

# A Multidimensional Statistical Analysis of Artisans and Unskilled Workers of Ecuador

Andrés Bonilla Marchán<sup>1</sup>, Ramiro Delgado<sup>1</sup> & Efstathios Stefos<sup>2</sup>

<sup>1</sup> Universidad de las Fuerzas Armadas (ESPE), Sangolquí, Ecuador

<sup>2</sup> National University of Education (UNAE), Azogues, Ecuador

Correspondence: Efstathios Stefos, National University of Education (UNAE), Azogues, Cañar, Parroquia Javier Loyola (sector Chuquipata), Ecuador. Tel: 593-7-3701-200. E-mail: estefos@aegean.gr

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## Abstract

The objective of this study is to highlight the social characteristics of the unskilled workers and artisans of Ecuador through a descriptive and multidimensional statistical analysis of data from the 2015 National Survey of Employment, Unemployment and Self-employment. The descriptive statistical analysis demonstrates the frequencies and percentages of the variables of the investigation while the multidimensional statistical analysis shows the principal criteria of differentiation and classification between the groups of people surveyed. The methods involved a factorial analysis of multiple correspondences indicating the criteria of differentiation, and a statistical hierarchical analysis, which attempts to define the subjects surveyed according to their common traits.

**Keywords:** Ecuador, unskilled workers and artisans, multidimensional statistical analysis

## 1. Introduction

Unskilled workers or laborers and artisans constitute 12.57% of the economically active population in Ecuador, according to the 2015 National Survey of Employment, Unemployment and Self-employment. The term “unskilled worker” in the Ecuadorian context refers to uneducated workers who either operate heavy machinery or engage in manual labor, whereas, the term “artisan”, is used to refer to a person who is skilled at making objects (decorative or functional) by hand. Additionally, the labor of the artisan or crafts person, unlike that of the unskilled worker in Ecuador, is legally recognized due to the fact that Ecuadorian artisans are protected by law (the Legislation of Artisans Act) and are certified by the National Defense of Craftsmen. In fact, Ecuadorian artisans enjoy certain privileges, such as tax incentives, which distinguish them from unskilled workers and serve to strengthen their sector. Despite this, however, unskilled workers and artisans are closely related in the types of activity they undertake, and by the fact that an unskilled worker could change his status to qualified artisan by becoming affiliated with the National Defense of Craftsmen. It is for this reason, and the fact that these two groups of workers make up 12.57% of the working population in Ecuador, that we have chosen to do a multidimensional statistical analysis on these two sectors. Hence, this study proposes to give us a general outlook on the social characteristics of both unskilled workers and artisans, in an effort to contribute to the formulation of strategies and policies that could improve their living conditions.

## 2. Methodology

As mentioned before, the development of this study was based on data from the 2015 National Survey of Employment, Unemployment and Self-employment (ENEMDU), which was downloaded from the official website of the National Institute of Statistics and Census (INEC, 2015). This information was analyzed using the statistical software R, which allowed us to distinguish the most relevant variables of the data provided and work with this information in relation to the statistical necessities of the study. Subsequently, the factorial analysis was performed using SPAD software which allowed for the formulation of seven groups based on their distinctive characteristics.

The study consists of a descriptive as well as a multidimensional statistical analysis. The descriptive analysis demonstrates the frequencies and percentages of the variables under study (Athanasiadis, 1995) and the multidimensional statistical analysis shows the principles and the most important criteria of differentiation and classification between the groups of the people surveyed. The methods used were a factorial analysis of multiple

correspondences which illustrates the criteria of differentiation, and a hierarchical analysis, which defines the groups of people surveyed according to their common characteristics (Stefos et al., 2011), the information of which can also be represented in a classification table connecting these clusters (Papapostolou et al., 2013). On the other hand, the factorial analysis of multiple correspondences shows the diversity of the sample population with relation to the answers given in the surveys, while determining the correlation between the variables of the survey. The SPAD v.4.5 Software was used for the data analysis provided by the Faculty of Humanities of the University of the Aegean.

### 3. Descriptive Analysis

Table 1. Area

	n	%
Urban	703523	78.36%
Rural	194258	21.64%
Total	897781	100.00%

The population of unskilled workers and artisans living in the urban and rural areas is 78.36% and 21.64%, respectively (Table 1).

Table 2. Sex

	n	%
Male	731287	81.45%
Female	166494	18.55%
Total	897781	100.00%

An overwhelming majority of the population surveyed are male (81.45%) while only 18.55% are female (Table 2).

Table 3. Age

	n	%
15-24	116039	12.93%
25-34	238330	26.55%
35-44	221563	24.68%
45-54	175151	19.51%
55-64	104963	11.69%
65-74	35486	3.95%
75-84	6009	0.67%
85-94	241	0.03%
Total	897781	100.00%

The age group of 15 to 24 year olds represents 12.93% of the population while the largest percentage of the sample population is represented by the age group of 25 to 34 year olds (26.55%), followed by the population of 35 to 44 year olds (24.68%), 45 to 54 year olds (19.51%), 55 to 64 year olds (11.69%), 65 to 74 year olds (3.95%), 75 to 84 year olds (0.67%) and lastly, 85 to 94 year olds (0.03%) (Table 3).

Table 4. Marital status

	n	%
Married	369480	41.15%
Living Together	260364	29.00%
Single	172966	19.27%
Separated	65515	7.30%
Divorced	14994	1.67%
Widowed	14461	1.61%
Total	897781	100.00%

Almost half of the population surveyed are married (41.15%), although a relatively large percent (29%), of couples that live together are not bound by any legal document. Additionally, 19.27% of the population are unmarried and just under half of that percentage (7.30%), are separated with a low percentage of subjects surveyed either divorced (1.67%) or widowed (1.61%) (Table 4).

Table 5. Level of education

	n	%
None	13967	1.56%
Literacy Center	2416	0.27%
Primary School	342710	38.17%
Basic Education	22039	2.45%
High School	383783	42.75%
Secondary Education	56075	6.25%
No University	9010	1.00%
Advanced University	67276	7.49%
Postgraduate	504	0.06%
Total	897781	100.00%

The percentage of the population without any level of education is as low as 1.56%, with only 0.27% declaring that they attend a literacy center. The subjects surveyed with only a primary school level of instruction, however, constitute as much as 38.17% of the population, with slightly a higher percentage (42.75%), almost half of the population, representing those who have only gone up to high school. Comparatively speaking, nevertheless, only 6.25% of the subjects said that they only have a secondary school education while as little as 2.45%, declared that they only have a basic education level of instruction. Conversely, less than ten percent of the population (7.49%) are shown to have advanced university studies and even less, postgraduate studies (0.06%) (Table 5).

Table 6. Languages spoken

	n	%
Only Spanish	852583	94.97%
Indigenous and Spanish Language	38902	4.33%
Spanish and a Foreign Language	4462	0.50%
Does not speak	842	0.09%
Only Indigenous Language	385	0.04%

Foreign Language	384	0.04%
Indigenous and a Foreign Language	224	0.03%
Total	897781	100.00%

Spanish is the language spoken by the majority of Ecuadorians (94.97%), although the majority of the rest of the population surveyed speak both Spanish and an indigenous language (4.43%). A very small percentage, however, can speak both Spanish and a foreign language (0.50%), although this percentage is higher than that of those who only speak an indigenous language (0.04%) or both an indigenous and a foreign language (0.03%). Even the percentage of Ecuadorian subjects who do not speak (0.09%) is higher than that of Ecuadorians who only speak an indigenous language and who speak both an indigenous and a foreign language put together (0.07 %) (Table 6).

Table 7. How the subjects choose to identify themselves

	n	%
Mestizo	764017	85.10%
Indigenous	52819	5.88%
Montubio	26547	2.96%
Black	14750	1.64%
White	14040	1.56%
African-Ecuadorian	13533	1.51%
Mulatto	11564	1.29%
Other	511	0.06%
Total	897781	100.00%

According to the data collected, 85.10% of the population in the study consider themselves to be mestizo, 5.88% to be indigenous, 2.96% to be Montubio, 1.64% to be black, 1.56% to be white, 1.51% to be Afro-Ecuadorian, 1.29%, mulatto, and 0.06%, other (Table 7).

Table 8. Type of work

	n	%
Permanent/indefinite/stable contract	174124	19.39%
Temporary/occasional or sporadic work contract	153872	17.14%
Day labor	133563	14.88%
Part time	29453	3.28%
Work by assignment	9176	1.02%
Per hour	5340	0.59%
NA	392253	43.69%
Total	897781	100.00%

The statistical data show that 19.39% of the sample population have either a permanent, indefinite or stable contract, while 17.14% have a labor contract for either temporary, occasional or sporadic work. Additionally, 14.88% of the subjects surveyed are contracted for day labor while less than a third of that percentage are hired for piecework 3.28%. Only a small percentage of the subjects under study are hired by assignment 1.02% or by the hour (0.59%) (Table 8).

Table 9. How the workers feel at work

	n	%
Content	633507	70.56%
Somewhat content	148316	16.52%
Discontent but conformant	90018	10.03%
Totally Discontent	24203	2.70%
Do not know, unresponsive	1736	0.19%
Total	897781	100.00%

An overwhelming majority of the sample population (70.56%) claim to feel content at work while roughly 16.52% describe themselves as “somewhat content”, which means that almost 90% of the subjects surveyed are relatively content in their jobs. Comparatively speaking, however, only 10.03% of the population studied are unsatisfied but conformant with their jobs with just under a third of this percentage 2.70% claiming to be totally discontent with their line of work and 0.19% either do not know or are unresponsive (Table 9).

Table 10. Have an activated cellular phone

	n	%
Yes	719690	80.16%
No	144022	16.04%
NA	34069	3.79%
Total	897781	100.00%

A large majority of the sample population 80.16% have an activated cellular phone compared to 16.04% of the population who claim not to own one (Table 10).

Table 11. Smart phone

	n	%
Yes	198316	22.09%
No	521374	58.07%
NA	178091	19.84%
Total	897781	100.00%

On the other hand, the percentage of the subjects who own a smart phone is approximately 6% more than those who own an activated cellular phone, almost a quarter of the population 22.09%. Nevertheless, a little over half of the population sampled do not own a smart phone 58.07% (Table 11).

Table 12. Those who have used a computer in the past 12 months

	n	%
Yes	340016	37.87%
No	523696	58.33%
NA	34069	3.79%
Total	897781	100.00%

Around 37.87% of the population surveyed have used a computer in the past 12 months, while 58.33% have not (Table 12).

Table 13. Those who have used the Internet in the past 12 months

	n	%
Yes	363488	40.49%
No	500223	55.72%
NA	34069	3.79%
Total	897781	100.00%

Similarly, more than half of the population have not used the Internet in the past 12 months 55.72%, although as much as 40.49% of the population have (Table 13).

Table 14. Region of origin

	n	%
Mountain Region	440306	49.04%
Coastal Region	429411	47.83%
The Amazon Region	27071	3.02%
Insular Region	992	0.11%
Total	897781	100.00%

In relation to the region of origin, 49.04% of the unskilled laborers and artisans surveyed have declared themselves to be from the mountain region of Ecuador, followed closely by a percentage of 47.83 who claim to be from the coastal region. The Amazon Region, 3.02% and the Islands 0.11% represent a very small percentage of these two sectors (Table 14).

Table 15. Branch of activity

	n	%
Agriculture, cattle raising, hunting, forestry and fishing	16187	1.80%
Mining and quarrying	3674	0.41%
Manufacturing industries	398858	44.43%
Electricity, gas and air conditioning supply	5804	0.65%
Water distribution and sewerage	1634	0.18%
Construction	289426	32.24%
Commerce, vehicle repair	102559	11.42%
Transport and storage	1749	0.19%
Activities of accommodation and food services	2016	0.22%
Information and communication	6421	0.72%
Professional, scientific and technical activities	2043	0.23%
Administrative services and support	4282	0.48%
Public administration, defense and social security	7590	0.85%
Teaching	455	0.05%
Activities related to social services and health	1409	0.16%
Arts, entertainment and recreation	185	0.02%
Other activities and services	53489	5.96%
Total	897781	100.00%

It was determined that the majority of the subjects surveyed, approximately half 44.43%, work in manufacturing industries, followed closely by 32.24% who work in construction. Another significant branch of activity for unskilled workers and artisans would seem to be commerce and vehicle repair as it is constituted by 11.42% of both these groups. Conversely, nearly half of this percentage 5.96%, however, represents those who claim to be engaged in other unspecified activities and services, while roughly a third of that percentage (1.80%), are involved in cattle raising, hunting, forestry and fishing. Other activities, however, such electricity, gas and air conditioning supply (0.65%), information and communication (0.72%), defense and social security (0.85%), draw just under one percent of the population while a very minimal percentage of the subjects surveyed are dedicated to activities such as teaching (0.05%) and arts, entertainment and recreation (0.02%) (Table 15).

Table 16. Income poverty

	n	%
Not poor	757686	84.40%
Poor	130333	14.52%
NA	9762	1.09%
Total	897781	100.00%

According to the data, 84.40% of the population are not considered to be poor, while 14.52% are (Table 16).

Table 17. Extreme income poverty

	n	%
Not indigent	851804	94.88%
Indigent	36215	4.03%
NA	9762	1.09%
Total	897781	100.00%

According to the statistical data, 94.88% of population are not considered to be indigent, while 4.03% are (Table 17).

Table 18. Activity Status

	n	%
Adequate Employment	471066	52.47%
Under employment due to insufficient work time	113326	12.62%
Under employment due to insufficient income	42981	4.79%
Inadequate employment	250687	27.92%
Unpaid employment	15779	1.76%
Unclassified employment	3942	0.44%
Total	897781	100.00%

Based on the statistical data below, a little over half of the sample population, approximately 52.47%, are classifiable as having adequate employment, yet more than a quarter of the population (27.92%), however, are considered to have inadequate employment. Interestingly, the third largest percentage in this variable (12.62%) represents the subjects who are underemployed due to insufficient work time, although those unskilled workers or artisans who are underemployed due to insufficient income is considerably less (4.79%). Conversely, the percentages of the population surveyed who engaged in unpaid employment (1.76%) or unclassified employment (0.44%) were significantly smaller (Table 18).

#### 4. Factorial Analysis of Multiple Correspondences

The method of factorial analysis of multiple correspondences was used to categorize the sample population according to the answers they provided. As a result, the criteria of differentiation are:

##### First criterion of differentiation (inertia percentage 8.28%)

According to the information gathered from the first axis, there is a relatively small percentage of the population who have used a computer and the Internet over the past 12 months, have a smart phone, are not poor and are between the ages of 15 and 24. On the other hand, there are those who do not own cellular phones, have not used a computer or the Internet in the past 12 months, whose level of instruction only goes up to primary school, and who are employed as manual laborers.

##### Second criterion of differentiation (inertia percentage 7.45%)

Regarding the second axis, this percentage represents that sector of the population who own cellular phones but have not, however, used a computer or the Internet in the past 12 months, who are regarded as poor and who only have a primary school level of education. These are differentiated from the portion of the population who are single, between the ages of 15 and 24, are not poor and have either a temporary, occasional or eventual work contract.

##### Third criterion of differentiation (inertia percentage 5.53%)

The third focal point, represents women who work in manufacturing industries, live in an urban area (primarily in the coastal region), speak only Spanish and regard themselves as mestizos. On the other hand, this criterion also serves to distinguish these subjects from the men who either do manual labor or work in construction, are satisfied with their jobs, regard themselves as indigenous and live in the rural regions.

#### 5. The Hierarchical Analysis

The hierarchical analysis consists of seven groups as shown in the chart below.

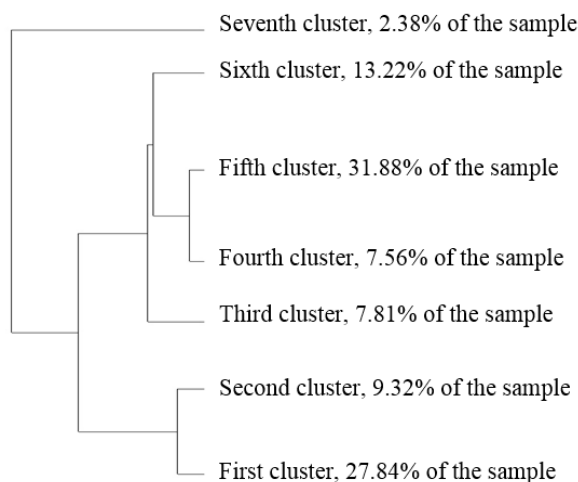


Figure 1. Classification chart

##### First cluster, 27.84% of the sample

The people from the first group have declared that they have had access to a computer and the Internet over the past 12 months. They own a smart phone, have a high school education but do not attend university. Additionally, this cluster represents those who are not considered to be poor, regard themselves as mestizos, live in the urban areas and are mostly between the ages of 25 and 34.

##### Second cluster, 9.32% of the sample

The subjects of the second group are younger than those of the first cluster with ages ranging from 15 to 24 years old. They have a basic or high school education and have used a computer and the Internet in the past 12 months. They are single and the majority of them work in commerce and vehicle repair with either temporary, occasional or eventual work contracts.



### Third cluster, 7.81% of the sample

The people from this group identify themselves as indigenous, speak an indigenous language in addition to Spanish, live in urban areas, either work in construction or do manual labor, have used a computer and the Internet in the past 12 months but are regarded as poor. Conversely, most of the subjects of this sector have a primary school education and are married.

### Fourth cluster, 7.56% of the sample

The surveyed subjects of the fourth cluster are considered to be poor and indigent, and are either self-employed or hold an unsuitable job. Most of them are between 35 and 44 years of age, have not used a computer nor have they accessed the Internet in the past 12 months. They do not own smart phones and few are pleased with their jobs.

### Fifth cluster, 31.88% of the sample

The fifth group is constituted by people who answered that they have not used a computer or the Internet in the past 12 months. However, although they do not own smart phones, they have cellular phones and are over 45 years old. These subjects, who regard themselves as mestizos, are not considered to be poor and generally speaking, tend to work in construction.

### Sixth cluster, 13.22% of the sample

The subjects of the sixth cluster are older than 65, only speak Spanish, have only got a basic level of education, do not own a cellular phone and have not used a computer or the Internet in the past 12 months.

### Seventh cluster, 2.38% of the sample

The people from the seventh group are men who live on the coast or in the Amazon region. They do not have cellular phones and work in either manufacturing or electricity, gas and air conditioning supply.

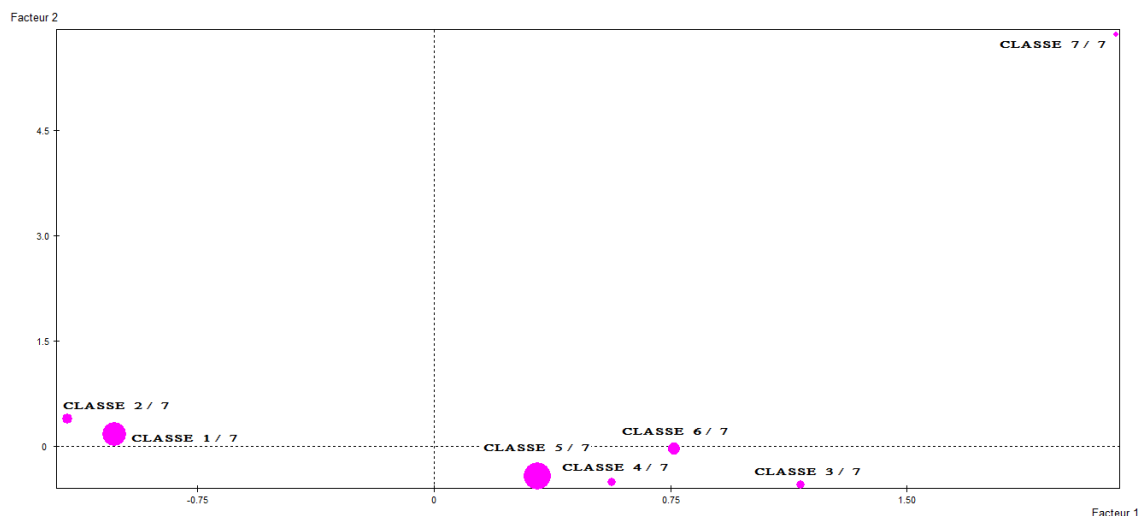


Figure 2. Correspondence analysis

These differences among groups are shown in Figure 2 where the Graph of Correspondence Analysis (factorial level 1x2) presents the centroids from the seven groups in two axes. It also defines the differences and similarities between the subjects surveyed of the seven groups (Olivier, 2008).

## 6. Conclusion

The objective of the present study was to investigate the social characteristics of the unskilled workers and artisans of Ecuador. The results of the multidimensional statistical analysis, hence, illustrate the following: most of the trade workers and artisans in Ecuador live in urban areas 78.36%, the majority are men 81.45%, their ages oscillate between 25 and 34 years old 26.55%, 35 and 44 years of age 24.68% and 45 and 54 years old 19.51%; approximately 41.15% are married, roughly 42.75% only have a high school education and a slightly smaller percentage 38.17% have a primary school education; 94.97% speak only Spanish; 85.10% are mestizos; 70.56% are content at work; 80.16% have an activated cellular phone; 58.07% do not have a smart phone; 58.33% have

not used a computer not the internet in the past 12 months; 40.49% have used the Internet in the past 12 months; 49.4% live in the mountain region and 47.83% in the coastal region; 44.43% work in manufacturing industries and 32.24% in construction; 84.40% are not regarded as poor; 94.88% are not indigent and over half of the population under survey 52.47% have suitable jobs while a little over a quarter of the population 27.92% have what is considered to be unsuitable employment (Stefos, 2015).

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### References

- Athanasiadis, I. (1995). *Correspondence Analysis and Hierarchical Classification* (pp. 51-56). Athens: New Technologies Editions.
- Benzécri, P. (1992). *Correspondence Analysis Handbook*. New York: Dekker.
- Bonilla, M. A., Delgado, R., & Stefos, E. (2017). The Social Characteristics of Postgraduate Students in Ecuador: A Multidimensional Statistical Analysis. *Review of European Studies*, 9(2), 35-44. <https://doi.org/10.5539/res.v9n2p35>
- Castellano, J. M., Stefos, E., & Williams, G. L. G. (2017). The Educational and Social Profile of the Indigenous People of Ecuador: A Multidimensional Analysis. *Review of European Studies*, 9(1), 137-147. <https://doi.org/10.5539/res.v9n1p137>
- Instituto Nacional de Estadística y Censos-INEC. (2015). *Encuesta Nacional de Empleo, Desempleo y Subempleo-ENEMDU, 2015*. Quito, Ecuador. Retrieved from <http://www.ecuadorencifras.gob.ec/enemdu-2015/>
- Kampouropoulou, M., Fokiali, P., Efstathiou, I., Koutris, T., & Stefos, E. (2015). Students' Views on the Use of a Virtual Educational Museum. *Review of European Studies*, 7(11), 1-6. <https://doi.org/10.5539/res.v7n11p1>
- Kouliani, G., & Stefos, E. (2015). Consequences of Dietary Habits and Endocrine Disruptors in School Performance of Children Aged 10-12 in Greece. *American Journal of Food Science and Nutrition*, 2(6), 113-120.
- Olivier, M. (2008). *The analysis of quantitative data* (I. Athanasiadis, Trans., pp. 86-88). Athens: Topos.
- Papapostolou, I., & Stefos, E. (2013). Qualitative analysis on pedagogical research. Methodological approaches. In I. Papapostolou (Ed.), *Educational activities, Teaching Interventions in Secondary Education* (pp. 244-251). Rhodes: Evdimos Editions.
- Papapostolou, I., Papapostolou, K., & Stefos, E. (2013). Educational Research. In *From Qualitative to Quantitative analysis* (p. 178). Rhodes: Evdimos Editions.
- Presidencia de la Republica del Ecuador. (2010). *Ley Organica de Educacion Superior* (LOES). Quito, Ecuador.
- Sarmiento, N. M., Paredes, P. A. M., & Stefos, E. (2016). Deaths by Suicide in Ecuador: A Quantitative Data Analysis. *Review of European Studies*, 8(1), 145-156. <https://doi.org/10.5539/res.v8n1p145>
- Stefos, E. (2015). Causes of Death of Indigenous Ecuadorians. *International Journal of Clinical Medicine Research*, 2(6), 65-70.
- Stefos, E., & Efstathiou, I. (2013). Quantitative analysis of the data of the School of Trianta during the period of 1906-1916. In I. Papapostolou (Ed.), *Educational activities, Teaching Interventions in Secondary Education* (pp. 29-57). Rhodes: Evdimos Editions.
- Stefos, E., & Kouliani, G. (2016). Nutrition Data Analysis Using R: Applications in Higher Education. *Health Sciences Research*, 3(1), 10-16.
- Stefos, E., & Papapostolou, I. (2013). Research Methodology. In *Processes and suggestions* (p. 406). Rhodes: Evdimos Editions.
- Stefos, E., Athanasiadis I., Gialamas, B., & Tsolakidis, C. (2011). The Use of New Technologies and the Project Method in Teaching Statistics: A Case Study in Higher Education. *HMS i JME*, 3, 84-100.

Valdivieso, G., Stefos, E., & Lalama, R. (2017). The Ecuadorian Amazon: A Data Analysis of Social and Educational Characteristics of the Population. *Review of European Studies*, 9(1), 120-129. <https://doi.org/10.5539/res.v9n1p120>

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