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Undergraduate Students in Ecuador: *A Data Analysis*

Estudiantes de pregrado en Ecuador: Un análisis de datos

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Abstract

The aim of the present study was to identify the social characteristics of undergraduate students in Ecuador. Several analyses were carried out for this purpose; namely descriptive and multidimensional analyses. The descriptive analysis reveals the frequencies and percentages of the variables used in the study. The multidimensional analysis of multiple correspondences shows the differentiation criteria, and the hierarchical analysis classifies respondents based on their common characteristics. The results of this study reveal the characteristics of current undergraduate students in Ecuador and as such can help government and other higher educational authorities to develop future policies regarding undergraduate study in Ecuador.

Keywords

Undergraduates; Ecuador; data analysis

Resumen

El propósito del presente estudio fue identificar las características sociales de los estudiantes de pregrado en Ecuador. Se llevaron a cabo varios análisis para este propósito; a saber, análisis descriptivos y multidimensionales. El análisis descriptivo revela las frecuencias y porcentajes de las variables usadas en el estudio. El análisis multidimensional de correspondencias múltiples muestra los criterios de diferenciación y el análisis jerárquico clasifica a los estudiantes sondeados con base en sus características comunes. Los resultados de este estudio revelan las características de los estudiantes actuales de pregrado en Ecuador y, como tal, pueden ayudar al gobierno y otras autoridades de educación superior para desarrollar políticas futuras sobre los estudios de pregrado en Ecuador.

Palabras clave

Estudiante no diplomado; Ecuador; análisis de datos

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Introduction

The Ecuadorian government, under the presidency of Rafael Correa [January 15, 2007-May 24, 2017], promoted research, development and innovation in higher education with the objective of transforming mental paradigms and addressing underdevelopment in order to eradicate the educational gap that exists within Ecuador. These actions have contributed to the creation of a harmonious society in which citizens enjoy equal opportunities and high-quality free education.

Admission to universities took place through a system of pre-university preparatory courses and students were directly admitted after passing the entrance exam or the exams of the preparatory courses, for which several opportunities were offered.

Free higher education in the public sector became a right which leads to an improvement in quality of life. Ensuring access to quality higher education involves a commitment to the academic responsibilities which are clearly laid out in the various articles of the Ecuadorian constitution, as well as in the laws governing higher education set out in LOES (Ley Orgánica de Educación Superior, 2010) and in articles related to ensuring an improvement in the quality of life of Ecuadorian citizens under the umbrella term "buen vivir".

It is important to mention that public institutions of higher education are regulated by entities such as the Council of Higher Education (Consejo de Educación Superior, CES) and the Council for Evaluation, Accreditation and Quality Assurance of Higher Education (Consejo de Evaluación, Acreditación y Aseguramiento de la Calidad de la Educación Superior, CEAACES).

In order to narrow down the research problem, the following information should be stressed: Ecuadorian higher education is a field where different types of institutions take part. In this regard, each institution has its own profile and style, and they all have problems in common. One of these problems deals with students dropping out of school, and this problem has social, economic, and educational consequences directly affecting the family setting, the institutions of higher education, and the country. This is a phenomenon that does not only occur in Ecuadorian universities but in most universities around the world (Bonilla-Marchán, Delgado & Stefos, 2017a).

Furthermore, the contribution behind this research study lies in finding out the impact of the variables pertaining to socio-demographics and academic-oriented technologies on students' decisions to drop out of university. Therefore, this research promotes a debate on this issue in the Ecuadorian institutions of higher education and the implications it may have in terms of the country's development.

Theoretical framework and literature review

The phenomenon of school dropouts was first researched approximately eighty years ago (Seidman, 2012). Several authors (e.g., Vincent Tinto, Alexander Astin, John Bean, Shevawn Eaton) have developed theories about the causes and implications of students dropping out of university. This caused a reflection on the philosophy, environment, and performance of institutions of higher education; however, the ideas resulting from these reflections have not been put into practice. According to Vincent Tinto (Contrato Social por la Educación, 2014), a prominent characteristic of students who go to university and then decide to drop out involves both socio-economic and academic-educational variables.

Article description | Descripción del artículo
This study, derived from thre research project *The Social Profile of Undergraduate Students in Ecuador*, is based on data from INEC (the National Statistics and Census Institute of Ecuador) whose official website has a data set from 2016 named ENEMDU (National Survey on Employment, Unemployment and Underemployment), resulting from the project The Social Profile of Undergraduate Students in Ecuador. This study aims to identify the social characteristics of undergraduate students in Ecuador. To do so, several analyses were carried out, i.e., descriptive, factor and multidimensional analyses.

Despite of the efforts of scholars and higher educational institutions over the last few decades, the goal of increasing the percentage of university graduates has been difficult to achieve. In fact, this goal has not been easy to reach by universities worldwide (Habley, Bloom & Robbins, 2012); this is even a challenge in countries where higher education is more developed such as United States of America.

The ethnic diversity of universities and the generational shift, from generation X to generations Y and Z, cause universities to encounter unique complexities in teaching and learning as well as actions taken regarding student retention (Taylor, Machado & Peterson, 2008). It is imperative to note that modern day young people connect to the web more easily and frequently than in the past. Thus, generation Z, also known as centennials, are referred to as digital natives because they are more dependent on technology than their predecessors from the millennial generation. Currently, almost three quarters of children in developed countries possess or have access to a smart phone, and 92% of centennial generation teenagers is online on a daily basis (Housand, 2016). Individuals from this generation are referred to as independent, tech-savvy, and part of a consumerist society. It is then pivotal to focus on these individuals, as they are the upcoming university students (Bonilla-Marchán, Delgado & Stefos, 2017b).

School dropout at the university level has a negative economic impact on students, their families, and the economy of a country, creating limits to development alternatives (Lowis & Castley, 2008). The impact is also negative on both public and private institutions of higher education. This is even a greater issue for universities that self-finance their activities. Furthermore, quality, efficiency and effectiveness indicators suffer negatively as well (Witte, 2009).

In Ecuador, there are few studies that examine the topic of students who drop out of institutions of higher. However, some published works, which discuss this issue, indicate dropout rates between 12% and 30% in the first three semesters.

Methodology

Data mining came into existence as a technological tool that intends to facilitate a better understanding of raw information on databases. When data mining is applied, trends and patterns of behavior can be identified. This can be done not only to extract information but also to discover relations in databases in order to determine patterns which are not especially evident. Data mining can be referred to as group of activities, which are utilized to find new, hidden, and unexpected contexts in the data. By making use of a data warehouse, information can be obtained to answer key questions that may remain unanswered unless the process of data mining is performed.

Once data is gathered, integrated and cleaned, you cannot yet embark on the task of data mining. In addition, it is necessary to carry out an acknowledgement or exploratory analysis of the data with the aim of knowing it in a better manner before data mining is done. This phase is even actually needed when open data mining is carried out, since there are huge amounts of data. Therefore, it is pivotal to determine the data to select and the tasks to perform based on the selected data.

Some years ago, the term visual data mining appeared (Wong, 1999), which means performing data mining through managing and interacting with graphics. The concept of visual data mining is interesting, which represents a hybrid connection between data mining and a more

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traditional visualization of data (Cleveland, 1993). However, it should be noted that data mining cannot be done with graphics only. In fact, from a classic perspective of data analysis what characterizes data mining is that models are extracted by algorithms; therefore, these are not visualized or discovered by the user. The result of the exploration techniques is a "strong-typed minable glance" with instructions about what data to work on, what task to perform, and how to gain understanding. A minable glance is comprised of a type of glance in the most classic sense regarding databases, that is, a table. The majority of methods of data mining are only capable of handling a table during each task. Therefore, the minable glance is intended to gather all the necessary information to carry out the task of data mining.

Using the descriptive method, the research methodology applied in this study is based on a review of the literature, critical reading, and document analysis on university drop-outs. The reviewed literature was aimed at identifying published materials of authors who have proposed theories and strategies on the topic of university drop-outs. This process helped evaluate and explain the objective behind this research study, learn about the current state of the topic at hand, and identify the theoretical framework and key conceptual definitions. Consequently, these elements, together with this study, will help us to better carry out an in-depth discussion regarding the factors that cause university drop-out.

The design was cross-sectional, and data were taken from a census. The database containing this information was found on the official website of INEC, which include a dataset from the 2016 National Survey of Employment, Unemployment, and Underemployment of Ecuador (Encuesta Nacional de Empleo, Desempleo y Subempleo, ENEMDU).

The variable answered was the university drop-out. The sociodemographic variable is formed by these indicators: gender, age, area of residence, geographical region, ethnicity, language, marital status, pregnancy, economic condition, extreme poverty, employment status, employment type, and principal activity. The variable pertaining to academic-oriented technologies is made up of the following indicators: school attendance, cell phone, smartphone, and computer use, together with access, rationale, and frequency of internet usage.

After downloading the data, it was manipulated by the statistical software R, which allowed us to identify the most relevant variables and work with the information according to the statistical requirements, as well as to examine the frequencies and percentages related to each variable observed (Stefos & Koulianidi, 2016). Subsequently, we performed a factorial analysis for which we used the SPAD software resulting in the identification of eight groups that were analysed according to their different characteristics (Stefos, 2015).

For the analysis of the present study, both a descriptive and a multidimensional statistical analysis was carried out. The descriptive analysis allows us to present the frequencies and percentages of the variables studied in the research project. A multidimensional statistical analysis was used to identify the most important differentiation criteria and to classify the respondents into groups. The methods used were factorial analysis of multiple correspondences that show the differentiation criteria and the hierarchical analysis that classify people based on their common characteristics (Stefos, Athanasiadis, Gialamas & Tsolakidis, 2011).

Factorial analysis of multiple correspondences is used to find out how responses vary by respondent. This method investigates the simultaneous correlation that exists in the variables of the survey. Factor axes

are the differentiation criteria that express the extent of discrepancy in people's responses. Hierarchical analysis shows the groups of people who share common responses and characteristics. This method also presents a classification graph that connects these clusters (Papapostolou & Stefos, 2013). The software used for the data analysis was SPAD v.4.5, which was supplied by the Faculty of Humanities of the Aegean University.

Results of descriptive analysis

For each of the tables below, information regarding the frequency and percentage of the variables under examination is provided, so a better understanding can be gained (Stefos & Efstathiou, 2013).

Regarding gender, 52.33% of undergraduate students are female and 47.67% are male (Table 1). This indicates that women drop out of institutions of higher education to a greater degree compared to men. The factors causing this issue are marital status and pregnancy, and the results included to the tables below prove this.

Table 1
Results of non-graduates by gender

	n	(%)
Female	292,582	52.33
Male	266,566	47.67
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Students in the age range of 18-23 years represent the highest percentage; 70.53%, followed by the group of 24-30 years with 23.11%, 31-40 years with 4.59%, 41-50 years with 1.45 %, and 51-60 with 0.32% (Table 2). The greater percentage of dropout is claimed to be in people ranging between 18 and 23 years of age, resulting probably from a lack of inadequate career guidance and counseling programs at the high school level or as a result of difficulties raised during pre-university training. These should be validated by new studies.

Table 2
Results of non-graduates by age

	n	(%)
18-23	394,353	70.53
24-30	129,216	23.11
31-40	25,690	4.59
41-50	8,086	1.45
51-60	1,804	0.32
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

In Ecuador, 87.94% of undergraduate students live in urban areas, and 12.06% reside in rural areas (Table 3). This means that more students from cities attend university, and this same group of students are those who drop out of universities more than their counterparts.

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Table 3
Results of non-graduates by geographical area

	n	(%)
Urban	491,695	87.94
Rural	67,454	12.06
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Of the population surveyed, 54.71% belong to the Andes, 43.50% to the coast and 1.79% to the Amazon (Table 4). This shows that most Ecuadorian university students live in the highlands region.

Table 4
Geographical regions students live in

	n	(%)
Highlands region	305,894	54.71
Coastal region	243,240	43.50
Amazon region	10,015	1.79
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

According to the data collected, 90.44% of undergraduate students consider themselves mestizos, 3.14% indigenous, 1.97% Montubio, 1.87% White, 1.16% Afro-Ecuadorian, 0.95% Black, and 0.46% Mulatto (Table 5). A higher rate of dropouts is comprised of students from the "mestizo" ethnicity. As this ethnic group is the biggest in Ecuador, the proportionality in population prevails.

Table 5
Results of non-graduates by ethnicity (self-reported)

	n	(%)
Mestizo	505,682	90.44
Indigenous	17,571	3.14
Montubio (coastal mestizo)	10,989	1.98
White	10,479	1.87
Afro-Ecuadorian	6,498	1.16
Black	5,335	0.95
Mulatto (mixed-race white and black)	2,595	0.46
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Most students, 91.01%, speak only Spanish, followed by 6.74% who speak Spanish and a foreign language, 2.16% speak an indigenous language and Spanish, 0.04% only speak a foreign language, and 0.03% only speak an indigenous language and 0.02% speak an indigenous language and a foreign language (Table 6). Using a similar rationale as stated in the previous table, students who speak Spanish report a higher rate of dropping out of university.

Table 6
Results of non-graduates by languages spoken

	n	(%)
Spanish only	508,889	91.01
Spanish and foreign language	37,676	6.74
Indigenous language and Spanish	12,092	2.16
Foreign language only	226	0.04
Indigenous language only	150	0.03
Indigenous language and foreign language	117	0.02
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Most students, 81.15%, are single, followed by 8.24%, who are married, 6.9% of students are cohabiting, 2.12% are separated, 0.7% are divorced and 0.3% are widowed (Table 7).

Presumably, because of their emotional instability or lack of responsibilities unmarried students tend to drop out of university, which still needs to be confirmed by future studies.

Table 7
Results of non-graduates by marital status

	n	(%)
Single	457,021	81.74
Married	46,078	8.24
Cohabiting	38,590	6.90
Separated	11,868	2.12
Divorced	3,913	0.70
Widowed	1,678	0.30
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

2.47% of all undergraduates are pregnant or breastfeeding (Table 8). Pregnancy may be a factor which influences women to drop out of university; however, many women do not do so for responsibility issues rather than health issues.

Table 8
Results of non-graduates by pregnancy or breastfeeding

	n	(%)
No	278,196	49.75
Yes	13,836	2.48
NA	267,117	47.77
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

90.11% of the population surveyed does not consider themselves poor, while 9.20% considers themselves poor (Table 9).

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Table 9
Poverty (self-reported)

	n	(%)
Not poor	503,873	90.11
Poor	51,446	9.20
NA	3,830	0.69
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Of the population surveyed, 96.38% does not consider themselves extremely poor while 2.93% does consider themselves extremely poor (Table 10).

Table 10
Extreme poverty (self-reported)

	n	(%)
Not extremely poor	538,917	96.38
Extremely poor	16,402	2.93
NA	3,830	0.69
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

66.86% of the population surveyed are economically inactive, 15.27% are in adequate or full employment, 5.32% do unpaid work, 4.95% have other type of part-time jobs, 4.04% are underemployed due to insufficient working hours, 2.79% are overtly unemployed, 0.54% are hidden unemployed, 0.19% are underemployed due to insufficient income and 0.05% belong to the category of unclassified employment (Table 11).

Table 11
Employment status

	n	(%)
Economically inactive	373,825	66.86
Adequate / Full employment	85,392	15.27
Unpaid employment	29,721	5.32
Other non-full employment	27,674	4.95
Underemployment due to insufficient working time	22,584	4.04
Overt unemployment	15,625	2.79
Hidden unemployment	3,030	0.54
Underemployment due to insufficient income	1,045	0.19
Unclassified employment	252	0.05
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

7.08% of the respondents work in the trade and the repair of vehicles, 2.95% in education, 2.82% in agriculture, hunting, forestry and fishing, 2.59% in the manufacturing industry, 1.97% in providing accommodation and catering services, 1.65% in public administration, defence or social security, 1.72% in activities related to social and health services, 1.41% in administrative support services, 1.41% are engaged in information and communication, 1.31% in professional activities, 1.10% in financial and insurance activities, 0.95% in other service activities, 0.95% in construction, 0.81% in transportation and storage, 0.41% in arts, entertainment and recreation, 0.17% in electricity and gas supplies and air conditioning, 0.10% in water distribution, sewerage, 0.9% in activities providing domestic service in private households, 0.09% in real estate activities, and 0.02% in mining and quarrying (Table 12).

Table 12
Employment type

	n	(%)
Trade and repair of vehicles	39,607	7.08
Teaching	16,478	2.95
Agriculture, livestock hunting and forestry and fishing	15,777	2.82
Manufacturing industries	14,478	2.59
Accommodation activities and food services	11,031	1.97
Public administration, defence and social security	10,329	1.85
Activities, social and health services	9,638	1.72
Administrative and support activities and services	7,872	1.41
Information and communication technologies	7,861	1.41
Professional, scientific and technical activities	7,302	1.31
Financial and insurance activities	6,151	1.10
Other services activities	5,304	0.95
Building	5,296	0.95
Transport and storage	4,546	0.81
Arts, entertainment and recreation	2,304	0.41
Electricity, gas, air conditioning supplies	971	0.17
Distribution of water, sewage	577	0.10
Domestic service in private households with	530	0.09
Real estate agencies	507	0.09
Mining and quarrying	110	0.02
NA	392,480	70.19
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

We can see that 66.22% are students, 0.27% are listed as other, 0.15% are housewives, 0.11% live on rental income, 0.10% are retired pensioners, and 0.01% are disabled (Table 13).

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Table 13
Reason for economic inactivity

	n	(%)
Student	370,277	66.22
Other	1,503	0.27
Housewife	841	0.15
Landlord	598	0.11
Pensioner	578	0.10
Disabled	29	0.01
NA	185,324	33.14
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Of the population analysed, 99.36% attend classes and 0.64% do not (Table 14). This indicates that there is a great number of students at university, but dropout rates then occur significantly.

Table 14
Attendance

	n	(%)
Yes	555,576	99.36
No	3,573	0.64
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Hereafter (that is from the table 15 to the table 21), a descriptive analysis is carried out about Ecuadorian university students in relation to technology. This analysis is focused on mobile devices, computers, internet access, and frequency of internet use. This information may be key for institutions of higher education on how the use of technological resources should be shaped and implemented into teaching and learning practices in the classroom.

The percentage of those who use cell phones is 88.04%, while 7.70% do not have a cell phone (Table 15).

Table 15
Use of cell phone

	n	(%)
Yes	492,299	88.04
No	43,055	7.70
NA	23,795	4.26
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

76.91% have a phone that is Smartphone, while 11.13% do not have a phone which is a Smartphone (Table 16).

Table 16

Smartphones

	n	(%)
Yes	430,069	76.91
No	62,230	11.13
NA	66,850	11.96
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

93.84% of the respondents have used computers in the past 12 months, while 1.90% have not (Table 17).

Table 17

Computer usage in the past 12 months

	n	(%)
Yes	524,732	93.84
No	10,621	1.90
NA	23,795	4.26
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

In the past 12 months, 94.67% have used the internet, while 1.07% have not done so (Table 18).

Table 18

Internet usage in the past 12 months

	n	(%)
Yes	529,366	94.67
No	5,988	1.07
NA	23,795	4.26
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

In the past 12 months, 88.54% used the internet at least once a day, 5.58% at least once a week, 0.44% at least once a month, and 0.11% do not know (Table 19).

Table 19

Frequency of internet use in the last 12 months

	n	(%)
At least once a day	495,093	88.54
At least once a week	31,218	5.58
At least once a month	2,434	0.44
Does not know	621	0.11
NA	29,783	5.33
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

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In the population surveyed, 40.20% used the internet to obtain information, 27.23% for education and learning, 24.73% for general communication, 1.62% for work reasons, 0.28% for electronic banking and financial services, 0.21% for entertainment, 0.17% for reading or downloading electronic books, 0.12% for movies, music or software, 0.07% for transactions with agencies, 0.04% ordering and buying products or services, and 0.01% for none of these (Table 20).

Table 20
Main reason for using internet in the past 12 months

	n	(%)
Get information	224,783	40.20
Education and learning	152,255	27.23
Communication in general	138,253	24.73
Work	9,030	1.62
Electronic banking and financial services	1,541	0.28
Entertainment activities	1,175	0.21
Read / download electronic books	955	0.17
Get movies, music or software	688	0.12
Transactions with agencies	403	0.07
Buy / order products or services	216	0.04
None of the above	66	0.01
NA	29,783	5.33
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

In the last 12 months, the Internet was used most frequently at home with 67.61%, 11.07% of the respondents used it in educational institutions, 8.76% in public access hotspots, 5.01% at work, 1.54% in the house of another person, and 0.69% chose "other" (Table 21).

Table 21
Main location of internet use in

	n	(%)
Home	378,025	67.61
Educational institution	618,770	11.07
Public access hotspots	48,990	8.76
Work	28,008	5.01
Other person's house	8,590	1.54
Other	3,876	0.69
NA	29,783	5.33
Total	**559,149**	**100.00**

Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

Results of Factorial Analysis of Multiple Correspondences

In this research study, the multiple correspondence factorial analysis method was used to find out how the respondents differ according to their answers. The differentiation criteria identified were the following:

First criterion of differentiation (percentage of inertia 13.29%)

On the first axis, on the one hand, there are people who expressed that they used computers or the internet during the last 12 months with a frequency of at least once a day while at home, have a cell phone or smartphone. On the other hand, there are people who are single, male and have jobs related to accommodation activities, food services, public administration, or defence and social security.

Second criterion of differentiation (percentage of inertia 8.18%)

On the second axis, on the one hand, there are people who have adequate employment, who have used the internet in the last 12 months most frequently at work, aged between 31-40 years, are employed in activities related to trade, vehicle repair or public administration, defense and social security. On the other hand, there are people who stated that they are economically inactive, are students aged between 18-23 years, are single and have used the internet in the last 12 months most often at home.

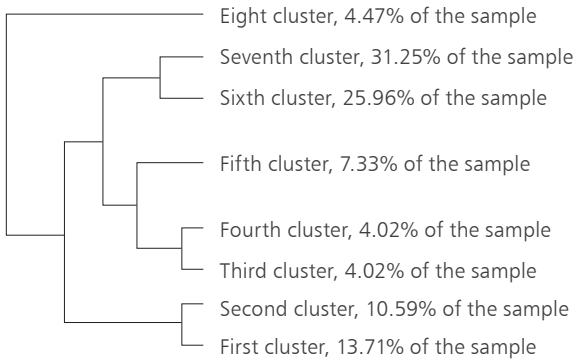
Third criterion of differentiation (inertia percentage 5.80%)

On the third axis, on the one hand, we have people who do not consider themselves neither poor nor extremely poor, live in urban areas, have a cell phone or smartphone, consider themselves mestizos and in the last 12 months used the internet most often at home. On the other hand, there are people who are poor or extremely poor, in the last 12 months used the internet most frequently in public access centres, and are engaged in activities related to agriculture, livestock, hunting, forestry and fishing.

Results of the Hierarchical Analysis

The hierarchical analysis led to eight cluster groups that are shown in the following classification graph (Figure 1) that connects these clusters.

Figure 1
Classification chart



Source: Own elaboration from the National Survey of Employment, Unemployment and Underemployment Database (2016)

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First cluster, 13.71% of the sample

The people in the first cluster are between 24 and 30 years of age, who have unpaid employment or have other non-full-time employment and are involved in vehicle trading and repair activities or agriculture, livestock hunting, forestry, fishing, or accommodation or food services or manufacturing industries.

Second cluster, 10.59% of the sample

People in the second cluster are between the ages of 31 and 40, are married, have adequate or full employment, have a cell phone, and in the last 12 months used the internet most often in their home. Their work is generally related to public administration, defense, social security or education.

Third cluster, 2.67% of the sample

The people of the third cluster are considered indigenous, speak an indigenous as well as Spanish, live in rural areas, are poor, work in agriculture, livestock hunting, forestry or fishing, have used the internet in the last 12 months with a frequency of at least once a week and belong to the geographical region of the Amazon.

Fourth cluster, 4.02% of the sample

The people of the fourth cluster consider themselves poor or extremely poor, live in rural areas and their condition of activity is unpaid employment related to agriculture, livestock, hunting, forestry and fishing. They do not have a smartphone and in the last 12 months used the internet most frequently in public access centres.

Fifth cluster, 7.33% of the sample

The fifth cluster is made up of people between the ages of 18 and 23 who speak only Spanish, are economically inactive, not extremely poor, do not have cell phones and in the last 12 months used the internet at least once a week, most frequently in public access centres.

Sixth cluster, 25.96% of the sample

The people in the sixth cluster are single men who belong to the economically inactive population, have an activated cell phone or smartphone and have used a computer and the internet with a frequency of at least once a day from home. These people are neither extremely poor nor poor, live in urban areas and consider themselves mestizos.

Seventh cluster, 31.24% of the sample

The people in the seventh cluster are women aged between 18 and 23, are not extremely poor, are economically inactive, have an activated cell phone or smartphone, and have used a computer and internet most frequently from home in the last 12 months.

Eight cluster, 4.47% of the sample

People in the eighth cluster are single, older than 23 years of age, live in urban areas, have a cell phone or smartphone, are not poor, consider themselves mestizos and in the last 12 months used the internet most frequently from home.

Discussion

The drop-out problem is one of the main concerns of higher education all over the world. It is paramount that higher educational institutions have as a priority the reversing of this trend with the aim of increasing intellectual capital. This kind of capital can help each country to organize and develop more effectively. Therefore, the challenge of increasing the student graduation rate is of vital importance throughout Ecuador, in Latin America countries, and all over the world.

The results reported in this study regarding the influence of the analysis factors significantly contradict the empirical evidence drawn from various studies carried out in the United States of America. As observed by Kristen A. Renn and Robert D. Reason (2013), the socio-economic and academic-technological variables, measured by means of research articles, seem to be relevant predictors of retention rather than dropout rates.

Among the analyzed variables, students' age has a significant influence on university drop-out. This finding is in line with studies that suggest that younger students (between 18 and 23 years old) are more likely to drop out of university. This information adds to the existing body of knowledge presented in Karen Leppel's studies (2012). The possible explanation behind this situation may be the lack of student guidance during the pre-university phase. The probability of students over the age of 24 dropping out of university is lower. This trend reflects what is happening in the majority of the regions of the world.

With regard to the gender variable associated to university drop-out in Ecuador, it is interesting to note that the ratio of 46.67% men to 52.33% women is similar to the worldwide trend. There are also more women in Ecuadorian universities (Charvet, 2010), and a similar situation occurs in the United States where 57% of students are women.

Conclusions and recommendations

The problem of students dropping out of university is a multi-causal and changing issue, with political, social, economic, technological and developmental

implications in each country. Despite the fact that various countries are aware of the lack of research studies on this topic, actions have not been taken to change the situation. Identifying and monitoring the rate of student drop-outs, as well as determining the predictor variables and exploring the varied causes and solutions are fundamental elements which may enhance the process of student retention. Higher education institutions, students, families, and governments are key stakeholders in this process.

One of the objectives of this study was achieved by identifying and describing a group of socio-demographic and academic-technological variables that have impacted university drop-out rates of people ranging between 18 and 60 years of age. This age group focused on individuals who pursued studies in Ecuadorian educational institutions but subsequently dropped out of their studies at the university level.

The objective of the present study was to investigate the social characteristics of undergraduate students in Ecuador. The multidimensional analysis confirmed the results of the descriptive analysis which allows us to build up a detailed profile of these students: Most of Ecuador's undergraduate students live in urban areas (87.94%). There are more female students (52.33%) than male students. Most (81.74%) are unmarried. 99.36% attend classes. 91.01% only speak Spanish. 90.44% consider themselves mestizo. 66.22% are economically inactive because they are students. 2.47% is pregnant or breastfeeding. 88.04% have a cell phone. 76.91% have smartphones. 93.84% have used a computer in the past 12 months. 94.67% have used the internet in the past 12 months, 67.61% used it most frequently from home, 40.20% to look for information, 27.23% for education and learning, and 24.73% for communication in general. 88.54% used the internet with a frequency of at least once day in the last 12 months. 54.71% live in the sierra region while 43.50% live on the coast. 90.11% do not consider themselves poor; 96.38% do not consider themselves extremely poor and 66.86% are economically inactive.

It is worth proposing a model that facilitates the prediction and systematic analysis of socio-demographic and academic-technological variables, along with their corresponding indicators, on the university drop-out issue with the aim of formulating key actions. These could be proposals and policies mandated by the government, as well as an ongoing advocacy for a national debate on school dropout and the role institutions of higher education can take to solve this problem.

Limitations and implications of the findings

It should be noted that this study is limited by the information available on the INEC database (INEC, 2016). Such source of information does not contain all the variables that have a significant impact on dropping out, such as economy, family, and adaptation to university life; as well as psychological factors such as intellectual coefficient, emotional intelligence, and others, which also influence students to drop out of university, according to experts in this field (Stefos & Papapostolou, 2013).

It is worth proposing a model that facilitates the prediction and systematic analysis of socio-demographic and academic-technological variables, along with their corresponding indicators, on the university drop-out issue with the aim of formulating key actions. These could be proposals and policies mandated by the government, as well as an ongoing advocacy for a national debate on school dropout and the role institutions of higher education can take to solve this problem (Koulianidi & Stefos, 2015).

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Future research studies

Further research should be conducted in order to determine the actual reasons of why dropout occurs among Ecuadorian university students. Carrying out qualitative and mixed-method studies could be key to gain a more complete understanding of the university drop-out problem. In this sense, it is equally imperative to research the causes and consequences behind this problem. The findings resulting from different studies may better help higher educational authorities to elaborate effective policies aimed at preventing and decreasing university dropouts. Consequently, investment in higher education will be better employed and have a greater impact on upcoming generations of university students in Ecuador (Kampouropoulou, Fokiali, Efstathiou, Koutris & Stefos, 2015).

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