ASSESSMENT OF PATIENT SATISFACTION USING AN AHP MODEL: AN APPLICATION TO A SERVICE OF PHARMACEUTICAL DISTRIBUTION

Paolo Melillo*
Department of Biomedical, Telecommunication and Electronical Engineering
University of Naples "Federico II"
Naples, Italy
E-mail: paolo.melillo@unina.it

Alice Delle Donne
Department of Biomedical, Telecommunication and Electronical Engineering
University of Naples "Federico II"
Naples, Italy
E-mail: a.delledonne@studenti.unina.it

Giovanni Improta
Department of Biomedical, Telecommunication and Electronical Engineering
University of Naples "Federico II"
Naples, Italy
E-mail: ing.improta@gmail.com

Santolo Cozzolino
Centro di Biotecnologie
A.O.R.N. "A. Cardarelli" di Napoli
Naples, Italy
E-mail: santolo.cozzolino@aocardarelli.it

Marcello Bracale
Department of Biomedical, Telecommunication and Electronical Engineering
University of Naples "Federico II"
Naples, Italy
E-mail: marcello.bracale@unina.it

ABSTRACT

Evaluation of patient satisfaction has been gaining increasing importance in the last decades. The assessment of patient satisfaction relies on questionnaires, usually based on Likert Scale.
The aim of this paper is integrating conventional questionnaires by AHP method. We applied the method to the patients who used the service of pharmaceutical distribution of the hospital "A.O.R.N. A. Cardarelli" in Naples.
From a literature research, we individuated three main dimension of the quality of the considered service and for each dimension three items.
The questionnaires submitted to the users includes questions about the level of satisfaction (LS_i) of each item evaluated by the 5-point Likert scale and questions for the pair-wise comparisons of items and dimensions according to AHP methods. Moreover, we asked some redundant scores about the global level of satisfaction and the level of satisfaction of each dimension.

* Corresponding author

We defined and computed AHP-based indexes of the satisfaction for the whole service and for each dimension. We evaluated the correlation between the redundant scores and the AHP-based indexes for consistent judgments.
We submitted the questionnaires to 102 users of the service. The significant correlation ($p<0.05$) between the redundant scores and the proposed AHP indexes shows that the AHP method could be used to provide information about the quality of the service, the patient satisfaction and the importance of each item / dimension.

Keywords: Analytic Hierarchy Process (AHP), patient satisfaction, service quality, pharmaceutical distribution

1. Introduction

Evaluation of patient satisfaction has been gaining increasing importance in the last decades. In most cases, it implies to measure the Service Quality (SQ) and due to intangibility and nonstandardized nature, service are quite difficult to measure. Many tools were developed to this aim, such as SERVQUAL. SERVQUAL basically measures SQ by comparing the expectations of users before they get service (called expected service quality) and the perceptions of users after they get the service (called perceived service quality).

The Analytic Hierarchy Process (AHP) (Saaty, 1980) (Saaty, 2006) is a useful methodology to provide information about subjective judgments and has been suggested for measuring service quality. However, most of the applications of AHP adopted it to compare two or more services. In a recent paper (Ramanathan, 2010) AHP was proposed to measure Service Quality by comparing expected and perceived service quality. The authors of this study (Ramanathan, 2010) compared their AHP-based method and SERVQUAL, concluding that users could express their satisfaction and comparisons more easily with the AHP questionnaire than with SERVQUAL.

The aim of this paper is to propose a method based on AHP to evaluate the patient satisfaction. We applied to the service of pharmaceutical distribution of the hospital "A.O.R.N. A. Cardarelli" in Naples. To evaluate the proposed method, we asked the users some redundant scores, defined AHP-based indexes, and computed the correlation between the introduced scores and indexes.

2. Methods

From a previously published literature review (Panvelakar, 2009), we identified three main dimension of the quality of the considered service: Facilities, Personnel's skills, Dispensing process. For each dimension we identified three items, as reported in Table 1.

We submitted questionnaires through face-to-face interviews to patients or people who used the service of pharmaceutical distribution of A.O.R.N. A. Cardarelli in Naples in the second week of December 2010 and in the first week of February 2011.

The questionnaire submitted to the patients consisted of three parts:

1) questions about sex, age and other anonymous information;
2) questions about the level of satisfaction of each item (LS_i) and dimension (LSd_i);
3) questions for the pair-wise comparisons of items and dimensions according to AHP methods.

The level of satisfaction of each item (LS_i) and of each dimension (LSd_i) were evaluated by the 5-point Likert scale, as shown in Table 2, which is the second part of the questionnaire translated in English. Moreover, a Global Level of Satisfaction (GLS) is asked to the users in a scale from 1 to 100.

Table 1. Dimensions and items in the evaluation of the service

Item	Dimension
1. Pharmacy location	d1. Facilities
2. Accessibility	
3. Room comfort	
4.Courtesy	d2. Personnel's skills
5.Pharmacists' explanation	
6. Privacy	
7. Drugs' availability	d3. Dispensing process
8. Waiting time	
9. Opening time	

Table 2. Questions about the level of satisfaction of each item and dimension.

The pharmacy is easy to reach					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_1
The pharmacy staff is always kind					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_4
The prescribed drugs are always available in stock					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_7
The building is also accessible to disabled people					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_2
The pharmacist is available for giving information					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_5
The time needed to serve is short or reasonable					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_8
The waiting room is adequate and comfortable					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_3
The pharmacist take care about my privacy					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_6
The opening hours of the pharmacy are adequate					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LS_9
The facilities (in terms of location, accessibility, comfort of the rooms) are adequate					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LSd_1
The attitude of pharmacist towards patients (courtesy, availability, respect of privacy) is satisfactory					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LSd_2
The service (availability of drugs, waiting times, opening hours) is satisfactory					
5- strongly agree	4- agree	3- not sure	2 - disagre	1- strongly disagree	LSd_3
Express your global level of satisfaction of the service in a scale 1-100					GLS

For each respondent, we computed according to AHP:

1) the local weight (LW_i) of each item within its dimension;
2) the weight of each dimension (Wd_i);
3) the global weight (GW_i) of each item.

We defined a Global Quality Index (GQI) as a linear combination of the level of satisfaction of each item, LS_i, and their global weight, GW_i.
Furthermore, for each dimension d_i, we defined a Quality Index (QId_i) as a linear combination of the level of satisfaction of the items of the dimension, LS_i,and their local weight, GW_i.
Table 4 reports all the AHP-based indexes and the formula adopted to compute them.

Table 4. Computed Quality indexes

	Description	Formula
GQI	Global quality index	$\sum_{i=1}^{9} LS_i \cdot GW_i$
QId_1	Quality index of the dimension Facilities	$\sum_{i=1}^{3} LS_i \cdot LW_i$
QId_2	Quality index of the dimension Personnel's skills	$\sum_{i=4}^{6} LS_i \cdot LW_i$
QId_3	Quality index of the dimension Dispensing process	$\sum_{i=7}^{9} LS_i \cdot LW_i$

As suggested by Saaty (Saaty, 1980), we computed the consistency measures of the judgment matrix and, as proposed by Pecchia (Pecchia, 2010) we accepted as consistent matrixes within the 20% level of inconsistency. As regards the respondents, we accepted an inconsistency in one judgment matrix.
We evaluated the correlation between GLS and GQI of the respondents and between LSd_i and QId_i..

3. Results

A sample of 101 users of the service completed the questionnaire and 74 subjects refused to answer the questionnaire for unknown reasons. The information about the gender and the age of the sample is shown in Table 5.

Table 5. Gender and age of the sample of users interviewed

	Patients interviewed (n=49)	Users (non patient) interviewed (n=52)
Age (year)	49.0 ± 14.7	48.7 ±12.1
Male	31 (63.3%)	28 (53.8%)
Female	18 (36.7)	24 (46.2%)

Table 6 reports the correlation coefficients between the Levels of Satisfaction and the AHP-based quality indexes and the relative p-value. The correlation is significant for all indexes (p-value <0.05)

Table 6. Correlation coefficient between the Levels of Satisfaction and the AHP-based quality indexes

	Number of instances	Correlation coefficient	p-value
GQI vs GLS	22	0.5164	0.014
QId_1 vs LSd_1	29	0.8285	<0.001
QId_2 vs LSd_2	42	0.5650	<0.001
QId_3 vs LSd_3	32	0.3649	0.040

4. Discussion and conclusion

In this study, we applied the AHP to evaluate the patient satisfaction of one service of direct drug distribution. In order to check the application of the AHP methods, we defined AHP-base quality indexes and evaluated the correlation of these indexes with the Level of Satisfaction asked to the respondents for redundancy. The significant correlation show that the AHP method could be used to provide information about the quality of the service, the patient satisfaction and the importance of each item / dimension.
Our results are consistent with those proposed by Ramanathan et all., who compared the use of AHP and SERVQUAL to measure patient satisfaction. They concluded that customers could express their satisfaction and comparisons more easily with the AHP questionnaire than with SERVQUAL.They stated that same respondent has been diagnosed to be an unhappy customer by SERVQUAL and
happy by AHP. We underline that the method proposed in the current study is based on a fewer number of question than those by Ramanathan.

Our study have the following limitations: most of the respondents were inconsistent in their judgment; we did not adopt a conventional methods for measuring quality as benchmark, like SERVQUAL, as the adoption of both methods would require a great number of questions and so a long time for the user to fill in the questionnaire; we did not pool the judgments as the results about the priority of the whole sample were out of the aim of the current study.

REFERENCES

Pecchia, L., Bath, P.A., Pendleton, N. & Bracale, M.(2010). Web-based System for Assessing Risk Factors for Falls in Elderly People. *International Journal of the Analytic Hierarchy Process, 2,* 135-157

Panvelkar, P.N., Saini, B., & Armour, C. (2009). Measurement of patient satisfaction with community pharmacy services: a review. *Pharmacy World & Science, 31,* 525-537.

Saaty, T.L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. New York: McGraw-Hill.

Saaty, T.L. (1996). *The Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process, Vol. IV of the Analytic Hierarchy Process Series*. Pittsburgh, PA: RWS Publications.

Ramanathan, R., & Karpuzcu H. (2010). Comparing perceived and expected service using an AHP model: an application to measure service quality of a company engaged in pharmaceutical distribution. *OPSEARCH*