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Papel da análise discriminante no aprimoramento da avaliação da satisfação dos usuários

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Keywords

Abstract

Objective

To test discriminant analysis as a method of turning the information of a routine customer satisfaction survey (CSS) into a more accurate decision-making tool.

Methods

A 7-question, 10-multiple choice, self-applied questionnaire was used to study a sample of patients seen in two outpatient care units in Valparaíso, Chile, one of primary care (n=100) and the other of secondary care (n=249). Two cutting points were considered in the dependent variable (final satisfaction score): satisfied versus unsatisfied, and very satisfied versus all others. Results were compared with empirical measures (proportion of satisfied individuals, proportion of unsatisfied individuals and size of the median).

Results

The response rate was very high, over 97.0% in both units. A new variable, medical attention, was revealed, as explaining satisfaction at the primary care unit. The proportion of the total variability explained by the model was very high (over 99.4%) in both units, when comparing satisfied with unsatisfied customers. In the analysis of very satisfied versus all other customers, significant relationship was identified only in the case of the primary care unit, which explained a small proportion of the variability (41.9%).

Conclusions

Discriminant analysis identified relationships not revealed by the previous analysis. It provided information about the proportion of the variability explained by the model. It identified non-significant relationships suggested by empirical analysis (e.g. the case of the relation very satisfied versus others in the secondary care unit). It measured the contribution of each independent variable to the explanation of the variation of the dependent one.

Descritores

Resumo

Objetivo

Testar a análise discriminante como um método de transformar a informação obtida num inquérito de satisfação dos usuários de rotina numa acurada ferramenta de tomada de decisão.

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624 Discriminant analysis and customers' satisfaction
Verdessi BD et al.

Rev Saúde Pública 2000;34(6):623-30
www.fsp.usp.br/rsp

Métodos

Utilizou-se questionário auto-aplicável com sete questões de dez opções numa amostra dos pacientes atendidos em duas unidades ambulatórias públicas, em Valparaíso, Chile, sendo uma de cuidados primários (n=100) e a outra de atenção secundária (n=249). Utilizaram-se dois pontos de corte na variável dependente (índice final de satisfação): satisfeitos vs insatisfeitos e muito satisfeitos vs os demais. Os resultados foram comparados com medidas empíricas habitualmente utilizadas (proporção de satisfeitos, proporção de insatisfeitos e dimensão da mediana).

Resultados

O nível de resposta foi muito elevado (sempre acima de 97,0%). Uma variável adicional revelou-se (atendimento médico), explicando a satisfação com o atendimento na unidade primária. Ao comparar satisfeitos com insatisfeitos, a proporção total da variabilidade explicada pelo modelo foi muito elevada (acima de 99,4%) em ambas unidades. Ao comparar muito satisfeitos com os demais, observou-se relação significativa apenas no caso da unidade primária. Explicou-se uma baixa proporção da variabilidade (41,9%).

Conclusões

A análise discriminante revelou relações não percebidas pela análise empírica e indicou a proporção exata da variabilidade explicada pelo modelo utilizado. A técnica afastou como não significativas relações sugeridas pela análise empírica (por exemplo, muito satisfeitos versus os demais no caso da unidade secundária). A técnica permitiu medir a intensidade da contribuição de cada variável na explicação da variação da satisfação.

INTRODUCTION

In Chile, as in other countries, there is a great need for reliable customer satisfaction measures. Customer Satisfaction Analysis (CSA) is one of the four national priorities, which has been established since 1994.[21] Satisfaction surveys are the most common method for CSA. The tradition of its use came from other services activities like banks and especially hotels. Thus, in the majority of the health services, where these instruments are used, a direct empirical inference between a series of variables is assessed and a final score of satisfaction with the service is given. One of the main problems after obtaining results from surveys is to turn these data into more accurate decision-making information. Especially in the very frequent case, when the levels of satisfaction are high, managers look for an instrument, which allows them to decide about the changes needed to improve further customer's satisfaction. Multivariate analysis allows studying the precise relationships between the component variables of the survey. Discriminant analysis (DA), as one of the multivariate analysis techniques, allows a precise measurement of the variability proportion explained by the model adopted. Besides, it reveals the weight of each variable in the explanation of the values assumed by the dependent variable. Furthermore, this technique permits to cut the scale of the dependent variable used at different points allowing the study, for example, of the determinants of "very satisfied" customers versus all others and, at another moment, simply discriminate between "satisfied" *versus* "unsatisfied" ones. For this reason, DA is pre-

sented in this paper as an instrument to deepen the meaning and usefulness of CSA surveys.

The objective is to test discriminant analysis as a method for turning the information of a routine CSA survey into a more accurate decision-making tool.

METHODS

The questions of the present survey evaluated nursing care (Nursing), physician care (Physician), pharmacy attention (Pharmacy), appointment conditions (Appointment), register attention (Registry) and continuity of care (Continuity) as independent variables and the overall perceived quality of the attention as the dependent variable (Final) (Figure 1). A ten-point, Likert-type scale was used to quantify each variable as perceived by the customers. Two different discriminant analysis equations were constructed. The first one was applied to discriminate between "very satisfied" (values 9 and 10) and all other perceptions of the dependent variable. The second one was used to discriminate between "satisfied" and "unsatisfied" customers (values 5 or less *versus* all other choices). The statistical package used was SPSS 7.5 for Windows PC format.

The survey was applied to a random sample of patients from two outpatient care units at the Valparaíso regional health service (VRHS): a primary care unit (average attention: 43.6 patients per day; n=100) and a secondary care unit (average 157.8 patients per day;

Independent
    1. Appointment: conditions of the appointment
    2. Registry: conditions of the registration
    3. Nursing care: nursing attention
    4. Physician's care: medical attention
    5. Continuity: continuity of care
    6. Pharmacy: pharmaceutical attention

Dependent
    7. Final: final score of care

Figure 1 - Variables

n=249). The surveys were applied each Tuesday and Thursday to 10% of the patients attending the facilities. Data were analyzed searching for the increasing degree of significance of the statistics employed until these values stabilized at a given value, when the sample was considered complete.

The results of DA were compared with three empirical measures, namely: the independent variables with the highest proportion of unsatisfaction, the ones with smaller proportion of satisfaction and those with smaller median.

The discriminant analysis statistics used:
- Wilk's Lambda: as a proxy of the proportion of the unexplained variability;
- Chi-square of Wilk's Lambda distribution and respective significance "p": measuring the significance of the mentioned relationship;
- Discriminant Function Coefficient Scores: as a measure of the individual contribution of each independent variable to the total variation of the final score.

The choice of relevant topics for analysis was made through the analysis of the literature and selection of those topics accepted as meaningful by previous experience with CSA surveys in VRHS. This was the criterion for content validity. Face validity was assured by interviews with a secondary sample (10%) of the patients surveyed, showing their understanding of the questions proposed. Construct validity was accessed through the Wilk's Lambda statistic value and its significance. A one-week-later telephone interview with 10% of the patients surveyed was performed to assure reliability.

RESULTS

Response rate was very high (97.0% in the case of the primary care unit and 98.4% in the case of the secondary care unit).

Content, face validity and reliability were assured through the previously mentioned methods.

In the study of the primary care unit ("Consultorio Plaza Justicia"), DA added the variable Physician (medical attention) to the empirical analysis as relevant both to discrimination between very satisfied and other patients, and also between satisfied and unsatisfied patients (Figure 2). Both functions were found significant ($p<0.05$) and, through the Wilk's Lambda statistics, a very high proportion of variability was explained by the equation (99.4%) in the case of satisfied versus non-satisfied. A much smaller proportion (41.9%) of variation was explained in the case of very satisfied versus other patients (Figure 2).

As to the secondary care unit ("Consultorio del Adulto"), the analysis revealed that the discriminant function for very satisfied versus other was found non-significant ($p=0.58$), but in relation to satisfied versus unsatisfied patients, the relationship was very significant ($p=0.002$) and practically explained all the variability (more than 99.9%). Only a negligible proportion (6.8%) of the variability was explained when comparing very satisfied with others. These variables were not different from those suggested by the empirical methods (appointment conditions, pharmaceutical attention and nursing care) although the order of their participation (measured through the discriminant function coefficient scores) changed, thus enhancing the importance of the appointment conditions (Figure 3).

DISCUSSION

Customer satisfaction assessment is a relatively new concern for the health care industry. The interest in this aspect of the care increased considerably in the mid-eighties as part of the "quality wave". This wave covered the healthcare services industry after having a strong impact upon other industries, initially in the US, but soon after all over the world.[1] The consolidation of customer satisfaction analysis as a routine practice was influenced by its incorporation as quite a relevant component (300 of 1,000 points) in the Malcolm Balbridge Award[12] procedures and in the standards of the Joint Commission for Accreditation of Health Care Organizations (JCAHCO).[6]

When dealing with this subject, a question arises: what for? This issue is extensively discussed in the specific literature.[34,36] Several authors argue that, if there are plenty of suggestions, there is no established evidence that patient satisfaction influence the technical aspects of quality through improvement in the compliance with treatment, for example. The majority of the authors agree, however, that patient satisfaction is definitely a self-standing outcome of care.[7,32] Although it is a frequent statement that the theoretical foundations of satisfaction in health care

Independent variables explaining disatisfaction

"Common sense"			Discriminant	
(A) Registry 21% Continuity 7 Pharmacy 4	(B) Registry 22 Nurs. Care 35 Appointm. 46	(C) Registry 6.0 Appointm. 8.0 Continuity 9.0	(D) Registry 0.646 Appointm 0.607 Physician 0.468	(E) Physician 12,089 Continuity 10,461 Pharmacy 9,256

(A) Greater proportin of disatisfaction (score=/<3)
(B) Smaller proportion of satisfaction (score= 9&10)
(C) Smaller median
(D) Discrim. Function Coef. Scores 9&10 X other (Chi-sq 26.049;p=.000)Wilks' λ:.581
(E) Discrim. Funtion Coef.=<5 X other (Chi-sq. 15.485;p=.Wilks' λ:.006

Independent variables explaining disatisfaction (stepwise analysis)

"Common Sense"			Discriminant	
(A) Registry 21% continuity 7 Pharmacy 4	(B) Registry 22 Nurs. Care 35 Appointm. 46	(C) Registry 6.0 Appointm. 8.0 Continuity 9.0	(D) Registry 0.944 Contin. 0.625	(E) No variables qualified for analysis

(A) Greater proportion of disatisfaction (score=/ <3)
(B) Smaller proportion of satisfaction (score=9&10)
(C) Smaller median
(D) Discrim. Function Coef. Scores 9&10 X other (Chi-sq 20,575;p=.000) Wilks' λ:. 581
(E) Discrim. Function Coef.=<5 X other (No variables qualified for analysis)

Figure 2 - Results: primary care unit (Plaza Justicia – n=100)

Idependent variables explaining disatisfaction

"Common Sense"			Discriminant	
(A) Registry 15% Registry 5.2 Nurs. care 3.6	(B) Pharmacy 44 Registry 57 Appointm. 62	(C) Pharmacy 8.0 Appointm. 9.0 Registry 9.0	(D) (Not signif.)	(E) Appointm. 10.9 Pharmacy 8.9 Physician 3.37 Nurs. care 5.9

(A) Greater proportion of disatisfaction (score=/ <3)
(B) Smaller proportion of satisfaction (score=9&10)
(C) Smaller median
(D) Discrim. Function Coef. Scores 9&10 X other (Chi-sq 12.19;p=.058) Wilks' λ:. 932
(E) Discrim. Function Coef.=<5 X other (Chi-sq 40.47;p=.002) Wilks' λ:. 000

Idependent variables explaining disatisfaction (stepwise analysis)

"Common Sense			Discriminant	
(A) Pharmacy 15% Registry 5.2 Nurs. care 3.6	(B) Pharmacy 44 Registry 57 Appointm. 62	(C) Pharmacy 8.0 Appointm. 9.0 Registry 9.0	(D) Pharmacy 1.0	(E) Appointm. 5.46 Pharmacy 4.45 Physician 3.37 Nurs. care 3.02

(A) Greater proportion of disatisfaction (score=/ <3)
(B) Smaller proportion of satisfaction (score=9&10)
(C) Smaller median
(D) Discrim. Function Coef. Scores 9&10 X other (Chi-sq 8.559;p=.03) Wilks' I:. 952
(E) Discrim. Function Coef.=<5 X other (Chi-sq 36.77;p=.000) Wilks' λ:. 001

Figure 3 – Results: secondary care unit (Cons. del Adulto – n=249)

Rev Saúde Pública 2000;34(6):623-30
www.fsp.usp.br/rsp

Discriminant analysis and customers' satisfaction **627**
Verdessi BD et al.

are weak,[26] there is a series of papers discussing them.[3,5,10,1319,22,32] It is commonly observed that the levels of satisfaction expressed are generally rather high, simply endorsing in many cases the status quo.[9,16,18,23] In some studies, the situation of being older or sicker is associated with a so-called "acquiescent response bias".[23] Other studies, on the other hand, demonstrate a dissociation of gender and age as factors correlated to consistently positive answers. The present study tries to demonstrate that even when a very strong positive (satisfied) answer is observed, it is possible to get decisive information from the survey data, using DA.

Some reviews of the literature recommend the following as basic conditions for a good customer satisfaction survey: clear definition of goals; assessment of different aspects of care; sub-scales correspondent to these aspects; tests of reliability and validity; and application feasibility to large populations.[10] Other studies[23] point out that an adequate survey should at least measure the access to health care and its availability, the technical quality of the services, interpersonal relationships, financial aspects, and communication.

In an extensive series of instruments studied,[2-4,15,23] the rate of response is often mentioned as a methodological hindrance. This parameter varied extensively (from 27% to 96% in a series of revisions).[9,10,27-29,35] It is by and large accepted that the degree of response compatible with valid surveys should be over 80%.[27] As previously mentioned, the study had a high response rate (always over 95%). Another aspect considered weak in many satisfaction surveys is the validity[2,3,7,14,24,28] and reliability analysis.[2,3,14,23,28] Some authors suggest that validity should be examined in terms of face, content, discriminant and construct validity;[28] others comment that face and construct validity are more feasible and relevant to this type of study.[14,25] In this study, content, face and construct validity were analyzed and found to be quite satisfactory (data available from the authors).

A second type of concern involves methodological issues, reliability and applicability of the studies. From this viewpoint, some authors consider the existence of a validity/applicability trade-off. Choosing laboratory-like research conditions can signify working in non-routine-like situations, which has an impact in their applicability.[8] Trying to balance scientific rigor with everyday usefulness represents one of the biggest challenges of the satisfaction surveys. This is precisely one of the aspects emphasized in the study. The selective use of a conceptually elaborated tool as DA can render it applicable even in routine working conditions in a developing country. Thus, one of the basic goals of this research is to overcome this validity/applicability trade-off.

Multicolinearity[30] has been pointed out as a factor of validity impairment of CSA studies. The present study also suggests the DA as a practical answer to this hindrance due to the fact that the construction of the statistics under this technique involves the clearance for colinearity between the variables studied.

The rotating, cumulative sample used in this study is a convenient tool in dimensioning the sample in everyday working conditions. This prevents the excessive effort and cost of overdimensioning it or, in an insufficiently dimensioned one, with the respective loss of significance.

Studies found in the literature indicate that the main variables most often associated with satisfaction were nursing care, quality of meals, physical conditions and, in a much less preeminence, medical activity.[32] Although expressing a high degree of satisfaction, this suggests that this last variable can be discriminant in some situations. For example, when a small proportion of unsatisfied patients has a significant impact in the overall care satisfaction such as it was observed in the case of the primary care unit.

The differences in the findings between the two health units studied can be explained by their different nature. The primary care unit ("Consultorio Plaza Justicia") is a location where patients and healthy people walk-in to seek health care and well-mother-and-baby care. The secondary care unit ("Consultorio del Adulto") is a place for outpatient care where only referred patients from primary care unit are admitted. It was observed in the first case that it was possible to identify the variables able to discriminate both between "very satisfied" and "all other" customers and between "satisfied" and "unsatisfied" ones. In the case of the secondary care unit, only a small proportion of the variation was explained (41.9%). The proportion of the variation explained in the case of satisfied versus unsatisfied patients was considerably higher (99.4%), suggesting that the variables chosen were quite adequate for the analysis proposed. Besides, in the case of this health unit, DA helped to identify the physician care as a variable of high degree of satisfaction (and for this reason, not identifiable by the empirical criteria often used) and very relevant (the highest discriminant function coefficient) to discriminate between satisfied and unsatisfied patients. In other words, unsatisfied patients with physician care were rarely seen in this unit, but they highly influenced the levels of unsatisfaction observed.

628 Discriminant analysis and customers' satisfaction
Verdessi BD et al.

Rev Saúde Pública 2000;34(6):623-30
www.fsp.usp.br/rsp

DA added important information also in the case of the secondary care unit. In this case, the set of variables used wasn't able to assess the difference between very satisfied versus all other patients. Nonetheless, it was effective to discriminate between satisfied and unsatisfied patients (more than 99.9% of the variability explained), which was a strong feedback on the adequacy of the set of variables chosen, unless there was interest in discriminating very satisfied patients from all the other.

The reason for the impossibility in (significantly) discriminating between very satisfied and all others in the case of the secondary care unit can be traced to the intense skewness of the distribution of the final satisfaction score (Final) regarding very satisfied patients. The same reason may point to the cause of the low proportion of variation explained in similar circumstances in the case of the primary care unit (Figure 4).

This study shows quite clearly how DA can give support to the choice of independent variables used in the CSA survey. It can adequately limit the extension of the inferences (in a very different way from when empirical inferences were used only). Finally, it can point out through the discriminant function coefficient scores to the more relevant independent variables amenable to change when the managers are committed with improving customer satisfaction levels.

Multivariate analysis, in general,[3,10,17] and discriminant analysis,[5,20] specifically, have been used as tools to identifying the factors of customer satisfaction. The question is often raised on how to use these methodologically more elaborated instruments in everyday practice of CSA.

Short self-administered instruments, such as the one used in the study, have been associated with comparatively better degrees of response and especially indicated when older and poorer populations are studied.[11,25,31]

At the VRHS a set of instruments both qualitative and quantitative have been applied to deal with the different situations of CSA (long surveys, short surveys, focus groups, active listening interviews and discussion groups using speech analysis).* The quantitative method of choice has been the short (7 to 10 question, 5 to 10 multiple choices), self-applied questionnaire. As mentioned before, a study performed at VRHS was presented at the 12th ISQua Conference demonstrating that this instrument provided similar results in terms of overall satisfaction assessment as a more complex, professionally applied instrument.[33]

DA demonstrated to be a valuable tool to complement validation, to control for multicolinearity, and to point out factors explaining global satisfaction, which could give guidance to immediate decision. After considering a few basic conditions, application is easy and non-valid explaining variables can be readily identified and ruled out. For these reasons, this technique can be an adequate tool in solving the conflict between validity and feasibility, which concerns both researchers and health care managers. It seems to add considerable value to patient satisfaction surveys, as it improves the ability of this type of instrument of identifying and dimensioning the importance of the variables effectively associated with overall care satisfaction.
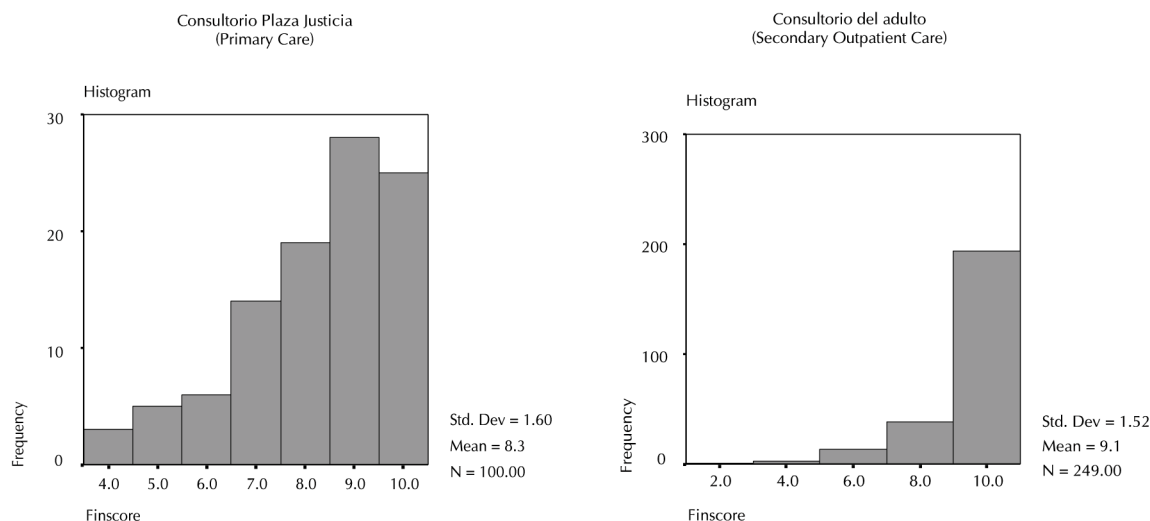

Figure 4 - Profile of the final score in the two facilities studied

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