mercado de trabalho. In: Barbosa, L. (org). Juventudes e gerações no Brasil contemporâneo. Porto Alegre, Sulina.
Bridges, W. (1994). Mudanças nas relações de trabalho. Job Shift. São Paulo: Makron Books.
Bruschini, C. (1990). Mulher, casa e família. São Paulo: Vértice; Fundação Carlos Chagas; Revista dos Tribunais.
Brynjolfsson, E., Mcafee, A. (2014). Novas tecnologias versus empregabilidade. São Paulo: M.Books.
Cockburn, C. (1985). Machinery of dominance: Women, men and technical know-how.London, Pluto Press.
Dutra, J. (1996). Administração de carreira: uma proposta para repensar a gestão de pessoas. São Paulo: Atlas.
Edgell, S. (2012).The sociology of work: continuity and change in paid and unpaid work.Sage Publications.
Gonçalves, C., Meielles, A. (2004). Projetos e relatórios de pesquisa em administração. São Paulo: Atlas.
Hirata, H. (2002). Globalização e divisão sexual do trabalho. Cadernos Pagu, (n. 17-18), pp.139-156.
Hirata, H,Rogerat, C. (1988). Technologie, qualification et division sexuelle du travail. In: Revue française de sociologie,(29-1), pp. 171-192.
Institute for the future. (2015). Human plus machine. Accessed 13 april 2018 from: http://www.iftf.org/ our-work/people-technology/.
International Labour Organization.(2017). ILO STAT Country Profiles. Accessed 04 may 2018 from: https://www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=BRA.
Leite, M., Guimarães, P. (2015). Tudo muda, nada muda: as implicações do uso das tecnologias de informação sobre o trabalho das mulheres no setor eletroeletrônico. Cadernos Pagu, Campinas, (n. 44), p. 333-366.
Lobbo, E. (1991). A classe operária tem dois sexos: Trabalho, dominação e resistência. São Paulo:Editora Brasiliense.
London, M. (1983). Toward a theory of career motivation. Academy of Management Review, EUA, (v. 8, n. 4), p.620-630.
London, M.,Stumph, S. (1982). Managing careers. Reading, MA: Addison-Wesley.
Nunes, D., Santos, N. M. B.F. dos; Fukunaga, F. (2020). Group dynamics and leadership: a collective process construction. Journal on Innovation and Sustainability RISUS, [S.l.], v. 10, n. 4, p. 27-36.
Oliveira, S. (2013). Profissões do futuro: você está no jogo? São Paulo: Integrare Editora.
Piasna, A., Drahokoupil, J. (2017). Gender Inequalities in the New World of Work. European Review of Labour and Research, Vol. 23(3), DOI: 10.1177/1024258917713839.
Rifkin, J.(1995).O fim dos empregos. Makron Books: São Paulo.
Schein, E. (1980). Developing Your Career: Know Your Career Anchors and Develop Your Options. Sloan Working Papers – M.I.T., Massachusetts, p.1148-1180, Anual. Working paper (Sloan School of Management). Accessed 31 march 2018 from: http://dspace.mit.edu/ bitstream/handle/1721.1/1968/SWP-1148- 08927036.pdf?sequence=1.
Schwab, K. (2016). A quarta revolução industrial. São Paulo: Edipro.
Schwartz, S. H. (1992). Universals in the context and structure of values: theoretical advances and empirical tests in 20 countries. Advances in Experimental Social Psychology, v.25.
Semesp. Sindicato das entidades mantenedoras do Estado de São Paulo. (2018). Accessed 04 may 2018 from: http://www.semesp.org.br/.