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# Choosing Course Dilemma in Distance Education: Engineering by Vocation or Management by Need

*O Dilema na Escolha de Curso por Alunos EaD: Engenharia por Vocação ou Gestão por Necessidade*

*El Dilema en la Eleccíon Del Alumnado por una Carrera EaD: ¿Ingeniería por Vocación o Gestión por Necesidad?*

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## Abstract

This paper aims to identify the Management students' choice motivations and their subareas in distance learning. The survey was collected from a structured questionnaire from students already enrolled in the management courses, from bachelor and technologist programs, with 1953 answers from all over Brazil. The collected data received quantitative treatment, being the main techniques, Descriptive Statistics, Multivariate Analysis and Exploratory Factor Analysis. The result of the analysis pointed as main motivations the personal vocation (career) and financial motivations, as much of the distance learning modality as in comparison with other courses like the Engineering. It was possible to verify the existence of interest on the part of these Management students to continue studies with emphasis in the exact and engineering courses in the future, as another undergraduate and postgraduate in the

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distance learning modality.

**Keywords**: Distance education. Management. Engineering. Baccalaureate and Technologist.

## Resumo

O presente trabalho tem como objetivo identificar as motivações na escolha dos alunos em cursar graduações na área de Gestão e suas subáreas, ofertados na modalidade EaD. A pesquisa foi desenvolvida a partir da aplicação de um questionário estruturado com alunos matriculados em cursos, tanto em bacharelado como em tecnólogo de uma instituição de ensino privado, tendo obtido 1953 respostas advindas de todas as regiões Brasil. Os dados coletados receberam tratamento quantitativo, sendo as principais técnicas, a Estatística Descritiva, Análise Multivariada e a Análise fatorial exploratória. O resultado da análise apontou como principais motivações a vocação pessoal (carreira), seguida por motivações financeiras. Foi possível constatar a existência de interesse por parte dos alunos matriculados em cursos de Gestão em, no futuro, prosseguirem estudos com ênfase em cursos de exatas e das engenharias, tanto de graduação como de pós-graduação na modalidade EaD.

**Palavras-chave**: Educação a distância. Gestão. Engenharia. Bacharelado e tecnológico.

## Resumen

El presente trabajo tiene como objetivo identificar las motivaciones en la elección de los estudiantes para estudiar graduación en Gestión y sus subáreas en educación a distancia, incluso si hay una oferta presencial. La encuesta se recopiló de un cuestionario estructurado con estudiantes ya matriculados en las áreas de gestión, tanto de licenciatura como tecnólogos, con 1953 respuestas de todo Brasil. Los datos recogidos recibieron tratamiento cuantitativo, siendo las técnicas principales, Estadística descriptiva, Análisis multivariante y Análisis factorial exploratorio. El resultado del análisis señaló como motivaciones principales la vocación personal (carrera), seguida de motivaciones

financieras, como gran parte de la modalidad en comparación con otros cursos como la Ingeniería, presente en las respuestas. Fue posible verificar la existencia de interés de los estudiantes matriculados en cursos de Administración en el futuro, para continuar estudios con énfasis en cursos exactos y de ingeniería, tanto de graduación como de posgrado en la modalidad de educación a distancia.

**Palabras clave**: Educación a distancia. Gestión. Ingeniería. Bachillerato y tecnólogo.

# 1. Introduction

The evolution of enrollments in higher education in Brazil has shown high growth rates since 1998, with annual rates exceeding 10% per year between 1999 and 2003. This growth has slowed since 2009, with annual rates rarely exceeding 5 %. Part of this growth was obtained through the expansion of distance education. In 2006, only 4.2% of students in higher education were taking courses in distance education, while in 2016 this percentage reached 18.6% (INEP, 2017). The evaluation of this growth in enrollment, especially in distance education courses, raised different questions about these courses, as well as the permanence of students in educational institutions, being a frequent object of research involving aspects related to the quality of courses and use by students (BIELSCHOWSKY ; MASUDA, 2018).

This work consists of the association of the intended career or already in progress with the choice of higher education by the student, especially those of Management courses. Management courses, for both technologist and bachelor's degree, are among the biggest vacancies offered by higher education institutions (HEIs), either in the face-to-face or in the distance education format; they form about 22% of the total vacancies offered (INEP, 2017).

The aim of this study is to identify the reasons for the choices between a bachelor's degree and a technical course and to understand whether the chosen course would be the one that the student would actually want. More specifically, the work intends to also verify if, among the students

enrolled in the Management and Administration courses, the career intended by these students would not be Engineering and what are the reasons that led them to choose a Management course and not Engineering.

Based on details of the offer of higher education courses in Brazil, this study counted with the collaboration of 1,953 students from Management, bachelor's or technical courses, from an HEI and identified their motivations for choosing the Management and Administration course, the relationship of the course with their professional performance and their relationship with courses in the Engineering area.

## 2. Theoretical Framework

Education in Brazil has been one of the main elements of the social transition of many individuals, since higher education is linked to guaranteeing a good job and salary (LEMOS; DUBEUX; PINTO, 2009). Professional qualification is an important challenge for those seeking to enter the labor market, and is often understood as a basic requirement for employability (SANTANA, 2013).

This section discusses elements related to the Brazilian panorama of higher education, the reasons that lead students to attend it and the relationship between the chosen course and the intended professional career.

### 2.1. Higher education panorama

In Brazil, to ensure compliance with educational legislation, public and private higher education institutions are regulated and supervised by the Secretariat of Regulation and Supervision of Higher Education (Seres), a unit of the Ministry of Education (MEC), which promote actions for raising the quality of teaching.

According to the Map of Higher Education of Brazil - Semesp (2017), in 2016, a total of 34,366 undergraduate courses were offered at 2,407 higher education institutions in Brazil, with a strong concentration of courses offered at universities. From 2009 to 2016, there was a 34.50% increase in enrollments in higher education.

In the same period, enrollment in face-to-face courses increased by 27.34%, while in distance education courses, they increased by 78.13%. It is important to note the reduction in enrollments in face-to-face education between 2015 and 2016, offset by the increase in distance education, which allowed a slight increase in students enrolled in undergraduate courses. In face-to-face courses, in the years 2014 and 2016, there was an increase in enrollments in bachelor's degrees and a reduction in technical courses (SEMESP, 2017).

This movement points to a significant reduction in technologist courses in person. The most significant reduction in these face-to-face courses suggests the need for further study of the reasons for this movement. The synthesis of these movements indicates a significant reduction in enrollments in Management and Administration in the bacharel courses offered in the face-to-face modality and stability in the enrollment of technological courses offered in the distance modality, according to Table 1.

This reduction in enrollment in face-to-face courses in the Management and Administration area signals the need for studies that point out the reasons; for this, it is also essential to determine the motivations for the choice of these courses by those entering higher education.

**Table 1:** Evolution of enrollments 2014-2017

| 2014 M&A | | | 2017 M&A | | Evolution 2017 over 2014 | |
|---|---|---|---|---|---|---|
| | Face-to-face | Distance Education | Face-to-face | Distance Education | Face-to-face | Distance Education |
| bachelor degree | 623.373 | 178.563 | 481.768 | 200.787 | -22,79% | 12,40% |
| Technical | 270.964 | 275.716 | 213.639 | 324.443 | -21,20% | 17,70% |
| Total | 894.337 | 454.279 | 695.407 | 525.230 | -22,20% | 15,60% |
| Grand Total | 6.497.889 | 1.341.876 | 6.529.681 | 1.756.982 | | |
| | 13,76% | 33,85% | 10,65% | 29,89% | | |

Source: Map of Higher Education in Brazil - SEMESP (2017).

According to Semesp (2017), the courses most sought by students up to 24 years of age in private higher education institutions in Brazil in 2015 were Law (721 thousand enrollments), Administration (539 thousand) and Civil Engineering (265 thousand), all in the face-to-face modality. In the age group from 25 to 44 years, the most sought courses were Law, Administration and Nursing; in the age group above 45 years, the elected were Law, Pedagogy and Psychology. Among the technical ones, People Management/Human Resources (93 thousand enrollments) and Logistics Management (51 thousand enrollments) stood out among the most sought after in 2015.

## 2.2. Reasons to pursue higher education

Having higher education in a given course is no longer considered a differential, but a prerequisite for certain positions in the market, becoming essential to guarantee opportunities for professional and personal growth, because in practice the knowledge provided by higher education courses allows a differentiated performance, being able to generate new opportunities in the market in more complex and challenging functions, which consequently improves remuneration (SANTANA, 2013).

The reasons for pursuing higher education have been widely discussed by several authors, such as Silva and Machado (2007); Lacerda; Kings; Santos (2007); Penaloza; Diogenes; Souza (2008); Bergamo et al. (2010); Trentin and Silva (2010); Portugal et al. (2013); Trentin and Silva (2010); Cricca et al. (2014); Viana et al. (2014).

Currently, in Brazil, there are some government programs that aim to facilitate access to higher education: the Unified Selection System (Sisu), administered by the Ministry of Education, integrates the selection process of several public higher education institutions; the University for All Program (Prouni) offers full and partial scholarships for Brazilian students at universities and private colleges; the Higher Education Student Financing Fund (FIES) grants financing that varies between 50% and 100% of the monthly fee with reduced interest.

According to Semesp (2017), employability has increased among those who have completed higher education. From 2014 to 2015, jobs for those with higher education grew 1.5%, reaching 9.7 million jobs in 2015. In high school, growth reached only 1%, and in elementary school there was a drop of 3% in employability (SEMESP, 2017). In addition, remuneration grows significantly as schooling increases. The average remuneration of a person with complete higher education was almost 300% higher than that of a person with complete secondary education, in 2014 (SEMESP, 2017). This fact can generate strong motivation for the search for higher education.

With the wide variety of educational institutions offering higher education courses, one of the candidate's decisions is the choice of the HEI where he will study. According to Bergamo et al. (2010), the choice of the educational institution is not limited only to aspects of teaching quality, but also to other factors of attractiveness of the institutions, such as location, financial aspects, social attributes of the campuses, infrastructure and technology.

It is also feasible to analyze all the available alternatives in order to gather information about the on-site and distance courses, as well as on the reputation of the institutions, the syllabus, the workload, the selection process, the education system, the value of tuition fees, the teaching staff and the available infrastructure - classrooms, laboratories, physical and virtual libraries, study platforms, online channels of communication with teachers, in addition to the existence of business incubators and programs for inserting students into the market (BERGAMO et al., 2010).

According to Taveira et. al. (2019), institutions in distance education can now have centers abroad, leading to opportunities to continue studies outside Brazil, which is also an excellent reason to enter a higher education course, because, in addition to being a differential in the curriculum, this international experience is often transformative from a personal point of view.

These motivational factors may be limited by the availability to take the intended courses. Although the offer of places is wide, several courses have limitations in this aspect. Examples of these limitations are

some professional bodies that do not admit that the courses are partially or wholly carried out in distance learning in areas such as Law, Medicine and Psychology, among others. Also the offer of courses in the distance education format in the Engineering area is very limited.

Table 2 presents the data for the year 2016. The numbers indicate that the offer of places for the M&A and Engineering courses in the face-to-face modality is very similar, with greater use for the Engineering courses, which occupy 43.72% of the places offered against 34.75% in M&A courses. In distance education, the difference is significant: in addition to a much higher offer of places in M&A courses, the number of enrollments and tickets is also much higher. Only 6.93% of the places offered in distance education in Engineering courses are occupied, against 24.27% of places in distance education in M&A courses.

**Table 2:** Vacancies offered, registration and tickets

| Face-to-face | | | Distance education | | |
|---|---|---|---|---|---|
| Discrimination | Law | M&A | Engineering | M&A | Engineering |
| Vacancies offered | 245.956 | 693.190 | 682.140 | 1.074.182 | 399.542 |
| Registrations | 1.204.636 | 1.431,42 | 2.029.448 | 676.506 | 115.310 |
| Admissions | 206.623 | 240.885 | 298.242 | 260.699 | 27.698 |
| Enrolled | 861.855 | 748.935 | 1.204.500 | 457.402 | 40.105 |
| **Face-to-face** | | | **Distance education** | | |
| Discrimination | Law | M&A | Engineering | M&A | Engineering |
| Registration / Vacancies | 4,9 | 2,06 | 2,98 | 0,63 | 0,29 |
| Admissions / Vacancies | 84,01% | 34,75% | 43,72% | 6,93% | |

Source: Higher Education Census (2016).

These data indicate that the option of not studying Engineering in distance education may not be motivated only by the fact that the offer is reduced.

## 2.3. Career choice

The choice of a career, made by young people often still immature, has been discussed for a long time. In 1978, Edgar Schein interviewed students at the Sloan School of Management and realized that, as the individual progresses through the various stages of his career, he gains self-knowledge and develops a clearer self-perception of his trajectory. Schein (1978) describes this self-concept as the career anchors, which are based on three characteristics: talents and skills, based on the success of the various jobs performed; reasons and needs, based on feedback from other people and the company and self-assessment when facing various challenges; and attitudes and values, based on the confrontation between the own values and norms and those of the organization or occupation.

For Araújo et al. (2013), the practice of professional training involves, in addition to cognitive, the ability to deal with complex situations, which seeks the need to understand human behavior and the composition of social systems. It is appropriate for people, before starting higher education, to research a course that allows their development as a professional and as a person and that is offered by a reliable HEI. In this regard, Cricca et al. (2014) state that there are other attributes for those looking to take a higher education course; the personal factor is what most influences students when choosing higher technology courses. For management and business students, the choice takes into account the relevance of cultural, social, personal and psychological factors.

A good number of students entering higher education are of an early age when making their career choice. According to the Higher Education Census (2016), about 20% of students enrolled in undergraduate courses are 20 years old or younger, which reinforces the idea of early choice. According to Pradella (2015), there is a great diversity of professions in the job market and the responsibility for the choice falls, in many cases, on adolescents who have just left high school, who do not always seek the guidance of specialized professionals, as psychologists, psychopedagogists, teachers and vocational counselors to help them in a more specific way to get their future professional career right. Due to their young age, these people who start their careers with an emotional

side still developing, full of dilemmas and little knowledge about themselves, are susceptible to external influences (PRADELLA, 2015).

On the other hand, the family can also play a role in the process of choosing a certain course. In many cases, because they are not mature enough to determine what career they will pursue, they choose courses and professions that bring status to the family. In this sense, the family will be able to both help and hinder the choice of career, since, due to the family's history and belonging, the young man does not consider the career he would choose and opts for a project that his parents outlined for him ( ALMEIDA; MAGALHÃES, 2011).

The economic aspect is also a guiding factor when choosing a professional career, since many young people have low-income economic conditions and work to help with family costs. Thus, they end up not having the same opportunity to choose the profession as the young person whose economic condition is more affluent (GRINGS; JUNG, 2017). In several cases, the choice of the institution and the course is made based on financing facilities, such as those already exposed.

The demands of organizations may also be factors in choosing a career. In search of greater competitiveness in the market, organizations encourage their employees to seek the necessary skills, preferably aligned with their strategies, guiding future students to seek certain courses. This allows to elevate their positions in the company, sharing both the willingness of employees for professional and personal growth and ascension in the company and the needs of organizations.

The training of employees with an emphasis on the skills and competencies necessary for their development, who also understand the association between personal and organizational values, may come to alter or minimize economic and social problems, establishing relations of complementarity, congruence and unilateralism among these values (ALVARENGA; LEITE, 2015).

# 3. Methodology

To meet the objectives of the study, a survey type survey was conducted. The studies of this modality must be classified as quantitative, comprising the interpretation of the data collected through statistical techniques. The population was formed by all students of courses in the management area of a higher education institution that offers courses in classroom and distance learning. On-site courses are offered only at IES headquarters, while distance-learning courses are offered at more than 500 on-site support centers located in several states in Brazil. Most courses classified by Inep in the area of Management and Administration (M&A) offered by IES are offered in both modalities. There are more than 20,000 students enrolled in G&A courses in all modalities, with a concentration in distance education, which accounts for about 97% of the total. Of this total, 45.70% are enrolled in baccalaureate courses and 54.30% in technical courses.

A structured questionnaire composed of 58 closed questions was developed. Before being sent to students, the questionnaire was subjected to a pre-test involving 18 students, with the recommended adjustments being made in this phase for the preparation of the final questionnaire. The final version of the questionnaire was inserted into the Google Form software and a questionnaire link was sent to all students through the student relationship management software. This questionnaire was available for answers between April 19 and May 2, 2018. In the format presented to students, only the complete questionnaires with all the questions answered were registered.

A total of 1,953 students from IES M&A courses answered the questionnaire, 1,913 students from distance education courses (representing 9.86% of the population) and 40 students from classroom courses (representing 6.67% of the population). There is a predominance of respondents in the distance education modality, which is in accordance with the profile of the educational institution in which the research was applied, with the majority of students in the distance education modality, as shown in Table 3.

**Table 3:** Course Modality

| | Frequency | Percentage |
|---|---|---|
| Distance education | 1.913 | 98,0 |
| Face-to-face education | 40 | 2,0 |
| Total | 1.953 | 100,0 |

The chi-square test goodness of fit to assess whether the proportions of those enrolled in distance education and face-to-face in the sample were similar to those of the population, presented a p-value of 0.137, indicating that the proportions in the sample do not differ from the proportions in the population and that, with regard to enrollment in distance education and in person, the sample considered representative of the population. The respondents of the baccalaureate courses were 991 students, which corresponds to 50.7%; of technologist courses, there were 962 students, corresponding to 49.3%.

The chi-square test goodness of fit showed a value of p = 0.000 indicating that the proportions between baccalaureate and technologist in the sample differ significantly from the proportions of the population, preventing the joint analysis of data for the sample. Based on this result, all statistics were made in a segregated manner between the two groups.

## 4. Results and discussion

The questionnaires received were transferred to an electronic spreadsheet. Then, they were analyzed, checked, validated and transferred to the statistical software, SPSS, version 17, for data treatment. The first statistics conducted were of a descriptive nature, to verify the integrity of the data and provide researchers with an initial view of the resulting sample.

Respondents were asked about their preferences about a technical or bachelor's degree, on a 5-point Likert scale, with responses ranging from 1 (certainly technical) to 5 (certainly bachelor's). Table 4 presents the results of the question, segmenting by type of course in which they are enrolled (bachelor's degree or technical).

**Table 4:** Current course type versus course type preference

| Preferences | Bachelor | Technical | Total |
|---|---|---|---|
| Certainly technical | 3,13% | 17,27% | 10,10% |
| Provably technical | 5,36% | 18,83% | 12,00% |
| Indifferent | 23,86% | 36,21% | 29,95% |
| Probably baccalaureate | 27,20% | 13,63% | 20,51% |
| Certainly baccalaureate | 40,44% | 14,05% | 27,44% |
| Total | 100,00% | 100,00% | 100,00% |

For baccalaureate's and technical students, there is a difference between preferences, a significant difference when Pearson's chi-square test is applied ($p < 0.0005$). For baccalaureate students, there is a high preference for the baccalaureate course over those of a technical course; for technical course, the preference is for indifference, which has the highest score. This allows us to conclude that students of baccalaureate's courses give more preference to the level of their choice (bachelor's degree) than students of technical courses give to their chosen level (technologist).

To discover the motivations for choosing his career, 22 possible attributes used for the decision were listed, based on the literature review. Each respondent attributes the importance of each attribute to their personal choice, on a 5-point Likert scale ranging from "none" to "essential". The purpose of this part of the questionnaire was to identify the main motivations for choosing the course in which you are enrolled.

Chart 1 shows the averages of the measured attributes in decreasing order. In this analysis it can be observed that some variables have higher scores; therefore, they are more important than others; the vast majority of attributes received values close to the midpoint of the scale (3.0), with only one remaining significantly higher than the others (p18 [The course allows me to work in different areas / segments of the company]), with an average of 3.84, and four attributes with a relatively low average, indicating less importance in the motivation of the choice.

**Chart 1:** Reasons for choosing the course

| Variable | Answer | Average | Pattern |
|---|---|---|---|
| p18 [The course allows me to work in different areas / segments of company] | 1953 | 3,84 | 1,267 |
| p16 [It is a course that keeps up to date with market developments] | 1953 | 3,68 | 1,303 |
| p25 [I identify with professionals in the field] | 1953 | 3,66 | 1,316 |
| p21 [Offers greater job offers] | 1953 | 3,62 | 1,304 |
| p12 [Provides faster professional advancement] | 1953 | 3,62 | 1,328 |
| p14 [Allows me to reach a managerial or managerial position more quickly] | 1953 | 3,46 | 1,377 |
| p23 [Duration is compatible with my financial situation] | 1953 | 3,45 | 1,431 |
| p22 [It is compatible with my social condition] | 1953 | 3,43 | 1391 |
| p20 [Provides better remuneration] | 1953 | 3,39 | 1,309 |
| p17 [It is a solid course, which provides job security and stability] | 1953 | 3,37 | 1,348 |
| p19 [There is a lower monthly fee] | 1953 | 3,31 | 1,482 |
| p27 [Complements current professional occupation] | 1953 | 3,25 | 1,586 |
| p11 [Due to being a prestigious course] | 1953 | 3,22 | 1,403 |
| p9 [I had good recommendations from friends, manager, teachers, others] | 1953 | 3,18 | 1,483 |

| | | | |
|---|---|---|---|
| p13 [It is a highly sought after course by people today] | 1953 | 3,09 | 1,403 |
| p24 [The job market is not saturated for this course] | 1953 | 2,98 | 1,421 |
| p28 [The institution offered financial facilities (scholarship, free entrance to the entrance exam, discount on tuition fees, etc.)] | 1953 | 2,87 | 1,670 |
| p10 [I had suggestions from family members] | 1953 | 2,66 | 1,504 |
| p8 [I have less difficulty in understanding] | 1953 | 2,37 | 1,358 |
| p7 [I received pressure from the company where I work/worked] | 1953 | 2,10 | 1,453 |
| p26 [The company where I work / worked for paid for this course] | 1953 | 1,78 | 1,320 |
| p15 [We have a family tradition in this course] | 1953 | 1,70 | 1,192 |

Due to the high number of items on the scale and in order to facilitate the analysis, an exploratory factor analysis was performed, using the Kaiser criterion to determine the number of factors, with subsequent oblique rotation for its interpretation. The KMO index (Kaiser, Meyer, Olkin) was 0.936, indicating the feasibility of using exploratory factor analysis for this data set. By Kaiser's criterion, eigenvalue above 1.0, the adoption of four factors was determined, which explains, in an accumulated way, 59.39% of the data variance.

When interpreting the factors, some adjustments were necessary. Question 24, referring to the attribute "market for graduates of the course not being saturated", was eliminated because it did not reach the minimum factor load to be included in any of the factors. Question 8 was removed for not having logical consistency with the other factor variables. Subsequently, each factor had its Cronbach's Alpha calculated to measure its reliability. All factors showed rates above the minimum

standards of an experimental study. New variables were also calculated, one for each factor, by averaging the values of the component attributes of each factor.

Chart 2 presents the results of this stage. The factors created after analyzing its composition were named Market, Cost, Recommendation and Company, based on the evaluation of their components. These values have very different averages, indicating a difference in the importance of each in the motivation of the choice.

**Chart 2:** Composition of factors

| Rotated matrix | Component | | | |
|---|---|---|---|---|
| | Market | Cost | Recommendation | Company |
| p21 [Offers greater job offers] | 0,745 | | | |
| p16 [It is a course that keeps up to date with market developments] | 0,736 | | | |
| p18 [The course allows me to work in different areas / segments of company] | 0,733 | | | |
| p17 [It is a solid course, which provides job security and stability] | 0,708 | | | |
| p20 [Provides better remuneration] | 0,681 | | | |
| p25 [I identify with professionals in the field] | 0,676 | | | |
| p14 [Allows me to reach a managerial or managerial position more quickly] | 0,636 | | | |
| p12 [Provides faster professional advancement] | 0,589 | | | |
| p23 [Duration is compatible with my financial situation] | | 0,817 | | |

| | | | | |
|---|---|---|---|---|
| p19 [There is a lower monthly fee] | | 0,786 | | |
| p22 [It is compatible with my social condition] | | 0,753 | | |
| p28 [The institution offered financial facilities (scholarship, free entrance to the entrance exam, discount on tuition fees, etc.)] | | 0,451 | | |
| p10 [I had suggestions from family members] | | | 0,777 | |
| p9 [I had good recommendations from friends, manager, teachers, others] | | | 0,657 | |
| p11 [Due to being a prestigious course] | | 0,528 | 0,583 | |
| p13 [It is a highly sought after course by people today] | | 0,473 | 0,513 | |
| p26 [The company where I work / worked for paid for this course] | | | 0,748 | |
| p7 [I received pressure from the company where I work/worked] | | | 0,693 | |
| p27 [Complements current professional occupation] | | 0,428 | | 0,559 |
| p15 [We have a family tradition in this course] | | 0,471 | 0,510 | |
| Variance Explained | 24,56% | 13,41% | 12,13% | 9,29% |
| Factor average | 3,58 | 3,27 | 3,04 | 2,21 |
| Cronbach's Alpha | 0,899 | 0,777 | 0,788 | 0,615 |

To check the averages of the constructs created, respectively, Market, Costing, Recommendations and Company, the Friedman test was performed, which indicated that there is some statistically significant difference between the constructs (p <, 0005), but without indicating between which constructs this difference occurs. To check which constructs are different, the Wilcoxon Signal Rank Test was performed for each pair of constructs. The applied test showed that the difference exists between all pairs (p value <0.005) for each pair. With that, it is possible to state that the main reason considered when choosing a higher education course is in aspects related to the future of the career (Market), followed by aspects related to the necessary financial investment (Costing). In smaller doses, there are the aspects of recommendations from family members and colleagues and, finally, those related to financing, in whole or in part, by the company where it operates. The latter may be less important because the students are not employed at the time of choice.

Then, the averages of each group of students, technical or baccalaureate, were compared for each of the factors. The t-test for independent samples showed that only the Costing factor presents significant differences between groups, with baccalaureate's students with an average for the costing factor of 3.12229 (sd = 1.15791), while the technical students presented a mean of 3.4132 (SD = 1.144312). The effect size calculated by the eta index (eta =, 125) indicates effect size between small and medium. This difference in importance in choosing the course only in the factor involving Costing, referring to the payment of tuition fees and other expenses in the course, indicates the greater importance of the item monthly fee for those who chose a technical course, both because they are more as well as by charging lower monthly fees. The most important item for both groups is the so-called Market, which involves the insertion and progression of a professional career. This attribute is equally important for both groups, which suggests that the two modalities, in the students' view, present the same career opportunities. The second factor in importance, Costing, presents significantly higher values for students in a technical course, which allows to reaffirm the already exposed, that one of the main reasons for choosing these courses is in their costing. This conclusion is corroborated by the movement towards migration

to technical courses, which has been more intense since 2015, especially in distance education courses.

The other objective of this work was to verify the possible possibility of choosing the Management course to be made at the expense of a course in the Engineering area. For this stage, a joint analysis was made of various information collected in the questionnaire.

The first condition was to verify if the student already worked in the Engineering area when making his choice. We obtained the following results: 304 students worked and 1,649 students did not. The percentage of students who already worked in the Engineering area is quite low, with only one in six students in the courses (Table 5).

**Table 5:** Professional performance in the Engineering area

| Answer | Frequency | % |
|---|---|---|
| Yes | 304 | 15,6 |
| No | 1.649 | 84,4 |
| Total | 1.953 | 100,0 |

When analyzing this information with the group divided between the technical and bachelor's degree students, the information indicates that there is a significant difference between the two groups: in the bachelor's degree courses, of the 50.78% students, 38.49% worked in the area Engineering and 53% do not work in this area. In technical courses, of the 49.26% of the students, 61.51% worked in the area and 47% did not.

The difference in profile of the groups, established by the chi-square test, which presented a $p < 0.0005$ value, points out that students of the technical course have more current or previous involvement with engineering activities. This strongly suggests that technical courses are preferred for people with professional experience or future career aspirations in engineering areas.

As for the next question, if at the time of choosing the higher education course they could have preferred a course in the Engineering

area instead of the chosen one, in the Management area, 579 students answered for the possibility of taking a course in the engineering area and 1,374 students discarded this possibility, indicating that there is an approximate contingent of 30% of management students who could have opted for a course in the Engineering area when choosing a higher education course. This percentage (29.6%) is much higher than that of those working in companies in the Engineering area, (15.6%,); this difference is statistically significant by the Fischer Exact test for the chi-square with $p < 0.0005$.

In this regard, it is evident that the attraction to courses in the Engineering area does not occur only among those who already work or have worked in the area and that there is a potential market for students for these courses, who, for some reason, choose courses Management area. The distribution of these students by the different courses offered was analyzed as follows: Administration (yes 30.57%, not 69.43%); Accounting Sciences (yes 27.75%, not 72.25%); Foreign Trade (yes 29.33%, no 70.67%); Commercial Management (yes 22.69%, not 77.31%); Industrial Production Management (78.52% yes, 21.48% no); Financial Management (yes 27.97%, no 72.03%) Logistics (yes 40.00%, not 60.00%); Marketing (yes 21.57%, no 78.43%); Management Processes (yes 32.53%, not 67.47%); Human Resources (yes 12.72%, no 87.28%) and Executive Secretariat (yes 10.31%, no 89.69%).

It is observed that the potential choice of a course in the Engineering area differs from the course in which you enrolled. Students from the Marketing, Human Resources and Executive Secretariat courses have reduced tendencies to have considered a course in the Engineering area, while students from courses with a strong connection with Engineering, such as Industrial Production and Logistics, present this possibility of much more intense.

When asked the question of those who considered taking a course in the Engineering area, but ended up opting for a Management course, about the reasons for choice, the most relevant was the lack of financial resources, as can be seen in Table 6.

**Table 6:** Relevance of reason for not choosing the course in the Engineering area

| Justifications for negative responses | Average | Standard deviation |
|---|---|---|
| Lack of financial resources | 3,88 | 1,356 |
| It takes a long time to graduate | 2,54 | 1,460 |
| There is no course I would like to take available in my city | 2,44 | 1,561 |
| I think it may require too many studies | 2,30 | 1,350 |
| There is no Engineering course I would like to take | 2,10 | 1,434 |
| I have no skill for calculations | 2,03 | 1,307 |
| I have no vocation or aptitude for courses in the area of Engineering | 2,03 | 1,226 |

Table 6 allows us to establish that the lack of financial resources is far above all other reasons, confirmed by the Wilcoxon Signal Rank Test, which pointed out a significant difference between the lack of financial resources and each of the other reasons presented (values $p < 0.005$). The supremacy of this reason corroborates the affirmation of the choice of Management courses for financial reasons pointed out in the analysis of the factors extracted from the factor analysis.

This situation can be confirmed even when analyzing the future intention of taking courses in the Engineering area, either undergraduate or postgraduate, among students who thought or not to study Engineering, with a strong and significant difference between groups ( Table 7).

**Table 7:** Intention to study in the field of Engineering in the future

| Answers | Yes | No | Total |
|---|---|---|---|
| Certainly not | 4,84% | 39,27% | 29,08% |
| Probably not | 30,97% | 42,33% | 38,97% |
| Probably yes | 43,43% | 12,29% | 21,51% |
| Certainly yes | 20,76% | 6,11% | 10,45% |
| Total | 100,00% | 100,00% | 100,00% |

Of those who considered engineering, of every three students, two intend to undertake future studies in engineering, while among those who did not consider engineering, less than 20% have the same intention. The combination of these data allows us to conclude that about 20% of all graduates of Management courses envisage the possibility of carrying out further studies in Engineering, offering significant market opportunities due to the high number of graduates of Management courses.

## 5. Final Considerations

The main conclusions obtained by the analysis of the results indicate that there is a significant percentage of students of courses in the Management area who, when registering, considered taking Engineering courses (29.6% of all students in the Management area). This percentage does not seem to be influenced by previous professional performance, as only 15.4% of students work or have worked in the Engineering area, and indicates a latent potential for enrollment in Engineering in distance education.

Among the reasons given for choosing the course, the one that stands out as the main one is the vision of the future career, followed by factors involving the investment necessary to pay for the selected course. As this costing factor presents itself more intensely among students of technical courses than bachelor's degrees, the conclusion related to this is that technical courses are chosen because they present lower investments, both in terms of tuition fees and duration.

The combination of these data allows us to conclude that the possible offer of technologist courses in the Engineering area would have an apparently significant market and could be a way to increase the enrollments in the Distance Education modality in the Engineering area, subject to the need for professional regulation by professional bodies.

Finally, there is a potential market for distance education courses in the Engineering area for graduates of courses in the Management area, which is the second most numerous in numbers of graduates, only inferior to the Education area, which suggests a future market with expressive numbers enrollment for distance education engineering courses, both at undergraduate and graduate levels.

In view of the rapid expansion of distance education in higher education courses in Brazil, careful analysis of the conclusions obtained in this work can guide the efforts of HEIs and indicate the need for adaptation in regulation by the legal authorities in education, as well as in professional regulation.

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