

Effect of socioeconomic level on internet home complaints, inquiries, and payments

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Abstract

En el marco de los Internet Service Providers (ISP), los reclamos se realizan por deficiencias en el servicio, los clientes buscan correctiva action, explanations, repair, seeking an apology. Se tiene indicios relativos a la influencia del nivel socioeconómico en el comportamiento de los clientes. This study mide el efecto del nivel socioeconómico en los reclamos, consultas y en los pagos. This study's subjects have 35,842 complaints made by 1,998 customers using copper and fiber technology. Customers of different socioeconomic statuses have made 521 inquiries. Los resultados indican que el nivel socioeconómico influye en el número de reclamos, el nivel alto genera más reclamos que los niveles bajo y medios. En lo relativo a las consultas, el nivel socioeconómico si influye en el número de consultas, los niveles socioeconómicos bajos duplican el número de consultas a los niveles altos. Aunque la mejora de la calidad de red si influye en el incremento del número de pagos anuales y en el valor de los pagos, el nivel socioeconómico no influye en el número de pagos anuales tampoco en el valor de los mismos.

Keywords:

socioeconomic level, telecommunications, complaints, inquiries, late payments, Internet home

1. Introduction

La calidad del servicio influye positivamente en las evaluaciones afectivas y cognitivas de los clientes, incluida la satisfacción, la confianza, el compromiso y el valor de los clientes [1].

Los autores estudian los modelos de calidad de servicio de los ISPs y propose to relate service quality to customer satisfaction through the number of

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complaints. In [2], authors explore service quality measurement and propose a performance index to indicate customer satisfaction based on the proportion of complaints. In [3], the authors indicate that through the number of customer complaints, service quality can be tracked based on the theory to assist company management in the timely monitoring customer satisfaction.

Customers complain when they receive poor services; their behaviors have two ways of expressing it: negative word of mouth and complaining to the company [4]. The most valued reason for complaining to a telecommunications company in order of importance is seeking corrective action, explanations, repair, seeking an apology, expressing emotion or anger [5].

En el contexto de Latinoamerica, se tiene evidencias relativas al comportamiento de los grupos socioeconómicos en el uso del Internet [6] y al uso de los servicios electrónicos [7]. En este estudio se ha planteado analizar el efecto del nivel socioeconómico en un aspecto importante de los servicios de los ISPs, como son los reclamos de los clientes.

No similar studies in the literature analyze the impact of socio-economic level on the number of complaints, inquiries, number of payments, and value of payment. The following research questions have been posed in this study:

- Q1. Does socioeconomic status influence the number of complaints?
- Q2. Does socioeconomic status influence the number of inquiries?
- Q3. Does socioeconomic status influence the number of payments?
- Q4. Does socioeconomic status influence the value of payments?

This paper is organized as follows: Section2 reviews the work done in the area and motivates the study. Section3 poses the research questions and explains the procedure used to conduct the study. Section 5 presents the results of the study. Sections 6 and 6 present the discussion and conclusions, respectively.

2. Literature review

2.1. Telecommunications complaints and inquiries

Los clientes se quejan cuando reciben servicios deficientes [4], usualmente lo hacen a la empresa o a terceras personas. It also indicates that the reasons for not complaining are when it is too late to complain when there is a perception that nothing will be done about the problem, and when there is a fear of complaining.

También indica que los motivos para no reclamar son: cuando es demasiado tarde para reclamar, cuando se tiene la percepción de que no se hará nada con el problema y el miedo a quejarse [5].

The company must be aware of the importance of service recovery in resolving these problems [8]. The ability to handle customer questions, concerns, complaints and frustrations is essential to the customer's perception of service

quality [9]. Proper complaint handling by the company could be an opportunity to improve customer satisfaction and the company's profitability [10].

The study [3] indicates that through the number of customer complaints the service quality can be monitored based on the theory to assist company management in the timely monitoring of customer satisfaction. The study has developed a service quality model to comprehensively monitor service quality.

La sociedad Latinoamericana el factor socioeconómico influye en varios aspectos del uso de la tecnología [6, 7]. Si conocemos el comportamiento del efecto de los niveles socioeconómicos en los reclamos, las empresas podrían ser más activas en el tratamiento de los reclamos de los clientes.

Las consultas de los clientes son preguntas que realizan los clientes respecto al uso del servicio de Internet, por ejemplo: consultas respecto a la cobertura del servicio, pérdidas de contraseña, entre otros.

2.2. Socioeconomic status

The literature is rich with a diverse range of socioeconomic indicators [11], each playing a crucial role in various fields of study such as dentistry [12], telecommunications [13], and more. These indicators, including household income, housing characteristics, years of schooling, education level, occupational activity, social class, and even the volume of cell phone calls and SMS messages, provide valuable insights into the socioeconomic landscape of these fields.

In [14] the authors define socioeconomic status as a measure of social situation that typically includes variables such as income, level of education, and occupation. Socioeconomic status is linked to various life impacts, from cognitive ability and academic achievement to physical and mental health.

Studies on Internet access in Latin America indicate that socioeconomic status determines Internet subscription. However, we need to know whether this factor influences the behavior of Internet home users. In the scientific literature, there are few studies of the socioeconomic factor and its relationship with the use of the Internet and technology; the few studies present results that are even contradictory.

In [15], the authors study the socioeconomic determinants that affect consumption intentions; the results suggest that the perceived availability is positively associated with the perceived benefit and attitude towards technology, and the author suggests that the socioeconomic factor influences the behaviors and use of technology.

In [6], the authors present a socioeconomic indicator of the percentage of customers who drop out of residential Internet service for economic reasons over four years. Table 2.2 describes the four socioeconomic levels or clusters: high, upper-middle, lower-middle, and low.

ID	Level	Description
1	High	The percentage of customers associated to a closet who have churned of Internet service due to economic reasons in a period of 4 years is between 0% and 11.11% (Number of churned customers due to economic reasons / (Number of churned due to other reasons + active customers))
2	Medium H.	Between 11.12% and 15.28%
3	Medium L.	Between 15.29% and 19.12%
4	Low	Between 19.13% and 40%

Table 1: Socioeconomic levels of closets

In telecommunications, a closet is an element that provides the network. The network comes from the exchange to the wardrobe, and from the closet, the network is distributed to its geographical area of influence, approximately 150 clients per district.

2.3. Payments

In telecommunications, when providers offer multiple classes of service they can raise more revenue than with a single class of service, the diversity of ISP service plans is conducive to higher revenues. ISPs price their services differentially based on their [16] characteristics.

As the relationship continues, existing customers' spending increases over time, and they also no longer care as they become price insensitive. Customers in long-term relationships will pay more and act as the service provider's promoters, which eventually leads to lower new customer acquisition costs and higher retention [17].

Most customers pay their bills on time, but some forget to do so or intentionally do not pay on time. ISPs strive to increase their customer base and improve their performance. However, they have to deal with late payments by some customers. Late payments can be attributed to fraud, regular delays, or other special reasons [18]. Late payments, although not fraudulent behavior, see reductions in cash flow and increase and d costs for debt collection [19].

Customer on-time or late payment could be influenced by improved network quality. ISPs issue monthly bills, collect payments, and apply service cuts to non-paying customers if the customer does not pay. This study will analyze the effect of increased network quality on the number of annual payments and the value collected.

3. Methodology

This study was conducted using data on complaints, payments, and customer inquiries about Internet home services for an ISP company in Ecuador from 2018 to 2020. The customers whose data have been used in this study will also be referred to as subjects.

Table 2 shows the number of customers by socio-economic level whose network quality was improved from January to April 2019.

Socio-economic level	Number of customers
1 (High)	357
2 (Medium High)	569
3 (Medium Low)	558
4 (Low)	514
TOTAL	1,998

Table 2: Number of customers by socio-economic level

Es decir se ha combinado clientes utilizando distintas tecnologías para bloquear el efecto de la tecnología en los reclamos. The measurements will be conducted over a year of copper technology usage and another year with fiber optic technology, providing a comprehensive understanding of the changes.

A group of customers whose network quality was upgraded between January and April 2019 was selected and upgraded from copper to fiber optic technology. The measurements were carried out for one year, in which customers used copper technology, and then for one year, in which they used fiber technology.

The month-year and the total number of customers whose network quality was improved (1,998 customers) are shown in the Table ??.

The period in which the number of complaints, inquiries, and payments from customers whose technology was upgraded was recorded from January to April 2019.

In this study, we compare customers with different socio-economic statuses with respect to complaints, inquiries, number of payments, and value of payments.

Based on the research questions, we have the following hypotheses to test:

Q1. ¿Does socio-economic status influence the number of complaints?

- H10 (Null hypothesis): There is no difference in the effects of socioeconomical level on number of complaints.
- H11 (Alternative hypothesis): There is a difference between the effects of socioeconomical level on number of complaints.

Q2. Does socioeconomic status influence the number of inquiries?

- H20 (Null hypothesis): There is no difference in the effects of socioeconomical level on number of questions.
- H21 (Alternative hypothesis): There is a difference between the effects of socioeconomical level on number of questions.

Q3. Does socioeconomic status influence the number of payments?

- H30 (Null hypothesis): There is no difference in the effects of socioeconomical level on number of payments.
- H31 (Alternative hypothesis): There is a difference between the effects of socioeconomical level on number of payments.

Q4. Does socioeconomic status influence the value of payments?

- H40 (Null hypothesis): There is no difference in the effects of socioeconomical level on value of payments.
- H41 (Alternative hypothesis): There is a difference between the effects of socioeconomical level on value of payments.

The results of the data analyses and hypothesis testing are presented below.

4. Results

4.1. Impact of network quality improvement on the number of complaints

This study's subjects have made 5,842 complaints. The table below shows the total number of complaints classified by socio-economic level.

Socio-economic Level	N. Complaints
1 (High)	4,795
2 (Medium high)	1,663
3 (Medium low)	1,601
4 (Low)	1,583
TOTAL	5,842

Table 3: Claims data

4.1.1. Influence of socioeconomic status on the number of complaints

Table 4.1.1 presents the statistical values of the average number of complaints during a service year by socio-economic level.

	1 (High)	2 (Medium high)	3 (Medium low)	4 (Low)
Mean	1.07	0.88	0.91	0.96
Standar Deviation	1.70	1.66	1.74	1.72
Median	0	0	0	0
Minimum	0	0	0	0
Maximum	12	18	16	16

Table 4: Number of complaints by socio-economic level

In order to answer research question Q1, hypothesis testing will be performed with a two-factor between-subjects treatment since a customer can be in only one socio-economic level.

To determine the normality of the data, the Kolmogorov-Smirnov and Shapiro-Wilk test was applied; the statistical significance value was 0.000. Therefore, the data is not normal. Therefore, a non-parametric hypothesis test will be applied.

The Kruskal-Wallis test for independent measures has been applied, and the statistical significance value is 0.022; this indicates that there is evidence to reject the null hypothesis H10. Therefore, the alternative hypothesis H11 is accepted, and it can be stated that there is a difference between the effects of socio-economic level on the number of complaints. Socio-economic status influences the number of complaints, with customers with higher socio-economic status generating more complaints than customers with lower and middle socio-economic status.

4.2. Impact on the number of inquiries

The study subjects performed 521 inquiries. The table 4.2 shows the inquiries classified by socioeconomic level.

Socioeconomic level	N. of inquiries
1 (High)	66
2 (Medium High)	139
3 (Low Medium)	140
4 (Low)	176
TOTAL	521

Table 5: Data from inquiries

4.2.1. Influence of Socio-economic Status on the Number of inquiries

Table 4.2.1 presents the statistical values for the number of inquiries by socio-economic level.

	1 (High)	2 (Medium High)	3 (Medium Low)	4 (Low)
Media	0.09	0.12	0.13	0.17
Standard Deviation	0.36	0.46	0.43	0.49
Median	0	0	0	0
Minimum	0	0	0	0
Maximum	3	8	6	4

Table 6: Number of inquiries by socio-economic level

In order to answer research question Q2, a hypothesis test with a two-factor between-subjects treatment will be performed since the subject belongs to only one socioeconomic level.

In order to determine the normality of the data, the Kolmogorov-Smirnov Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to determine the normality of the data; the statistical significance value is 0.000. Therefore, the data is abnormal so that a non-parametric hypothesis test will be applied.

The Kruskal-Wallis test, a non-parametric alternative to the one-way ANOVA, was used for independent measures. With a statistical significance value of 0.000, we have strong evidence to reject the null hypothesis H20. This confirms that the socioeconomic level significantly influences the number of inquiries, with the low socioeconomic level showing a consultation rate twice as high as the high socioeconomic level.

4.3. Impact on number of payments

Table 7 presents the total number of payments made by the number of customers during a year sorted by socio-economic levels.

Socioeconomic Level	N. Payments
1 (High)	8,379
2 (Medium High)	13,454
3 (Medium Low)	12,866
4 (Low)	11,801
TOTAL	46,500

Table 7: Data on number of payments

4.3.1. Influencia del nivel socioeconómico en el número de pagos

En tabla 4.3.1 se presentan los valores de estadísticas descriptiva por nivel socioeconómico.

	1 (High)	2 (Medium High)	3 (Medium Low)	4 (Low)
Mean	12.07	12.19	11.97	12.01
Standard Deviation	3.57	3.51	2.94	2.91
Median	12	12	12	12
Minimum	1	1	1	1
Maximum	48	56	64	48

Table 8: Number of payments by socio-economic status

We have independent measures to analyze the influence of socioeconomic status on the number of payments as the customers belong to only one socioeconomic status. Hypothesis testing with one factor and two treatments between subjects will be performed to answer research question Q3.

Our commitment to thorough data analysis led us to apply the Kolmogorov-Smirnov and Shapiro-Wilk tests to determine the normality of the data. With a statistical significance value of 0.000, it became clear that the data did not follow a normal distribution, necessitating the use of a non-parametric hypothesis test.

The Kruskal-Wallis test has been applied for independent measures; the statistical significance level is 0.580. Therefore, there is no evidence to reject the null hypothesis H30; it cannot be stated that the socioeconomic level influences the number of payments.

4.4. Impact on the value raised

Regarding the valuation of the Internet service, table 9 shows the payment value classified by socio-economic level.

Socioeconomic Level	Payment value
1 (High)	215,801
2 (Medium High)	338,433
3 (Medium Low)	316,971
4 (Low)	298,337
TOTAL	1,169,542

Table 9: Payment value details

4.4.1. Influence of socio-economic status on the value collected

Table 4.4.1 shows the statistical values of the annual Internet service payment by socio-economic level.

	1 (High)	2 (Medium High)	3 (Medium Low)	4 (Low)
Mean	311.07	306.77	294.79	303.75
Standard Deviation	123.83	105.80	88.52	99.99
Median	316.96	316.48	310.56	315.81
Minimim	24.00	1.00	17.00	5.00
Maximum	1,511.00	1,491.00	1,234.00	1,315.00

Table 10: Collections by socio-economic level

A one-factor two-treatment between-subjects hypothesis test will be performed to answer the research question Q4, which is focused on the influence of socioeconomic status on annual payments. This is a relevant approach as customers in our study belong to a single socioeconomic level.

To determine the normality of the data, the Kolmogorov-Smirnov and Shapiro-Wilk test has been applied; the statistical significance value is 0.000, so there is no normality of the data; therefore, a non-parametric hypothesis test will be applied.

The Kruskal-Wallis test for independent measures has been applied; the statistical significance value is 0.105, indicating no evidence to reject the null hypothesis H40. Therefore, it cannot be stated that socioeconomic status influences the value of annual payments.

5. Discussion

It is not recommended to treat all customers equally in terms of methods to increase customer loyalty [20]. Therefore, it is necessary to know about customer behavior. Additionally, the population under study is stratified by

socio-economic level, which is why this little-studied variable has also been addressed.

The socio-economic level of clients influences the number of complaints. Higher socio-economic levels generate more complaints, demand higher quality, and express this through complaints channels. Socio-economic status also influences the number of inquiries, with lower socio-economic levels having twice as many inquiries as higher socio-economic levels, which could be attributed to the higher socio-economic levels' more excellent knowledge of information technology than the poorer socio-economic levels. Socio-economic status does not influence the number of annual payments or the total value of annual payments.

ISPs could consider customer care to increase satisfaction and quality of service [21]; additionally, take into account that the socio-economic status of customers influences the use of IT especially in heterogeneous societies.

6. Conclusions

We concluded that improving network quality through the change from copper to fiber optic technology positively influences the number of complaints. The improved technology reduces the number of customer complaints by 24%. Socioeconomic status also influences the number of complaints, with upper-class customers generating more complaints than middle and lower-class customers.

Improved network quality does not influence the number of customer inquiries; even if the technology improves, customers will ask about password changes and other inquiries related to ICT usage. Socioeconomic status does influence the number of inquiries, with the lower socioeconomic classes having twice as many inquiries as the upper classes.

Socioeconomic status does not influence the number of payments per year, possibly because the cut-off measure applies to customers of all socioeconomic levels.

Socio-economic level does not influence the value of payments in a year; there is no difference between socio-economic levels.

If the socio-economic level does not influence payments, it is concluded that the number of annual customer payments is positive across all sectors and socio-economic levels of customers.

This study affirms the influence of the socio-economic variable on the behavior of customers of ISP services, which could be extrapolated to the use of communication technologies in general.

7. Future Work

In the future, it is expected to continue studying the behavior of telecommunications service customers at different socio-economic levels and to further study aspects of the ISP quality of service model in a heterogeneous society growing socially, educationally, and educationally in using ICTs.

References

References

- [1] P. Thaichon, T. N. Quach, The relationship between service quality, satisfaction, trust, value, commitment and loyalty of internet service providers' customers, *Journal of Global Scholars of Marketing Science* 25 (4) (2015) 295–313.
- [2] K. Chen, H. Yang, A new decision-making tool: the service performance index, *International Journal of Quality & Reliability Management*.
- [3] K.-S. Chen, T.-C. Chang, K.-J. Wang, C.-T. Huang, Developing control charts in monitoring service quality based on the number of customer complaints, *Total Quality Management & Business Excellence* 26 (5-6) (2015) 675–689.
- [4] D. Pei-wu, H. Yan-qiu, Research of customer complaints and service recovery effects, in: *2006 International Conference on Management Science and Engineering*, IEEE, 2006, pp. 958–962.
- [5] S. G. Nimako, A. F. Mensah, Motivation for customer complaining and non-complaining behaviour towards mobile telecommunication services, *Asian Journal of Business Management* 4 (3) (2012) 310–320.
- [6] F. Uyaguari, C. Acosta, A. Uyaguari, V. Bermeo, D. Cordero, Low socio-economic status and customer churn respect to home internet service in the intra-city context, in: *International Conference on Information Technology & Systems*, Springer, 2022, pp. 196–205.
- [7] F. Uyaguari, J. F. Cordero, A. Lopez, E. J. Sacoto-Cabrera, External factors and socioeconomic influence on users acceptance of online payments, in: *International Conference on Science, Technology and Innovation for Society*, Springer, 2023, pp. 212–221.
- [8] B. B. Holloway, S. E. Beatty, Service failure in online retailing: A recovery opportunity, *Journal of service research* 6 (1) (2003) 92–105.
- [9] J. E. Collier, C. C. Bienstock, Measuring service quality in e-retailing, *Journal of service research* 8 (3) (2006) 260–275.
- [10] T. Garín-Muñoz, T. Pérez-Amaral, C. Gijón, R. López, Consumer complaint behaviour in telecommunications: The case of mobile phone users in spain, *Telecommunications Policy* 40 (8) (2016) 804–820.
- [11] B. Galobardes, M. Shaw, D. A. Lawlor, J. W. Lynch, G. D. Smith, Indicators of socioeconomic position (part 1), *Journal of Epidemiology & Community Health* 60 (1) (2006) 7–12.

- [12] S. M. Costa, C. C. Martins, M. d. L. C. Bonfim, L. G. Zina, S. M. Paiva, I. A. Pordeus, M. H. Abreu, A systematic review of socioeconomic indicators and dental caries in adults, *International journal of environmental research and public health* 9 (10) (2012) 3540–3574.
- [13] G. Castillo, F. Layedra, M.-B. Guaranda, P. Lara, C. Vaca, The silence of the cantons: Estimating villages socioeconomic status through mobile phones data, in: *2018 International Conference on eDemocracy & eGovernment (ICEDEG)*, IEEE, 2018, pp. 172–178.
- [14] N. E. Adler, T. Boyce, M. A. Chesney, S. Cohen, S. Folkman, R. L. Kahn, S. L. Syme, Socioeconomic status and health: the challenge of the gradient., *American psychologist* 49 (1) (1994) 15.
- [15] D. H. Shin, Understanding user acceptance of dmb in south korea using the modified technology acceptance model, *Intl. Journal of Human-Computer Interaction* 25 (3) (2009) 173–198.
- [16] L. He, J. Walrand, Pricing differentiated internet services, in: *Proceedings IEEE 24th Annual Joint Conference of the IEEE Computer and Communications Societies.*, Vol. 1, IEEE, 2005, pp. 195–204.
- [17] F. F. Reichheld, W. E. Sasser, Zero defections: Quality comes to services, *Harvard business review* 68 (5) (1990) 105–111.
- [18] S.-Y. Hung, D. C. Yen, H.-Y. Wang, Applying data mining to telecom churn management, *Expert Systems with Applications* 31 (3) (2006) 515–524.
- [19] C.-H. Chen, R.-D. Chiang, T.-F. Wu, H.-C. Chu, A combined mining-based framework for predicting telecommunications customer payment behaviors, *Expert Systems with Applications* 40 (16) (2013) 6561–6569.
- [20] A. Kuusik, U. Varblane, How to avoid customers leaving: the case of the estonian telecommunication industry, *Baltic Journal of Management* 4 (1) (2009) 66–79.
- [21] N. Abdolvand, N. M. Charkari, R. Mohammadi, A technical model for improving customer loyalty with m-commerce: mobile service providers, in: *IADIS International Journal on Computer Science and Information System*, 2006, pp. 50–62.