Examining Soft and Hard Attributes of Health Care Service Quality and Their Impacts on Patient Satisfaction and Loyalty

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Background and Objectives: Many studies have confirmed the influences of various service quality dimensions on patient satisfaction and loyalty, but no existing theoretical model accounts for variation in how different types of patients evaluate service quality's soft and hard attributes. This research gap may cause problems for administrators needing to decide how to distribute resources appropriately across multiple departments. Therefore, this study establishes a theoretical model of the differences between inpatients' and outpatients' evaluations of hard and soft qualities and compares such evaluations' influences on patient satisfaction and loyalty. Also, to supplement statistical analysis and respond to scholars' calls for more mixed-methods studies of health care quality, this research incorporates analysis of online reviews to provide a holistic, close to real-time picture of patients' service experience perceptions. **Methods:** This study's survey sample comprised 292 inpatients and 137 outpatients from a Taiwanese hospital. We used partial least squares structural equation modeling to test the hypothetical model and importance-performance map analysis to identify factors that were significant to the service process but performed poorly. Finally, we used a text-mining technique to scrape 536 reviews posted on Google Maps, and Leximancer Portal to perform automated content and sentiment analyses on those data, as a means of mapping the critical concepts and themes that influenced patient experiences. **Results:** This study's analyses support the ideas that both hard and soft qualities are critical dimensions of service quality, and that each has different influences on inpatients' and outpatients' satisfaction and loyalty. Specifically, the sampled inpatients strongly valued the hard qualities of the hospital but were not satisfied with it. On the other hand, soft qualities attracted outpatients' attention and influenced their satisfaction and loyalty. In addition, content analysis revealed that soft qualities were the main reason patients left comments, whether positive or negative. Waiting time emerged as another critical element in triggering patients' unfavorable reviews. **Conclusions:** Patient population type, whether inpatient or outpatient, has been found to impact perceptions of service quality within health care institutions. As such, health care administrators should be cognizant of this phenomenon and make informed and tailored decisions when addressing quality within their respective services. Emphasis on the development of both interpersonal and professional skills among health care personnel may prove beneficial in enhancing the patient experience and ultimately fostering positive online reviews.

Key words: content analysis, health care service quality, patient satisfaction, PLS-SEM analysis, text mining

The health care industry has grown rapidly in recent years and is a crucial factor not only in population health but also in economic growth.[1-3] Many scholars have pointed out that, in the current competitive environment, the key to health care's success and long-term sustainability—and therefore, its ultimate goal—is patient satisfaction.[4-6] Previous research found that high-quality service delivery is a prerequisite to patient satisfaction.[7,8] Monitoring medical service processes' quality and outcomes can help decision makers understand how their systems can be improved to fit or even exceed patients' needs and expectations.[7] To assess patient-perceived health care quality, scholars have used measurement

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scales such as SERVQUAL and SERVPERF from the service management field[1] as the basis for medical care assessment instruments such as HEALTHQUAL.[9]

Typically, such measurement scales cover 5 dimensions: tangibility, reliability, responsiveness, assurance, and empathy. Tangibility, also called "hard" quality, comprises the facilities, equipment/technology, and overall physical environment that affect service quality. These tangible elements significantly influence how customers assess service providers' performance in health care and elsewhere.[10,11] On the other hand, "soft" service quality reflects human resource management and the employees' commitment.[11] More specifically, it represents the reliability, responsiveness, assurance, and empathy reflected in interpersonal interactions between clients and service providers. Although these elements do not directly influence treatment outcomes, soft service quality is the most important indicator of patient satisfaction.[3,9]

Recently, to achieve goal 3 of the United Nations' 2030 Sustainable Development Goals—that is, to ensure healthy lives and promote well-being for all ages[12]—various organizations have launched projects aimed at making health care systems more efficient and increasing access to medical services. For example, a program approved by Taiwan's Executive Yuan aims to strengthen rural health care standards and offer remote communities better services, as part of a wider strategy of ensuring that every citizen can access high-quality health care.[13] Nevertheless, scholars have found little evidence of whether hard or soft service quality aspects are more important to patients. This deficiency may cause dilemmas for policy makers deciding funding levels of each of these categories. Service management researchers have reported that customers appear to evaluate noninterpersonal and interpersonal aspects of service quality differently.[11] However, to the best of our knowledge, no existing theoretical framework has been built to assess such differences. Therefore, the present study's first research goal is to create such a model (see Figure 1).

Although they have developed various tools for identifying indicators and factors that influence medical services' quality, scholars have not reached any consensus on the standard implied by the term "high healthcare service quality."[7] In large part, this is because the aforementioned influences are context-specific, and patients from different backgrounds may also evaluate them differently.[8,14] After developing a medical service quality evaluation index, Gao et al.[3] called for future research to refine it to take account of different types of patients, so that more targeted recommendations could be offered. Similar conclusions were drawn in several review articles.[8,9,14] However, few original studies have responded to such calls. Hence, this article has a second research goal: to ascertain the key similarities and differences in how inpatients and outpatients in the same health care

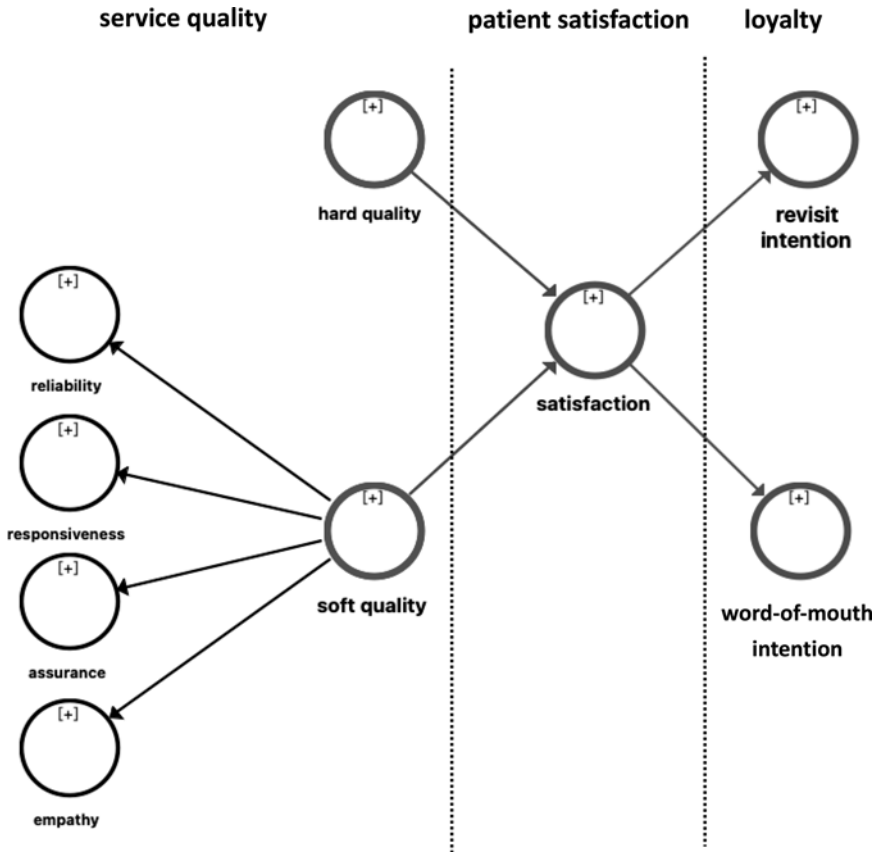

Figure 1. Conceptual model.

institution assess its service quality. We selected only 1 hospital to test our research proposition to control the potential impacts on service quality of different organizational cultures.[15]

Finally, increasing numbers of patients are accustomed to expressing opinions about their health care experiences on social media and in other online forums,[7] and such online reviews influence others' assessments of whether a particular medical institution is worth visiting.[3,16] Analyzing such reviews has also been found to provide health care administrators with valuable information that can help them improve service quality and identify critical factors influencing patient satisfaction.[3,7]

However, theoretical modeling of patient satisfaction has several limitations. For example, Shah et al.[7] pointed out that the usefulness of service quality surveys was generally constrained by their small sample sizes. In addition, measurement items on satisfaction questionnaires are often obtained from traditional theories and are therefore likely to ignore some triggers of patients' negative sentiments. Collecting and analyzing surveys is also very time-consuming, and thus, their results are likely to be less reflective of patients' real-time thoughts than online reviews are. Therefore, to evaluate the relationship between service quality and patient satisfaction more objectively and comprehensively, our third research goal is to map online reviews of the target hospital and assess the semantic mentions of patient-perceived health care quality. The complementary use of textual and statistical analyses in this study can reasonably be expected to transcend the restrictions of any single method and hopefully will provide a more holistic picture of health care quality.

The major contributions of this research are threefold. First, its new model can be expected to provide a fresh theoretical perspective on the dimensionality of medical service quality. Second, it should boost understanding of how certain service quality factors are perceived differently by 2 different patient groups and thus aid administrators in the design of strategies for attracting and satisfying diverse target markets. And third, it is one of very few studies to mix multiple approaches (ie, structural equation modeling, text mining, and automated content analysis [ACA]) in contextualizing and theorizing health care service quality. As such, it is expected to have important methodological implications for future researchers.

METHODS

Instruments

Previous studies have called on researchers to devise health care service quality measurements for unique sociocultural and political contexts.[9,14] Therefore, this study did not directly adopt any measurement items from existing studies. Rather, we began the development of our survey questionnaire with content-domain specification and item-pool generation. The *hard quality* construct was operationalized as the physical facilities, equipment, information communication technology, and health care personnel's appearance: that is, what could be perceived by the patient's 5 senses.[11,17-20] *Soft quality*, on the other hand, was conceptualized as a second-order reflective construct comprising 4 subdimensions: reliability (ie, medical service performance); responsiveness (the staff's willingness to provide necessary services promptly); assurance (the staff's knowledge and courtesy); and empathy (the attention and sense of care received during treatment). Research has consistently demonstrated that soft quality is often conceptualized as a reflective construct, as it is expected that the subdimensions of this construct will be correlated. Specifically, an increase in soft quality is typically reflected by an increase in all 4 subdimensions. This highlights the importance of considering the various dimensions of soft quality in the evaluation of medical service quality.[1,17,19] *Revisit intention*, a patient's willingness to return to the hospital in the future, and *word-of-mouth intention*, the patient's willingness to recommend the hospital to family, friends, or other individuals, were both included as indicators of patient loyalty.[4,21] All items were rated on the same 7-point Likert scale, which ranged from 1 = "Extremely dissatisfied" to 7 = "Extremely satisfied."

Once we had compiled all the measurement items, a content validity evaluation was performed by 4 experts on health care and service quality, who provided various suggestions for the addition, deletion, and rewording of items. Detailed descriptions of all measurement items can be found in Tables 1 and 2.

Data collection

Most health care quality studies are of Western origin and ignore the distinctive cultural and economic features of non-Western contexts.[9] As the goals of this research were to test possible relationships among hard and soft qualities, patient satisfaction, and patient loyalty, rather than to generalize research findings to any whole populations, it utilized nonprobability sampling. Therefore, a hospital in Taiwan was selected as our research site. As Cheah et al.[22] pointed out, an attentively designed nonprobability sampling approach can be a trustworthy means of examining a theoretical model in a particular study context.

In 2021, trained investigators distributed the questionnaire to patients after treatment and discharge. The survey was completed on-site. The investigators were told to survey only those individuals who were 18 years of age or older who were able to read and with whom they had no conflicts of interest. If the patients had any problems answering the questionnaire, the investigators immediately assisted them by clarifying the questions. Confidentiality and anonymity were guaranteed during this process. This data collection process and the survey instrument were both approved by the institutional review board of the target hospital. Because of the ongoing COVID-19 pandemic, the data collection process was impacted in some ways. The pandemic may have affected patients'

Table 1. Measurement Model Results: Outpatients

Factors and Items	Mean	SD	Kurtosis	Skewness	Loading	CR	AVE
Hard quality						0.959	0.664
1. Presence of directional signs in every floor	5.582	1.254	−0.006	−0.764	0.809		
2. Presence of modern equipment	5.563	1.160	0.150	−0.643	0.846		
3. Completeness of medical equipment	5.635	1.140	0.683	−0.768	0.837		
4. Neat and tidy appearance of hospital employees	5.951	0.989	1.458	−1.056	0.735		
5. Spacious and crowd free	5.325	1.306	0.351	−0.712	0.851		
6. Clean floors and walkways	5.435	1.289	0.886	−0.872	0.857		
7. Clean and hygienic public toilets	5.110	1.544	0.150	−0.762	0.835		
8. Good ambiance in the waiting area	5.182	1.494	0.042	−0.792	0.812		
9. Comfortable seats in sufficient quantities in the waiting area	4.974	1.598	−0.231	−0.655	0.782		
10. Moderate air conditioning in the waiting area	5.299	1.553	0.243	−0.905	0.846		
11. Clean diagnosis/treatment room	5.750	1.132	2.008	−1.130	0.827		
12. Availability of entertainment features in the waiting area (eg, television, magazines)	5.368	1.219	0.438	−0.552	0.731		
Soft quality						0.982	0.723
Reliability						0.976	0.874
1. Knowledgeable and professional physicians	6.172	0.910	2.417	−1.277	0.918		
2. Careful examination of patients by physicians	6.148	0.916	1.582	−1.127	0.943		
3. Nurses with good medical skills	6.159	0.888	1.115	−1.033	0.954		
4. Nurses provide description of how to take medicine	6.111	0.975	1.440	−1.175	0.919		
5. Services are provided within the promised time limits	6.061	0.994	0.615	−0.965	0.934		
6. Accuracy of records	6.125	0.952	1.414	−1.129	0.940		
Responsiveness						0.946	0.779
1. Friendliness of hospital staff	6.095	1.090	5.166	−1.945	0.897		
2. Ease of registration for treatment/physician's appointment	6.070	1.053	2.620	−1.395	0.914		
3. Acceptable waiting time for treatment	5.615	1.281	1.172	−1.069	0.816		
4. On-time appointment for treatments and consultation	5.984	1.053	2.281	−1.309	0.862		
5. Patient needs/complaints are attended to within an appropriate time frame	5.906	1.072	2.786	−1.405	0.921		
Assurance						0.980	0.907
1. Physicians carefully examine patients and explain their conditions in detail	6.169	0.903	1.594	−1.144	0.960		
2. Clear explanation of the treatment method and strategy to be administered	6.139	0.895	1.545	−1.088	0.960		
3. Confidence and trust in the physicians	6.156	0.914	2.274	−1.244	0.956		
4. Confidentiality of diagnosis and personal information	6.174	0.891	0.626	−1.013	0.949		
5. Hospital considers patients' right and needs important	6.255	0.871	2.048	−1.281	0.938		
Empathy						0.906	0.906
1. Personalized attention by physicians	6.172	0.900	1.483	−1.102	0.949		
2. The physician carefully listens to the patients	6.165	0.929	1.587	−1.182	0.952		
3. Explanation of illness thoughtfully	6.203	0.906	2.792	−1.399	0.960		
4. Kindness of physicians	6.141	0.948	2.207	−1.271	0.949		
5. Sensitivity of the nurses to patient needs and requests	6.227	0.906	4.253	−1.589	0.952		

(*continues*)

Table 1. Measurement Model Results: Outpatients (*Continued*)

Factors and Items	Mean	SD	Kurtosis	Skewness	Loading	CR	AVE
Patient satisfaction						0.979	0.940
1. I am satisfied with the process of the treatment received	5.988	0.954	1.811	−1.138	0.972		
2. I am satisfied with the results of the treatment	5.973	0.940	1.632	−1.035	0.966		
3. Overall, I am satisfied with the medical care I received from this hospital	6.031	0.973	2.642	−1.342	0.970		
Revisit intention						0.982	0.949
1. I will come back to use the services of this hospital	6.025	0.910	1.726	−1.094	0.980		
2. I intend to continue using this hospital's facilities	6.025	0.909	1.565	−1.070	0.977		
3. I will choose this hospital for future medical needs	6.039	0.934	2.164	−1.194	0.965		
Word-of-mouth intention						0.984	0.955
1. I am likely to say positive things about this hospital	6.031	0.960	1.463	−1.132	0.971		
2. I am likely to recommend this hospital to family or friends	5.991	1.010	1.856	−1.224	0.982		
3. I am likely to recommend the services of this hospital to others	6.001	1.009	1.889	−1.228	0.979		

Abbreviations: AVE, average variance extracted; CR, composite reliability.

willingness to enter hospitals, and some treatments may have been conducted outside of the hospital buildings to prevent the spread of infection. As a result, our data are limited to patients who entered the hospital building. A total of 503 questionnaires were distributed and 429 questionnaires were completed, yielding a response rate of 85.3%.

Statistical data analysis

Our data analysis proceeded in 4 phases. First, SPSS 27.0 software was used to screen all data for missing values, skewness, and kurtosis, and to conduct descriptive analysis. Next, the constructs' reliability and validity were assessed using SmartPLS 3.5.7. Then, the theoretical model was tested to verify the causal relationships among the constructs, with the inpatient and outpatient data sets being analyzed separately to facilitate comparisons between them. We adopted partial least squares structural equation modeling (PLS-SEM) as our main statistical analysis. Although many previous service quality studies have employed covariance-based structural equation modeling to test conceptual models, scholars have found that PLS-SEM can be more effective when dealing with more complex models that involve higher-order constructs and mediations.[23] In the present study, we have conceptualized soft quality as a second-order construct and satisfaction as the mediating construct. In addition, we aim to evaluate the importance and performance of all items in the soft- and hard-quality categories in explaining patient satisfaction, a task that requires the use of advanced techniques in SmartPLS software. Given these complexities and the exploratory nature of the relationships among the constructs, PLS-SEM is the appropriate method for examining our hypothetical model.

Finally, we employed importance-performance map analysis (IPMA) as a means of extending the standard reporting of path coefficient estimates in PLS-SEM. This analysis technique compares the total effects of predecessor constructs on a target construct (ie, their importance) with their average latent variable scores (ie, their performance). The purpose of this analysis was to identify elements of our service quality construct that had a significant impact on patient satisfaction (ie, high importance) but displayed low performance as indicated by low-average latent variable scores.[24] Unlike conventional importance-performance analysis, SmartPLS-based IPMA enables researchers to present a detailed 2-dimensional matrix at the measurement-item level instead of at the latent-construct level, and also model individual items' influences on the dependent variables, to inform future administrative decisions about the resource allocations most likely to improve service quality.

Text mining and ACA

To achieve our third research goal, WebHarvy, a web-scraping tool, was used to collect review comments about the target hospital from Google Map. In all, it obtained 536 reviews posted from January 2013 to August 2022. Then, ACA was conducted with Leximancer Portal, which enables researchers to explore unstructured textual data both statistically and visually and thus give structure to them.[25] Specifically, Leximancer identifies the main concepts and themes that emerge from a set of texts and develops a concept map by analyzing words that recurrently co-occur, thus avoiding subjective researcher bias.[26] After analyzing the overall experiences of all reviewers, we made a comparative map within which users who had high satisfaction (ie, gave ratings of 4 or 5 stars) and those who had low

Table 2. Measurement Model Results: Inpatients

Factors and Items	Mean	SD	Kurtosis	Skewness	Loading	CR	AVE
Hard quality						0.948	0.645
1. Presence of directional signs in every floor	6.185	0.979	1.759	−1.255	0.779		
2. Cleanliness of ward/rooms	6.219	0.934	1.575	−1.268	0.800		
3. Comfortable ward/rooms	6.178	0.979	0.915	−1.187	0.777		
4. Cleanliness of bathroom	6.468	0.741	1.274	−1.332	0.773		
5. Clean bedsheets and patient clothes	6.139	1.005	0.831	−1.156	0.852		
6. Comfortable beds/mattress	6.110	0.992	−0.018	−0.936	0.888		
7. Quiet and peaceful ward/room	5.985	1.120	0.359	−0.979	0.818		
8. Well ventilated ward/room (ie, room at the right temperature and well aired)	5.902	1.169	2.000	−1.253	0.796		
9. Ward/rooms have good atmosphere/ambiance (ie, pleasant room lighting)	5.942	1.182	0.916	−1.145	0.769		
10. Availability of entertainment feature in the ward/room (eg, television)	5.912	0.978	−0.165	−0.628	0.767		
Soft quality						0.976	0.661
Reliability						0.966	0.850
1. Knowledgeable physicians	6.438	0.682	1.076	−1.099	0.917		
2. Careful examination of patients by physicians	6.467	0.651	−0.37	−0.839	0.947		
3. Nurses with good medical skills	6.518	0.652	1.973	−1.348	0.879		
4. Accuracy of records	6.423	0.712	0.052	−0.953	0.929		
5. Services are provided within the promised time limits (eg, test results are received on time)	6.431	0.692	0.198	−0.951	0.936		
Responsiveness						0.928	0.721
1. Presence of an experienced physician (who is aware of the patients case) is available at all times during the hospital stay	6.285	0.782	1.608	−1.109	0.809		
2. On-time appointment for treatments and consultation	6.036	1.103	2.841	−1.622	0.862		
3. Fast and easy admission to the hospital	5.796	1.461	1.695	−1.501	0.764		
4. Patient needs are attended to immediately	6.219	0.957	3.326	−1.616	0.895		
5. Quick and uncomplicated discharge procedures	6.239	0.824	1.051	−1.028	0.907		
Assurance						0.965	0.820
1. Physician answers the patients' questions clearly and adequately	6.453	0.683	1.150	−1.146	0.920		
2. Clear explanation of the treatment strategy to be administered	6.438	0.753	1.486	−1.341	0.931		
3. Physician visits or checks the patients during hospitalization	6.482	0.829	6.952	−2.271	0.840		
4. Confidence and trust in the physicians	6.506	0.658	0.781	−1.143	0.917		
5. Hospital considers patient rights and needs as important	6.445	0.773	3.228	−1.637	0.928		
6. Confidentiality of diagnosis and personal information	6.496	0.736	2.175	−1.541	0.893		
Empathy						0.963	0.840
1. Personalized attention by physicians	6.467	0.629	0.717	−0.944	0.877		
2. Kindness of physicians	6.467	0.715	1.601	−1.335	0.922		

(*continues*)

Table 2. Measurement Model Results: Inpatients (*Continued*)

Factors and Items	Mean	SD	Kurtosis	Skewness	Loading	CR	AVE
3. Nurses listens to patients' feeling and help them	6.467	0.715	1.601	−1.335	0.912		
4. Sensitivity of the nurses to the needs and private requests of patients	6.496	0.716	4.573	−1.796	0.953		
5. Equal attention to patients irrespective of their social status	6.499	0.715	10.894	−2.417	0.917		
Patient satisfaction						0.947	0.856
1. I am satisfied with the overall hospitalization service received	6.261	0.921	17.88	2.223	0.872		
2. I am satisfied with the results of the treatment	6.285	0.724	0.583	−0.846	0.942		
3. Overall, I am satisfied with the medical care I received from this hospital	6.321	0.615	−0.64	−0.333	0.960		
Revisit intention						0.992	0.977
1. I will come back to use the services of this hospital	6.292	0.746	1.284	−1.070	0.990		
2. I intend to continue using this hospital's facilities	6.285	0.744	1.287	−1.057	0.988		
3. I will choose this hospital for future medical needs	6.285	0.754	1.137	−1.046	0.988		
Word-of-mouth intention						0.983	0.951
1. I am likely to say positive things about this hospital	6.336	0.676	−0.751	−0.531	0.959		
2. I am likely to recommend this hospital to family or friends	6.270	0.740	0.356	−0.810	0.982		
3. I am likely to recommend the services of this hospital to others	6.270	0.759	0.569	−0.905	0.984		

Abbreviations: AVE, average variance extracted; CR, composite reliability.

satisfaction (ie, gave ratings of 1 or 2 stars) were profiled separately. As such, the results could be expected to reveal which service quality elements were most relevant to highly satisfied customers, as well as which such elements should be immediately improved, due to their strong associations with low patient satisfaction. Finally, Leximancer's Sentiment Lens was utilized to clarify which words were associated with the positive and negative emotions that led to patients' favorable and unfavorable impressions, respectively.

RESULTS

Respondents' profiles

Our 429 research participants, whose demographic characteristics are presented in Table 3, comprised 292 outpatients and 137 inpatients. Both these subsamples consisted mainly of repeat users of the target hospital (88.7% of the outpatients and 68.6% of the inpatients). Around half of both subsamples (53.8% of outpatients and 48.2% of inpatients) were on low to middle incomes of NT $20 0001 to NT $50 000 per month. There were more female outpatients (67.1%) and more male inpatients (50.4%). Nearly half of both outpatients (46.7%) and inpatients (45.2%) were aged 41 to 60 years, but inpatients were older-skewing, with twice as many older than 60 years (25.5% vs 12.7%) and many fewer younger than 40 years (26.9% vs 40.5%). Outpatients were also twice as likely as inpatients to have bachelor's and/or master's degrees (56.9% vs 27.7%). Accordingly, these 2 groups of patients could reasonably be expected to have different lifestyles and viewpoints.

Measurement model estimation

As shown in Tables 1 and 2, every item's factor loading exceeded the ideal threshold value of 0.7, verifying indicator reliability.[27] In addition, the composite reliability values of all constructs were more than 0.7, indicating a valid internal consistency reliability, and the value of average variance extracted for each construct was higher than 0.5, demonstrating acceptable convergent validity.[27,28]

The discriminant validity of constructs was confirmed on the basis of the Fornell-Larcker criterion (see Table 4). In short, this study's proposed measurement model was valid and reliable.

Structural model and causal relationship testing

As illustrated in Figures 2 and 3, all path coefficients of the structural models were significant ($P < .001$); thus, the causal relationships among the hard and soft attributes of service quality, patient satisfaction, and loyalty were established. Importantly, the inpatients

Table 3. Respondents' Demographic Characteristics

Outpatient			Inpatient		
Options	**Frequency**	**%**	**Options**	**Frequency**	**%**
First visit to the hospital			First visit to the hospital		
Yes	27	9.2	Yes	43	31.4
No	259	88.7	No	94	68.6
Did not answer	6	2.0			
Gender			Gender		
Male	87	29.8	Male	69	50.4
Female	196	67.1	Female	62	45.3
Did not answer	9	3.0	Did not answer	6	4.4
Age group, y			Age group, y		
18-20	12	4.1	18-20	1	0.7
21-30	53	18.2	21-30	11	8.0
31-40	53	18.2	31-40	25	18.2
41-50	72	24.7	41-50	31	22.6
51-60	60	20.5	51-60	33	24.1
≥61	37	12.7	≥61	35	25.5
Did not answer	5	1.7	Did not answer	1	0.7
Monthly personal income (New Taiwan dollars)[a]			Monthly personal income (New Taiwan dollars)[a]		
≤10 000	35	12.0	≤10 000	22	16.1
10 000-20 000	18	6.2	10 000-20 000	11	8.0
20 001-30 000	50	17.1	20 001-30 000	9	6.6
30 001-40 000	68	23.3	30 001-40 000	37	27.0
40 001-50 000	39	13.4	40 001-50 000	20	14.6
50 001-60 000	19	6.5	50 001-60 000	15	10.9
60 001-70 000	10	3.4	60 001-70 000	4	2.9
70 001-80 000	8	2.7	70 001-80 000	1	0.7
80 001-90 000	4	1.4	80 001-90 000	1	0.7
≥90 001	3	1.0	≥90 001	1	0.7
Did not answer	38	12.9	Did not answer	16	11.6
Education			Education		
Elementary school graduate	14	4.8	Elementary school graduate	21	15.3
Junior high school graduate	31	10.6	Junior high school graduate	23	16.8
Senior high school graduate	71	24.3	Senior high school graduate	48	35.0
Bachelor's degree	131	44.9	Bachelor's degree	33	24.1
Master's degree	35	12.0	Master's degree	5	3.6
Did not answer	10	3.5	Did not answer	7	5.1

[a]US $1 was worth about NT $30.40 at the time of writing.

and outpatients had divergent perceptions of the hard and soft aspects of health care quality. Specifically, inpatients paid greater attention to hard quality (β = .414, $P < .001$) than soft quality (β = .395, $P < .001$), while among outpatients, soft quality was a better predictor of satisfaction (β = .658, $P < .001$) than hard quality was (β = .206, $P < .001$). These results are in line with these 2 patient subgroups' aforementioned demographic differences and differing reasons for visiting the hospital. Yarimoglu and Ataman[5] likewise

Table 4. Discriminant Validity of the Constructs (Fornell-Larcker Criterion)[a]

Inpatient Model								
Construct	**Hard Quality**	**Reliability**	**Responsiveness**	**Assurance**	**Empathy**	**Satisfaction**	**Revisit**	**WOM**
Hard quality	0.803							
Reliability	0.599	0.922						
Responsiveness	0.470	0.664	0.849					
Assurance	0.569	0.815	0.707	0.906				
Empathy	0.576	0.774	0.652	0.870	0.916			
Satisfaction	0.658	0.579	0.495	0.643	0.61	0.925		
Revisit	0.538	0.531	0.503	0.675	0.583	0.787	0.988	
WOM	0.579	0.605	0.529	0.681	0.614	0.783	0.898	0.975
Outpatient Model								
Construct	**Hard Quality**	**Reliability**	**Responsiveness**	**Assurance**	**Empathy**	**Satisfaction**	**Revisit**	**WOM**
Hard quality	0.815							
Reliability	0.624	0.935						
Responsiveness	0.671	0.747	0.883					
Assurance	0.598	0.834	0.728	0.953				
Empathy	0.562	0.807	0.657	0.854	0.952			
Satisfaction	0.647	0.742	0.729	0.749	0.689	0.969		
Revisit	0.669	0.707	0.684	0.684	0.639	0.894	0.974	
WOM	0.655	0.679	0.620	0.647	0.602	0.836	0.900	0.977

Abbreviation: WOM, word-of-mouth intention.

[a]The value on the diagonal line is the square root of average variance extracted for the latent variable. The value should be higher than the value on the non–diagonal line.

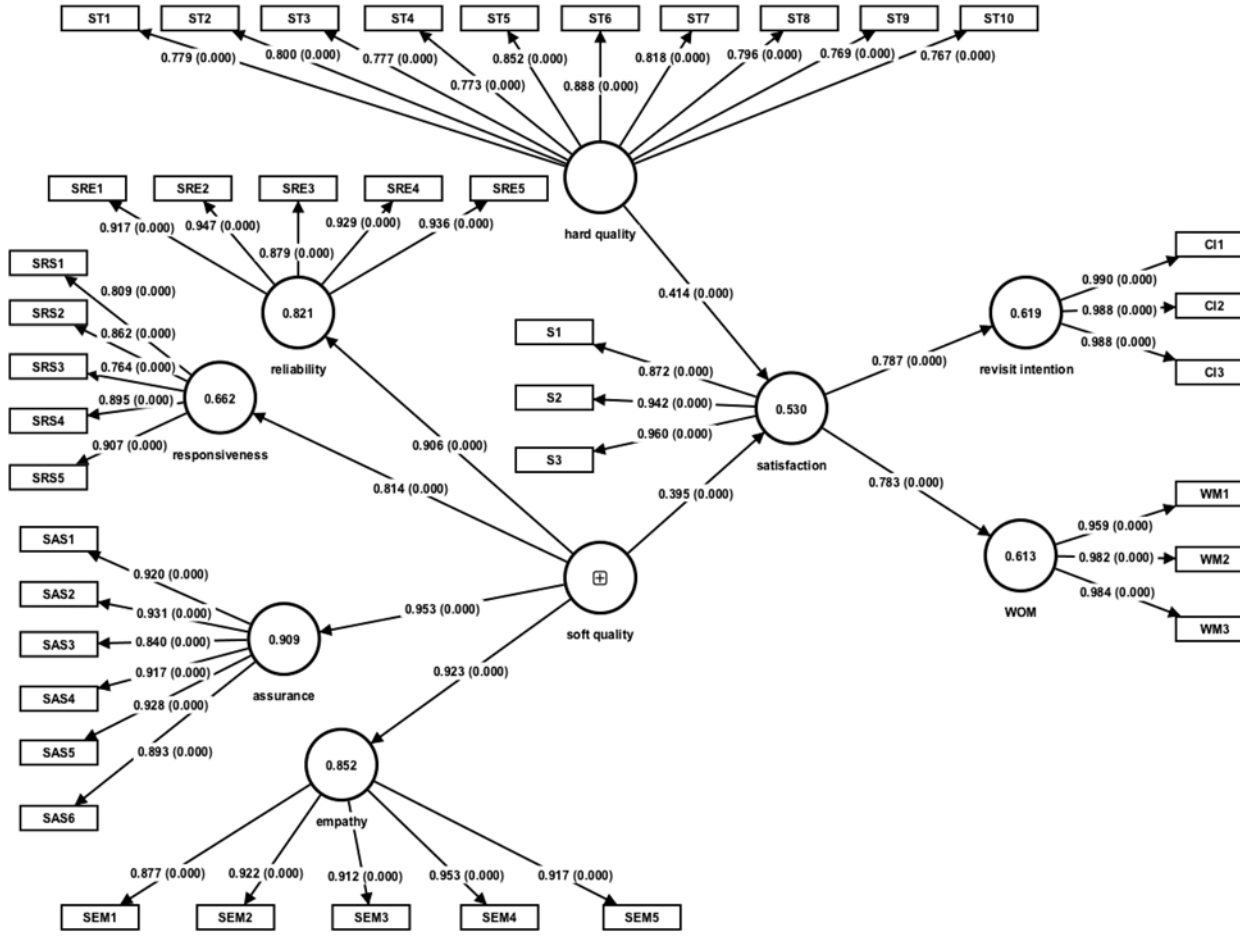

Figure 2. Structural equation modeling results: inpatients. Codes: ST1, directional signs; ST2, cleanliness of ward; ST3, medical equipment; ST4, appearance of hospital employees; ST5, clean bedsheets and clothes; ST6, comfortable beds; ST7, quiet and peaceful ward; ST8, well-ventilated ward; ST9, rooms have good atmosphere; ST10, availability of entertainment feature; SRE1, knowledgeable physicians; SRE2, careful examination; SRE3, nurses with good medical skills; SRE4, accuracy of records; SRE5, services are provided within the promised time limits; SRS1, presence of an experienced physician; SRS2, on time appointment for treatments; SRS3, fast and easy admission; SRS4, patient needs are attended to immediately; SRS5, quick discharge procedures; SAS1, physician answers the patients' questions clearly; SAS2, clear explanation of the treatment strategy; SAS3, physician checks the patients during hospitalization; SAS4, confidence and trust in the physicians; SAS5, hospital considers patient rights; SAS6, confidentiality of diagnosis; SEM1, personalized attention by physicians; SEM2, kindness of physicians; SEM3, nurses listens to patients' feeling; SEM4, sensitivity of the nurses to the needs of patients; SEM5, equal attention to patients irrespective of their social status; S1, satisfied with the overall hospitalization service; S2, satisfied with the results of the treatment; S3, satisfied with the medical care; CI1, will come back to use the services; CI2, intend to continue using this hospital's facilities; CI3, will choose this hospital for future; WOM, word-of-mouth intention; WM1, likely to say positive things; WM2, likely to recommend this hospital to family; WM3, likely to recommend the services of this hospital to others.

found that patients' demographic backgrounds significantly influenced how they assessed health care quality. Our research findings add new insight to the current literature, insofar as not only socioeconomic factors but also inpatient versus outpatient status may influence how service quality is evaluated. This could be because inpatients, who needed to stay in the hospital longer and presumably used a wider range of its facilities, focused on the tangible elements more than their outpatient counterparts, whose interactions and relationships with health care professionals were therefore more to the forefront.

In both models, patient satisfaction strongly predicted word-of-mouth and revisit intentions. This reconfirms previous studies' findings that satisfaction is the key factor in building customer loyalty.[4-6] Accordingly, we proceeded with a further analysis, IPMA, to identify service quality elements that had high overall importance but that performed poorly on measures of satisfaction, as a means of informing efforts to improve patient experience.

Importance and performance map analysis

In IPMA, median lines are added to an initial 2-dimensional matrix produced by SmartPLS to divide the map into 4 quadrants (see Figure 4). The elements positioned in quadrant I, whose performance and importance are both above average, are the major strengths of a service, and administrators can maintain competitive advantages by continuing to do what they

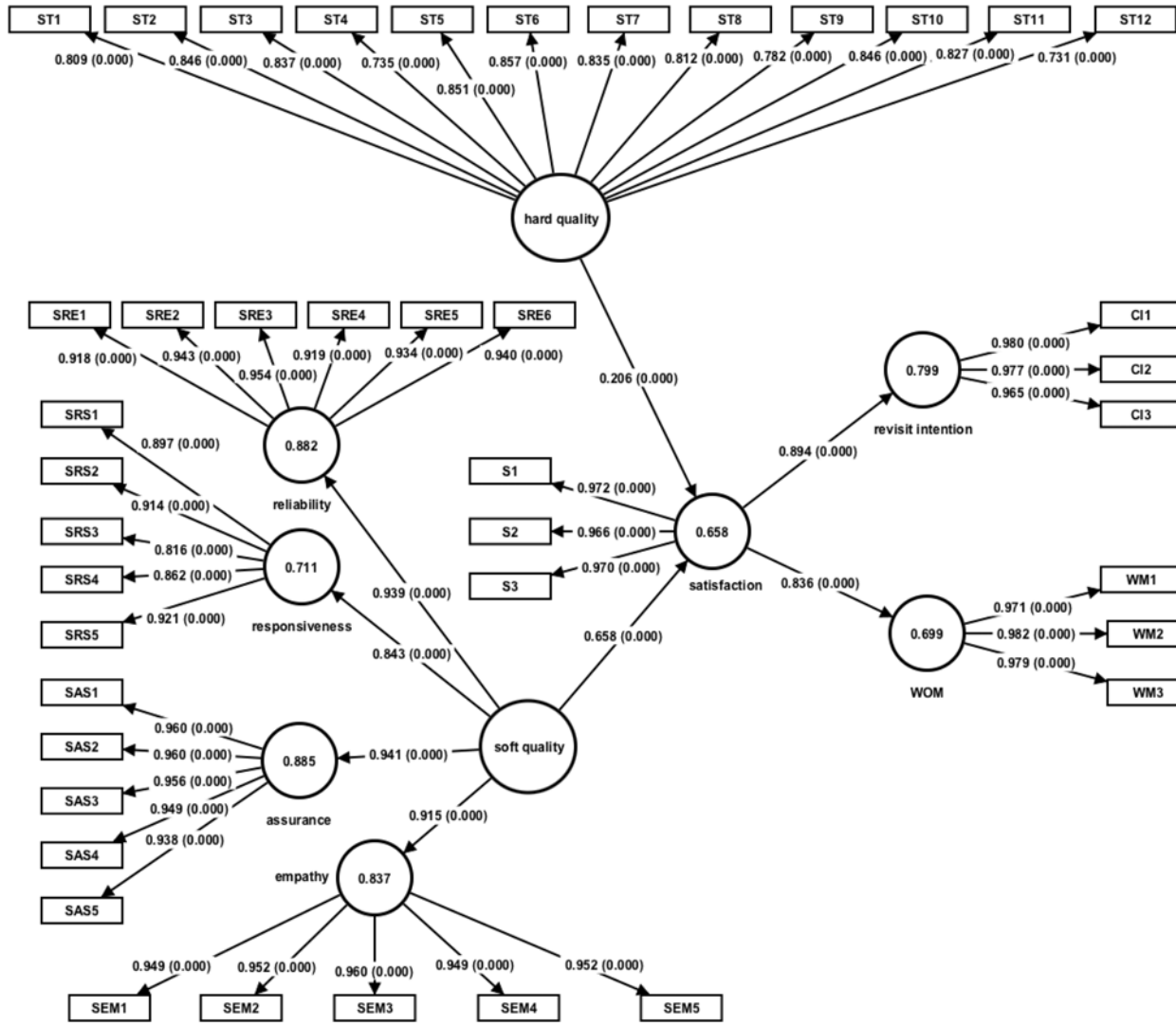

Figure 3. Structural equation modeling results: outpatients. Code: ST1, directional signs; ST2, presence of modern equipment; ST3, completeness of medical equipment; ST4, appearance of hospital employees; ST5, crowd free; ST6, clean floors; ST7, hygienic public toilets; ST8, good ambiance; ST9, comfortable seats; ST10, air conditioning; ST11, clean diagnosis room; ST12, availability of entertainment; SRE1, knowledgeable physicians; SRE2, careful examination; SRE3, nurses with good medical skills; SRE4, clear instruction of taking medicine; SRE5, services are provided within the promised time limits; SRE6, accuracy of records; SRS1, friendliness of hospital staff; SRS2, ease of registration; SRS3, acceptable waiting time; SRS4, on-time appointment for treatments; SRS5, patient needs are attended to immediately; SAS1, physicians carefully examine patients; SAS2, clear explanation of the treatment strategy; SAS3, confidence and trust in the physicians; SAS4, confidentiality of diagnosis; SAS5, hospital considers patient rights; SEM1, personalized attention by physicians; SEM2, kindness of physicians; SEM3, explanation of illness thoughtfully; SEM4, kindness of physicians; SEM5, sensitivity of the nurses to the needs of patients; S1, satisfied with the process of the treatment; S2, satisfied with the results of the treatment; S3, satisfied with the medical care; CI1, will come back to use the services; CI2, intend to continue using this hospital's facilities; CI3, will choose this hospital for future; WOM, word-of-mouth intention; WM1, likely to say positive things; WM2, likely to recommend this hospital to family; WM3, likely to recommend the services of this hospital to others.

are already doing in regard to these factors.[29] For outpatients, many items of soft quality could be found in this area, that is, were reasons such patients continued to choose the target hospital. For inpatients, on the other hand, only 1 item of hard quality—bathroom cleanliness—was in this quadrant. Elements in quadrant IV, meanwhile, have high importance but low performance from a patient perspective. Management should therefore take immediate action to rectify these weaknesses. As Figure 4 indicates, there were no elements in this area from the outpatient sample. For inpatients, however, almost every item of hard quality was located in this quadrant, indicating that the target hospital's physical environment and facilities were in urgent need of improvement if the goal of inpatient satisfaction was to be attained (see Figure 5).

Automated content analysis

Text mining of Google Map reviews was performed to supplement our statistical findings and obtain a more

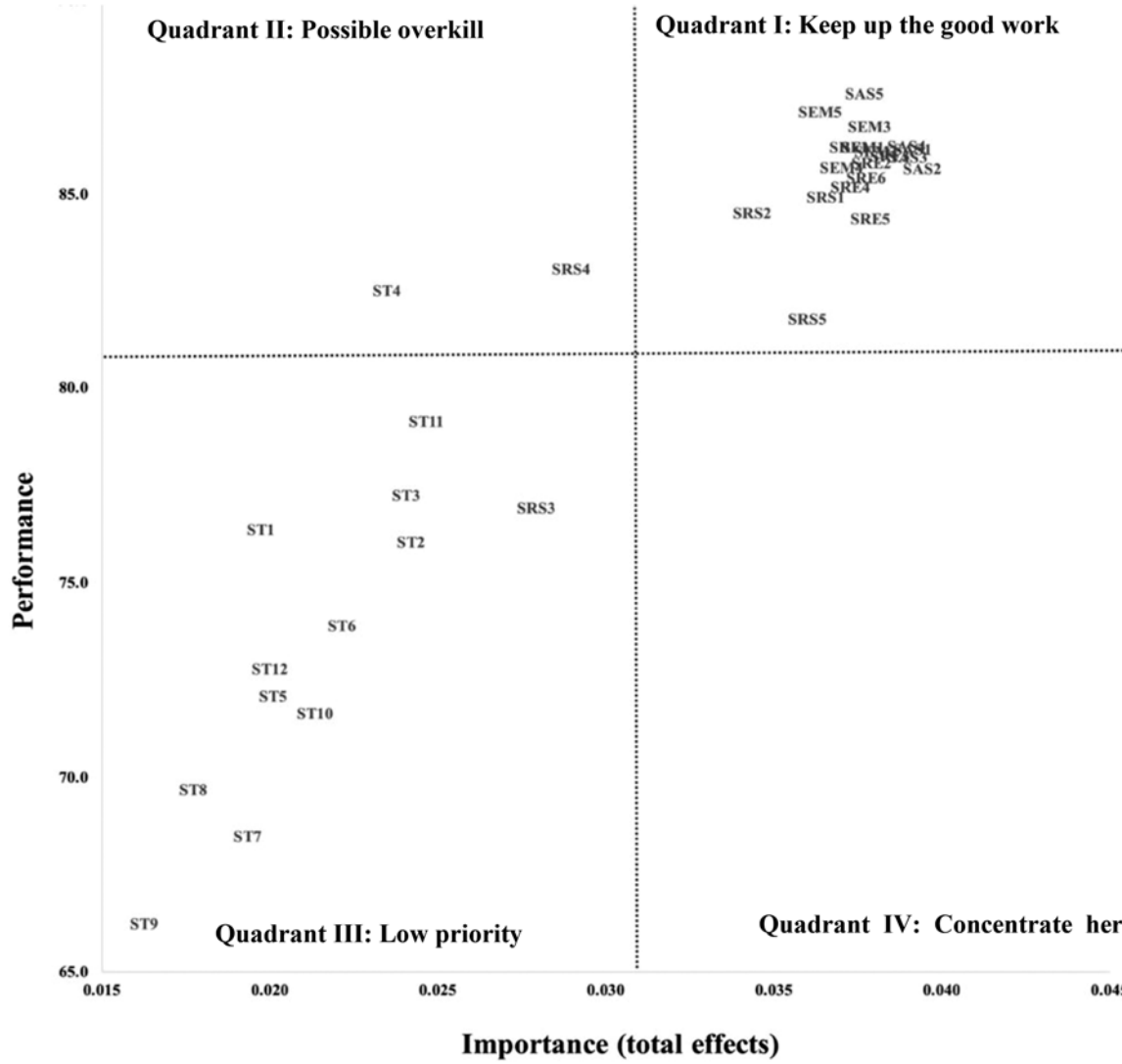

Figure 4. Importance-performance mapping results: outpatients. Code: ST1, directional signs; ST2, presence of modern equipment; ST3, completeness of medical equipment; ST4, appearance of hospital employees; ST5, crowd free; ST6, clean floors; ST7, hygienic public toilets; ST8, good ambiance; ST9, comfortable seats; ST10, air conditioning; ST11, clean diagnosis room; ST12, availability of entertainment; SRE1, knowledgeable physicians; SRE2, careful examination; SRE3, nurses with good medical skills; SRE4, clear instruction of taking medicine; SRE5, services are provided within the promised time limits; SRE6, accuracy of records; SRS1, friendliness of hospital staff; SRS2, ease of registration; SRS3, acceptable waiting time; SRS4, on-time appointment for treatments; SRS5, patient needs are attended to immediately; SAS1, physicians carefully examine patients; SAS2, clear explanation of the treatment strategy; SAS3, confidence and trust in the physicians; SAS4, confidentiality of diagnosis; SAS5, hospital considers patient rights; SEM1, personalized attention by physicians; SEM2, kindness of physicians; SEM3, explanation of illness thoughtfully; SEM4, kindness of physicians; SEM5, sensitivity of the nurses to the needs of patients.

holistic picture of patients' experiences. Leximancer was utilized in the present study to generate a heat map, in which themes of greater importance in the review data were represented by brighter colors and strong relationships between concepts were indicated by proximity between gray dots.[25] Figure 6 illustrates the 5 major themes extracted from 536 reviews: "physician," "nurses," "hospital," "minutes," and "quality." The most prominent theme, represented in red, is "physician," which is associated with concepts such as consultation, medicine, visit, and clinic. The second major theme, shown in brown, is "nurses," and is related to concepts such as care, professional, and attitude. These findings suggest that patients place emphasis on the soft aspects of service quality, including empathy, responsiveness, reliability, and assurance, which aligns with the results of the IPMA analysis. Notably, the theme of "minutes" (represented in blue) emerged as particularly essential, despite not being highlighted by the PLS-SEM results. Concepts related to waiting time were identified as significant in online reviews. Amarantou et al.[4] also found that waiting times strongly influence patients' evaluations of health care service quality. Therefore, administrators should strive to design seamless service processes.

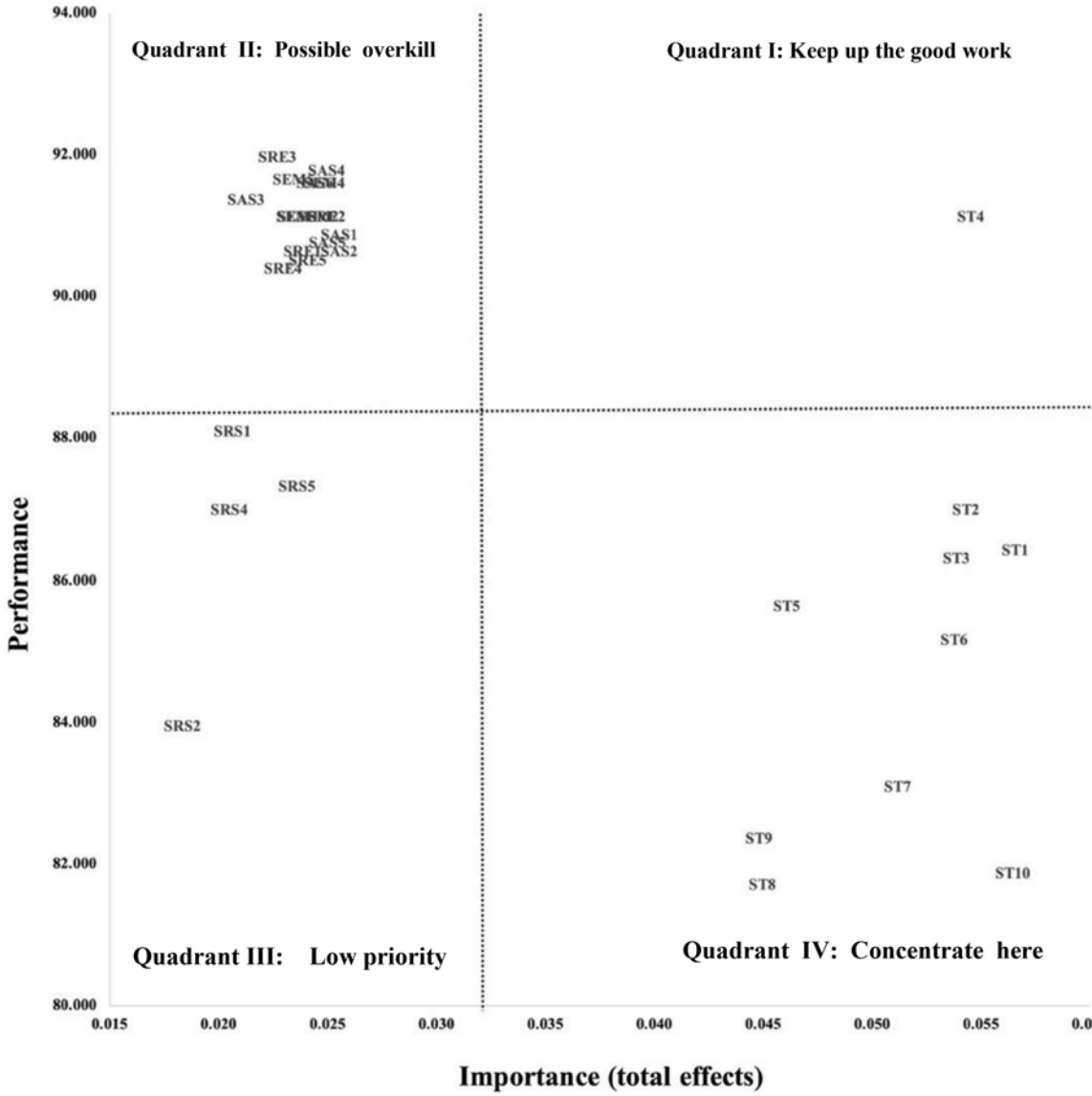

Figure 5. Importance-performance mapping results: inpatients. Code: ST1, directional signs; ST2, cleanliness of ward; ST3, medical equipment; ST4, appearance of hospital employees; ST5, clean bedsheets and clothes; ST6, comfortable beds; ST7, quiet and peaceful ward; ST8, well ventilated ward; ST9, rooms have good atmosphere; ST10, availability of entertainment feature; SRE1, knowledgeable physicians; SRE2, careful examination; SRE3, nurses with good medical skills; SRE4, accuracy of records; SRE5, services are provided within the promised time limits; SRS1, presence of an experienced physician; SRS2, on time appointment for treatments; SRS3, fast and easy admission; SRS4, patient needs are attended to immediately; SRS5, quick discharge procedures; SAS1, physician answers the patients' questions clearly; SAS2, clear explanation of the treatment strategy; SAS3, physician checks the patients during hospitalization; SAS4, confidence and trust in the physicians; SAS5, hospital considers patient rights; SAS6, confidentiality of diagnosis; SEM1, personalized attention by physicians; SEM2, kindness of physicians; SEM3, nurses listens to patients' feeling; SEM4, sensitivity of the nurses to the needs of patients; SEM5, equal attention to patients irrespective of their social status.

To better understand the factors that triggered positive and negative comments and ratings, we categorized comments with 1 or 2 stars as "low satisfaction," and 4 or 5 stars as "high satisfaction." Reviews with 3 stars were excluded from analysis, as reflecting their writers' neutral attitudes. This process resulted in a pool of 232 positive and 262 negative comments. This roughly equal distribution reflects that today's patients are accustomed to expressing their opinions of their experiences online, regardless of whether such experiences are good or bad.

Then, the positive and negative comment data were used to create a comparative map that revealed that the theme of "Dr." was most frequently identified by patients with high satisfaction (as indicated by its proximity to the "high satisfaction" gray dot in Figure 7). The comments that included this theme often described the compassionate nature of a particular

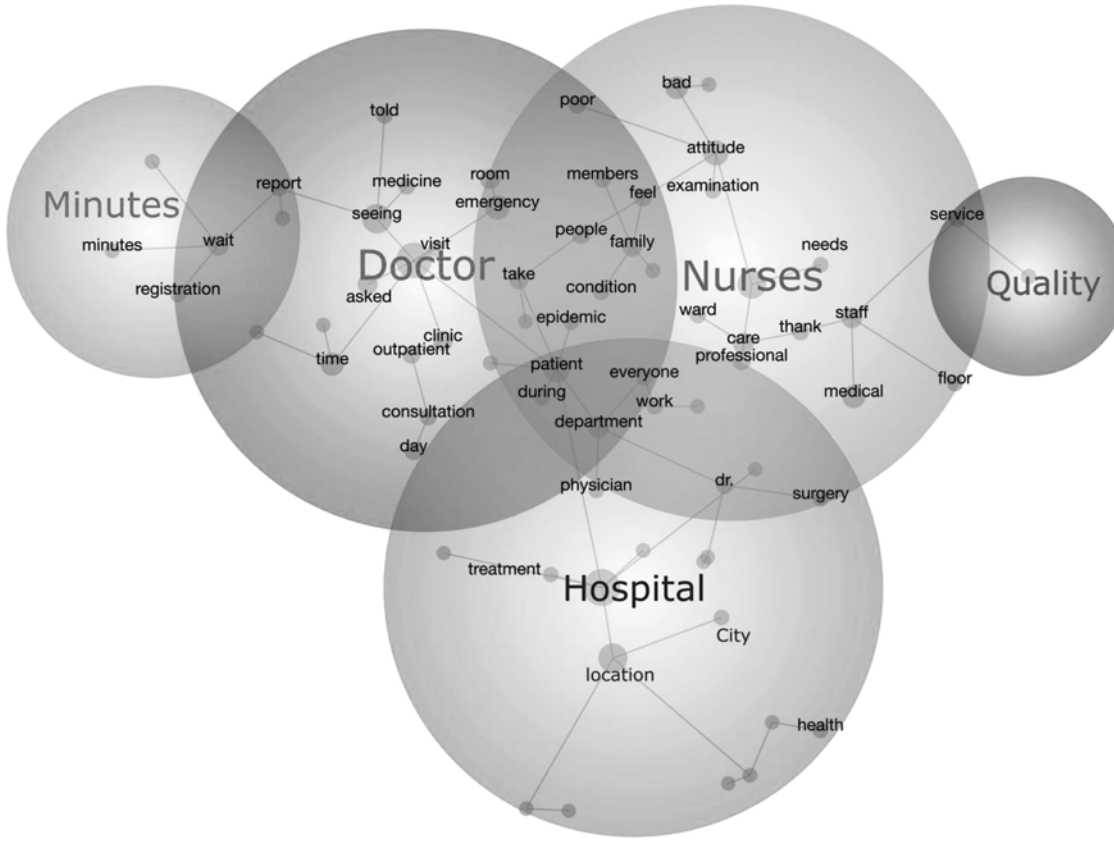

Figure 6. The concept map of online reviews.

physician. For example, 1 review stated: "Dr. John Chen [researcher-assigned pseudonym] from the plastic surgery department is highly skilled and provides excellent medical care to his patients. The nurses in ward 6B were also very enthusiastic and professional during my stay in the hospital one week ago." These findings align with previous research indicating that interactions between health care professionals and patients are among the most significant factors in patient satisfaction. Conversely, concepts related to the service process, such as "wait," "money," or "poor," were more frequently associated with negative feelings among participants with lower satisfaction (as indicated by their proximity to the "low satisfaction" gray dot in Figure 7). When running Leximancer's Sentiment Lens, we also found that the same terms were strongly connected to negative ones such as "angry," "terrible," and "inconvenient." Conversely, words such as "friendly," "best," "excellent," and "efficiency" were closely linked to patients' favorable feelings.

The ACA results revealed that soft attributes of service quality significantly influenced patients' willingness to leave comments, both positive and negative. Because new customers give online reviews considerable weight when selecting service providers,[3,7] resources should be devoted to increasing health care personnel's professional and interpersonal skills as a means of improving the service process.

CONCLUSION

Data obtained from 429 patients at the same Taiwanese hospital were used to validate our innovative theoretical model that divides health care service quality into hard and soft types. Both these quality types strongly and positively predict patient satisfaction, a critical indicator of patients' loyalty. Our PLS-SEM results revealed that inpatients pay more attention to hard quality than soft quality, whereas outpatients value soft quality more. This finding sheds light on the importance of analyzing patients' perceptions of service quality separately in terms of their varied backgrounds and motivations for seeking medical attention. The IPMA results also indicate that the hospital's physical environment is the area that health care administrators should immediately improve to satisfy inpatients, whereas among outpatients, soft quality is key to retaining competitive advantages. It is important to note that the survey items used in the present study were developed on the basis of previous research in the area of health care quality, which may not fully capture the unique circumstances faced by health care centers during the COVID-19 pandemic. As a result, our findings may not be

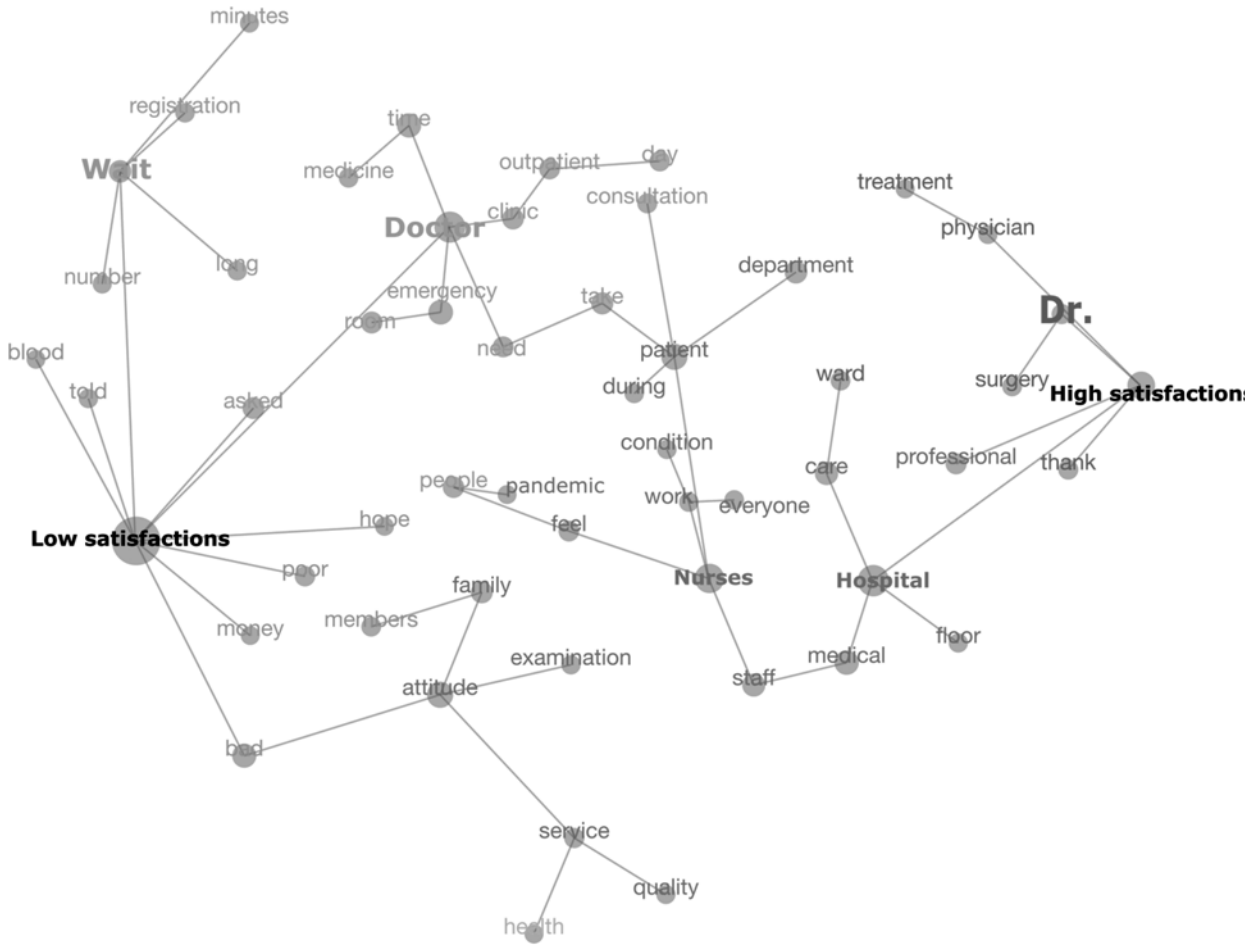

Figure 7. The comparative map for reviews with low- and high-satisfaction ratings.

generalizable to situations in which the pandemic has had a significant impact on patients' access to health care. To address this limitation, future research should consider modifying survey items to better reflect the operational challenges faced by health care centers during the pandemic and should also focus on investigating the potential moderating effect of the pandemic on patients' perception of service quality. This would help better understand the specific ways in which the pandemic has impacted health care service quality.

A concept map generated by ACA indicated 5 major themes that attracted the attention of patients who reviewed the target hospital online. Among them, the human resource aspect triggered the most online comments: that is, patients tended to post positively or negatively based on the soft quality of physicians and nurses, rather than because of the hospital's physical environment or facilities. Waiting time emerged as another critical theme, indicating the importance of a smooth service process. Among dissatisfied patients, untimely services elicited negative emotions, as detected by Leximancer's Sentiment Lens. Therefore, to improve patients' experiences and thus prompt them to leave more favorable comments, hospitals should take action to train their personnel in interpersonal as well as professional skills. The concept of service design could also usefully be introduced to improve the service process and reduce waiting times for both registration and consultation. In future research, it would be valuable to separately collect text data from inpatient and outpatient populations, as well as gather a range of demographic information. This would allow for comparison of results and the ability to make more tailored recommendations. Furthermore, future research endeavors should consider collecting data from a diverse range of regions to examine the cultural specificity of the results presented in this study. Previous literature has demonstrated that culture, at various levels, such as national, organizational, or unit, plays a significant role in shaping individuals' behavior and perspectives. Research has found that Western cultures, characterized by high levels of individualism, may exhibit a greater inclination toward expressing dissatisfaction and seeking practical rectification following poor service experiences compared with individuals in Eastern cultures. Conversely, in collectivistic cultures, such as Taiwan, the expectation is for individuals to hold a corresponding societal position and contribute accordingly.[30] This results in a heightened expectation for quality and perfection in health

care services, as demonstrated in our study's ACA results, which found that "soft aspects" of health care service were a critical factor in patients leaving positive or negative comments. Examination of the relationship between culture and service quality in health care across various cultural contexts would be a valuable contribution to the literature.

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