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A fuzzy framework to evaluate service quality in the healthcare industry: An empirical case of public hospital service evaluation in Sicily

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ABSTRACT

A novel fuzzy evaluation framework is applied in this study to evaluate service quality in the public healthcare sector. In particular, the proposed framework is based on the ServQual disconfirmation paradigm and incorporates the Analytic Hierarchy Process (AHP) method to elicit reliable estimations of service quality expectations. Moreover, degrees of uncertainty, subjectivity and vagueness on the part of stakeholders are addressed via linguistic evaluation scales parameterized by triangular fuzzy numbers. With reference to nine relevant public hospitals in the Sicilian Region (Italy), a detailed case study evaluating four core service criteria and 15 fundamental service items is conducted so as to discern dissatisfying aspects regarding the public healthcare service in the Region. Dissatisfaction reasons with the provided service are identified in the analysis as well, further demonstrating the effectiveness of the proposed approach.

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1. Introduction

Healthcare is a fundamental and relevant issue whose importance pervades all aspects of society. In fact, it has medical, social, political, ethical, business, and also financial implications.

Although the recent restructuring of the Italian healthcare system, following the model of the business enterprise, has produced new opportunities, it calls for yet more rigorous constraints. Perhaps, the most significant opportunity for healthcare organizations is a new autonomy in pursuing targeted service outcomes, whereas economic and budget issues unmistakably represent the stringent constraints. However, the gap between these two often conflicting aspects may be bridged by an element, i.e. quality, able to compensate for the distorting potential inherent in an unwary or ill-advised overemphasis merely on costs and budgets [1–4].

Healthcare quality has been defined as “the ability to achieve desirable objectives using legitimate means” whereby the desirable objective implied is “an achievable state of health” [5]. Similarly, healthcare quality may be conceived as an approach to achieve improved health outcomes for consumers [6]. Nevertheless,

necessary prerequisites of quality healthcare also include appropriate technology, timely treatment, adequacy of the offer of services with regard to the demand, as well as guaranteeing acceptable standards of medical practice [7]. All the more, from a corporate viewpoint, healthcare quality constitutes a reliable means for extending the client base, so as to gain a competitive edge, thus assuring economic viability and long-term profitability [8–10].

To all intents and purposes, public healthcare quality can be viewed as a multi-dimensional entity affected by various interacting aspects and actors: institutions which organize and finance healthcare, healthcare providers and professionals in the front line of service tending to patients' needs in terms of diagnosis, treatment and, in recent years, rehabilitation as well. Last but not least, there are the citizens experiencing the clinical outcomes, but whose bottom line also comprises a keen eye for certain aspects of the services provided, such as human relationships, hospitality and the regard for their dignity and privacy. Fig. 1 shows the three main dimensions of healthcare service quality [11].

In detail:

- *management quality*, concerns efficient and effective resource utilization and management to deliver services able to satisfy stakeholders' needs. The evaluation of this quality dimension

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Fig. 1. Multi-dimensionality of healthcare quality.

takes into consideration the managerial measures and methods adopted.

- *professional quality*, includes perspectives of healthcare experts and professionals regarding medical aspects of healthcare. This quality dimension is directly characterized by in-house medical skills and hospital facilities.
- *Stakeholder perceived quality*, consists of citizens/patients perceptions with reference to healthcare aspects involving accessibility, responsiveness, human relationships, hospitality and other service features.

This latter quality dimension is considered the most significant one since it exerts a direct influence on the perceived value of the hospital and its image and, as such, it is regarded as a key measure of the service effectiveness, as well as of the patient satisfaction [12–14]. Additionally, this quality dimension also indirectly impacts on patients' behavior in the sense that, satisfied patients do not tend to seek healthcare services elsewhere and, moreover, they more likely recommend the same hospital to other potential patients [15,16]. For such reasons, the systematic implementation of procedures and approaches to evaluate stakeholder satisfaction represents a fundamental aspect in today's healthcare context [17].

In the literature, a number of methods have been proposed to assess stakeholder satisfaction in the healthcare field. Basically, they can be classified into three fundamental groups: Stated Importance Methods (SIMs), Derived Importance Methods (DIMs) and the Multi-Criteria Decision-Making (MCDM)-based approaches. As regards SIMs [18–20], stakeholders are asked to fill out a detailed questionnaire related to both expectations and perceptions on fundamental service quality aspects. On the contrary, DIMs [21,22] require a significantly simplified questionnaire given that stakeholders are asked to assess only perceptions on service quality aspects and to provide their overall satisfaction degree as synthesis of the perceived service quality. Quality expectations are statistically derived in a second phase, after the survey, on the basis of relations among the collected perceptions and the overall satisfaction degree. Finally, MCDM approaches are based on the general principle that the attitude of customers toward a given service is based on their assessment of service aspects on the basis of the importance assigned to them [23]. With this recognition, MCDM methodologies such as the Analytic Hierarchy Process (AHP) method [24], the Visekriterijumska optimizacija I KOmpromisno Resenje (VIKOR) method [25], the Technique for Order Preference

by Similarity to Ideal Solution (TOPSIS) method [26] and so on, constitute a solid underpinning on which to draw so as to favor the development of approaches able to comparatively evaluate and/or select service alternatives. Several recent applications of such approaches in the healthcare sector are described in [27–29].

Nevertheless, results obtained by the above mentioned methods can be imprecise or even unreliable for various reasons. For example, lengthy questionnaires typical of SIMs often bore respondents, consequently lessening the reliability of the data collected [30]. In addition, since users tend to attribute a greater importance to all service aspects especially when they are asked upon to directly rate them, quality expectations may be overestimated and also characterized by a lower discriminatory power. Moreover, quality preferences garnered by such methods can be flawed by uncertainty, subjectivity and vagueness inherent in the use of linguistic variables to assess service quality aspects [31,32].

In the light of the previous considerations, a novel evaluation framework is herein developed to overcome the known weaknesses of the aforementioned methods, with the aim of assessing the healthcare service quality. Specifically, such a framework is based on the ServQual disconfirmation paradigm [33] and incorporates the AHP method to point out reliable estimates of quality expectations [34,35].

ServQual is the most commonly used conceptual model for studying and analyzing the quality of services [36]. The large employment of its paradigm is widely witnessed by the large amount of scientific literature produced over the years in different service fields, such as car rental industry [37], financial services [38], transportation [39], higher education [40], quality certification [41], hotel services [42,43], online business [44–46]. On the contrary, AHP is one of the most established MCDM methods for facing a wide variety of decision situations, in fields such as government, business, industry, healthcare, shipbuilding and education [47]. This fact is probably due to some aspects characterizing such method, such as: possibility to integrate both quantitative and qualitative and also conflicting criteria, opportunity to conduct sensitivity analysis on obtained results and, moreover, it is well supported by user-friendly computer software. Furthermore, the advantageous mathematical structure characterizing AHP and its easiness in acquiring the required data allow to overcome many critical issues, namely the well-documented respondents tendency to select the central category of the evaluation scale to express their judgments [48], the influence in the evaluation process of the categories number of the evaluation scale, the form and the type of related linguistic variables [49,50].

Finally, a fuzzy evaluation environment is considered to deal with the inherent uncertainty, subjectivity and vagueness characterizing stakeholders in expressing their own judgments on service quality [51–53]. The fuzzy set theory has been successfully applied in many fields of the management science as decision-making [54], service performance evaluation [55,56], information retrieval [57,58], and so on. In the field of healthcare service quality evaluation, several recent applications are described in [59–61]. Fig. 2 summarizes the architecture of the evaluation framework developed.

The framework herein proposed seeks to support healthcare-decision makers and managers in their choice of effective and efficient strategies aimed at service quality improvements. For example, it can facilitate the rational prioritization of interventions, such as allotting additional resources for those service aspects that prove to be inadequate, in order to achieve improved levels of performance.

The remainder of the present paper is organized as follows. Section 2 contains a detailed description of the framework. Section 3 illustrates the strategic service quality analysis focusing on the public healthcare service of Sicily (Italy). Finally, conclusions section

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