

Exploration and Development of SERVQUAL

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Abstract

The gap-based SERVQUAL model is a popular service quality determinant due to its superior diagnostic capacity over alternative explanatory frameworks. However, some researchers criticize the performance of the SERVQUAL model and propose alternative service quality measurement constructs. Nevertheless, it is argued that the superior diagnostic capacity of SERVQUAL is its key strength; and that any criticism made of it when making comparison with alternative models does not reflect the differing nature of scales of statistical analysis. Arguably, the only limitation of a gap-based model is misinterpretation of customers' evaluation and perception of a service. In this research, the gap score is transformed into a ratio score. Also, empirical tests and implications are presented to support this alternative contribution to the body of knowledge.

Key Words : service quality, SERVQUAL, gap score, ratio scale

1. Introduction

In today's competitive environment, the pursuit of service quality is now considered essential. Service quality, therefore, is considered a critical determinant of competitiveness (Kuei and Lu, 1997). A service, however, is intangible. Thus the customers cannot judge its *quality* or *value* prior to purchase and consumption. Parasuraman et al. (1985, 1988) suggests that in a service setting, customers judge its quality by comparing their perceptions of what they receive with their expectations of what they should have received. Most of marketing researches also argue that a service organization has high quality if it meets customer preferences and expectations consistently.

There are two key elements in the attainment of high quality. One important element is the identification of customers' service requirements and expectations. It is generally recognized that consumers evaluate the service they receive, and their expectations are critically important in determining whether or not they are satisfied (Brown and Swartz, 1989). Consequently, customers' expectations are vital to the quality of service that a firm delivers. The second key factor of service quality is customers' perception. The notion of perceived quality reflects the opinion of the customer regarding the superiority or global excellence of a product or service (Zeithaml, 1988). Hence, Parasuraman *et al.* (1985, 1988) suggest that service quality should be represented as the difference, or gap, between service expectations and actual service performance (i.e., the disconfirmation paradigm), that is, gap-based SERVQUAL scale.

However, Cronin and Taylor (1992) suggest that there are problems inherent in the use of the disconfirmation paradigm to measure service quality and propose that the performance-only measure should be considered, what they term SERVPERF. Teas (1993) criticizes the conceptual and operational foundation of SERVQUAL, and proposes, in preference, the evaluated performance (EP) model that addresses the ideal point problem by formally incorporating the classic ideal point concept into SERVQUAL. Brown *et al.* (1993) also recognise that a major problem with the SERVQUAL stems from the use of a difference score. They propose that the non-difference score measures generated by comparing directly customers' expectations and perceptions.

However, in spite of the above criticisms, it is still common to see the SERVQUAL scale used by service organizations and identified as the appropriate service quality measurement tool (Brady *et al.*, 2002; Oliver, 1997). It could be argued that such research whilst focusing on the statistical performance is limited in application. Conversely, such an argument neglects the usefulness of SERVQUAL in which it is far easier for practitioners to understand service quality components (Kuei and Lu, 1997). In this research, therefore, we support the conceptual and operational foundation of the SERVQUAL scale, and test its validity. Additionally, since the gap-based model is a linear interval scale that occasionally distorts customers' evaluation relative to their perceived satisfaction, we modified the calculation of service quality of the SERVQUAL scale by a ratio scale to allow interpretation of the customers' evaluation of a service encounter.

Our research purpose is fivefold. First, the current issues and controversies concerning the service quality measurements are examined. Second, the validity of the SERVQUAL scale is explored by statistical analysis. Third, the reason why the ratio scale is appropriate for measuring service quality is analyzed and ratio-based SERVQUAL scale is presented. Forth,

the service quality measurements (i.e., gap-based SERVQUAL, SERVPERF) and ratio-based SERVQUAL are empirically tested. Fifth, implications of the conceptual issues of the ratio-based SERVQUAL are explored by comparing an EP model and other alternative service quality measurements.

2. The controversies and commentaries concerning service quality measurements

Juran (1992) defines quality as fitness for use. He contends that the product must confirm to the needs and expectations of end users. Juran's work has its merits, especially in the manufacturing setting where outputs can be quantitatively measured. However, in the service setting, as noted by Kettinger and Lee (1994), there are no guidelines for measuring quality. Thus, many researchers have proposed instruments to evaluate the service quality of an organization delivering a service. Especially, Parasuraman *et al.* (1985) and Zeithaml *et al.* (1988,1990) suggest a conceptual model for understanding service quality. Theoretical constructs for measuring service quality are also suggested by Zeithaml *et al.* (1988). Parasuraman *et al.* (1988, 1991, 1994a) further proposed and tested a multi-item instrument, known as SERVQUAL, to evaluate service quality from customers' points of view. Their measurement of service quality proposes a gap-based comparison of the expectations and performance perceptions of customers'. This measurement paradigm is similar to the disconfirmation model traditionally used to assess consumer satisfaction (Cronin and Taylor, 1992,1994; Parasuraman *et al.* 1994a; Teas, 1993,1994)

The SERVQUAL model employs a pair of 22-item scales, each identical and with the expectation that one assesses the perceived performance of a service provides, the other the customers' expectations regarding the level of service to be received. Calculating the gap score between the 22 items, each of five dimensions forms the service quality measure. This gap can be expressed as "Service Quality (SQ)=Perception (P)- Expectation (E)". For each respondent, the service quality for each dimension is calculated as follows:

$$SQ_j = \frac{\sum_{i=1}^{n_j} (P_{ij} - E_{ij})}{n_j} \quad (1)$$

where SQ_j is the service quality of the j^{th} dimension, E_{ij} is the expectation for the i^{th} item in the j^{th} dimension, P_{ij} is perception for the i^{th} item in the j^{th} dimension, and n_j is the

number of items in the j^{th} dimension. An average score for each dimension is then calculated across all respondents. A global service quality score is also calculated by taking the arithmetic mean score for the five dimensions. Positive scores represent better-than-expected service, while negative ones represent poor service. A score of zero implies that quality is satisfactory. Since its instrument is useful in that it is comparatively easy for practitioners to understand service quality components, the gap-based SERVQUAL scale has been the dominant measurement paradigm in the service quality literature (Asubonteng *et al.*, 1996; Smith, 1999; Brady *et al.*, 2002).

However, Cronin and Taylor (1992) suggest that there are problems inherent in the use of the disconfirmation paradigm to measure service quality. Therefore, they suggest that the expectations scale be discarded in favor of a performance-only measure of service quality. They also argue that since a five dimension structure is not confirmed by empirical test, uni-dimensionality of the 22 items is suitable for assessing service quality. The term performance-only measure has come to refer to service quality measure that are based only on customers' perceptions of the performance of a service provider, as opposed to the difference between the customers' performance perceptions and their performance expectations. Therefore, the service quality of SERVPERF is presented as 'Service Quality (SQ) = Performance Perception (P)'. The service quality for uni-dimensionality is calculated as follows:

$$SQ = \frac{\sum_{i=1}^n P_i}{n} \quad (2)$$

where SQ , P_i and n are respectively service quality of a service delivered, perception for the i^{th} item, and the number of items. In addition to their theoretical argument, Cronin and Taylor (1992) report empirical evidence that the performance-only SERVPERF instrument outperforms the gap-based SERVQUAL scale across four industries (i.e., banks, pest control, dry cleaning, and fast food).

Teas (1993) raises questions that the validity of the gap concept and corresponding measurement framework is questionable because of a number of problems involving conceptual and operational definitions of the concept of expectations and the resulting ambiguity with respect to the theoretical justification and interpretation of the gap-based framework (i.e., the gap-based SERVQUAL measurement specification is not compatible with the feasible ideal point interpretation of expectation when finite classic ideal point attributes are involved : sometimes negatively correlated). On the basis of these problems, he proposed

the EP model and a norm quality (NQ) model of service quality and empirically tested. The non-probabilistic EP model is

$$SQ_j = \frac{-1 \sum_{i=1}^{n_j} |P_{ij} - I_{ij}|}{n_j} \quad (3)$$

where I_{ij} is the ideal amount for the i^{th} item in the j^{th} dimension, others are defined in Eq. (1). Subsequently, Teas (1993) tested criterion and construct validity of the gap-based SERVQUAL scale and proves that EP model is characterized by greater validity.

Some researchers also criticize the gap-based SERVQUAL scale (Brown *et al.*, 1993; Carman, 1990; Grapentine, 1995; Peter *et al.*, 1993; Robledo, 2001). They argue that the calculation of a difference score can lead to several psychometric problems. These problems can be summarized as follows : (1) poor reliability which attenuates correlations between constructs, (2) questionable discriminant validity which refers to the degree to which measures of theoretically unrelated constructs do not correlate too highly with one another, (3) variance restriction which is generated by having always motherhood variable in gap-based model, and (4) weak predictive or concurrent validity which means low correlation between service quality, customer satisfaction, and purchase intentions. So far, most of the researchers agree that the above limitations of SERVQUAL stemmed from gap score are unavoidable. The research, therefore, has commonly something which focus on increasing the variance of data used for statistical analysis to improve the performance. Brown *et al.* (1993) modify gap-based SERVQUAL in a way that they introduce non-difference score of the same facets of service instead of a gap score. They measure the score through comparing directly expectations and perceptions of customers, just as the performance-only scale. Hence their results are similar as those of SERVPERF. Robledo (2001) also proposes a measurement of the disconfirmation in a single questionnaire (SERVPEX), which includes expectations and perceptions in a single scale (i.e., from "much worse than expected" to "much better than expected"). Although he tries to support the inclusion of expectations in the assessment of service quality, there is no difference between his approach and Brown *et al.*'s (1993).

However, in spite of the evidence presented by such research, and similar studies (e.g., Babakus and Boller, 1992; McAlexander *et al.*, 1994; McDougall and Levesques, 1994), especially the problems generated by gap score, the SERVQUAL scale is still a popular service quality measurement used by service organizations. It has been identified as a highly regarded service quality measurement tool in text books and journal articles (Brady *et al.*,

2002). Parasuraman *et al.* (1994b), recognizing controversies relative to their service quality measure, compare the performance of alternative measures, SERVQUAL, SERVPERF, non-difference score measure, and a three-column disconfirmation scale that compares a customers' desired and adequate expectations to their performance perceptions. The results of their investigation indicate that both SERVPERF and the non-difference score measure outperform SERVQUAL. Parasuraman *et al.* (1994b), however, argue that trade-offs between predictable power and diagnostic value are unavoidable and recommend the continued use of their gap-based SERVQUAL scale due to its superior diagnostic capacity:

" ... the superior predictive power of the performance-only measure must be balanced against its inferior diagnostic value. Therefore, formally assessing the practical usefulness of measuring expectation and the trade-offs involved in not doing so is a fruitful avenue for additional research." (p.120)

Additionally, they propose the need for studies comparing the paired-item, difference score formulation of SERVQUAL with direct formulations that use single items to measure customers' perceptions relative to their expectations.

Researchers acknowledge that customers have expectations and that they play a certain role as standards or reference points used by customers to evaluate the performance of a company (Bolton and Drew, 1991a, 1991b; Brown and Swartz, 1989; Oliver, 1980; Parasuraman *et al.*, 1985, 1988, 1994a; Robledo, 2001; Zeithaml *et al.*, 1990). In this manner, we support the superior diagnostic capacity of the SERVQUAL scale. Hence we introduce the ratio-based measure that could compare the paired-item (i.e., perception and expectation of an item) and serve as single items regardless of the type of scaling.

3. Ratio-based SERVQUAL: Proposed model

Before we propose our model, two critical issues neglected by former researchers are presented : (1) consistency of data analyzed and (2) appropriate scale to preserve customers' evaluation.

3.1 The fallacy of existing statistical analysis of gap-based SERVQUAL scale

An important issue originally raised by Cronin and Taylor (1992) is the nature of the link between customer satisfaction and service quality. A gap-based model uses difference scores between expectations and perceptions on prescribed criteria. Hence a gap score is dependent on corresponding expectation score which is usually lower than a seven point in a seven-point scale. In Cronin and Taylor's (1992, 1994) study and similar studies, however, customer satisfaction and overall service quality measures are treated as independent variables

of expectation. Namely, that a dependent variable of an ideal point (i.e., seven point in a seven-point scale). In such a setting, even though excessive quality can have occurred, customers are never satisfied with a service and overall service quality is always poor.

It was previously identified that Cronin and Taylor (1992, 1994) use differently generated scales to highlight the inferiority of gap-based SERVQUAL scale in assessing the construct validity, that is, regression analysis is executed between gap score obtained by P-E concept and other measures obtained by similar performance-only concept, whereas performance and other measures are obtained through similar concept. It is apparent, therefore, that performance-based model is superior to the gap-based one in such analysis, because of high correlations. In a like manner, alternative measures (i.e., EP, non-difference score, and SERVPEX) show higher construct validity than gap-based SERVQUAL scale.

In spite of former marketing researchers' studies, the concepts of performance perception, customer satisfaction, and overall service quality are usually similar to customers when interviewed to respond to a service quality questionnaire. To preserve the consistency of assessing construct validity from a statistical point of view, gap scores of SERVQUAL should be correlated with the gap scores between perceived customer satisfaction and expectation, or between perceived overall service quality and its expectation. That is, if service quality is measured by gap score, the overall service quality and customer satisfaction should be also obtained by gap score. The results according to the above concept are noticeably changed. Especially, correlations between gap-based SERVQUAL and other important measures that are much higher than previous ones. A high correlation indicates some degree of convergent validity. Consequently, the inferior construct validity of gap-based SERVQUAL scale suggested by Cronin and Taylor (1992, 1994) and other researches is the only result of comparing between differently generated scales. Therefore, the earlier identified limitations of gap-based SERVQUAL scale are rectified when identical generated scales are applied. Additional empirical test and discussion are presented in the following empirical test section. Nonetheless, since its untreated limitation exists, gap score is not appropriate for measuring service quality.

3.2 The Limitation of gap scale : risk of distortion customers' evaluation

In marketing research, the rating problem has been widely studied. A number of methods and rating scales have been developed to ease the gathering and dissemination of information (Urban and Hauser, 1993). Customers' responses often depend on scale properties and interpretation. Minimizing judgment distortions is essential to obtain more reliable information, and many of the inherent problems can be avoided by choosing the most

suitable rating scale. In most scales, ratings are generally expressed in verbal form and an answer is chosen from among a finite set of possibilities. Numbers must be assigned in such a way that a number of particular properties are preserved (Franceschini and Rupil, 1999).

Most scaling techniques used in marketing research use ratings that occur on linear interval scales, such as the seven-point scale popularly used to measure service quality. Consider the following simple example. If the judgment *high* implies a greater ranking than *medium* and *low*, then the assigned numbers satisfy the following relationship:

$$S_{high} - S_{medium} = S_{medium} - S_{low} \quad (4)$$

The traditional gap-based SERVQUAL scale relies on the linear interval scale. As discussed earlier, the gap-based scale may result in erroneous determinations when an interval scaling method is used for service quality measurement. For example, it could provoke misinterpretation that if gap score is the same between the two items (i.e., one item is evaluated with five-point scale, the other with nine-point scale), the interpretation that the customer satisfactions of the two are equal, is unacceptable. Moreover, the most efficient approach for improving service quality is not a seven point in a seven-point scale, but a focus on meeting expectation scores for each item. What are the merits of adopting a seven-point scale to measure expectations and perceptions and why have Parasuraman *et al.* (1994a, 1994b) extended this scale to a nine-point version in their recent amendments? Subsequently, this is why our proposed method uses ratio scale to measure service quality in SERVQUAL.

4. Ratio-based SERVQUAL

In the ratio scale, the assigned numbers satisfy the following relationship:

$$S_{high} / S_{medium} = S_{medium} / S_{low} \quad (5)$$

It is advantageous because it compares measurement between different rating scales. As introducing the ratio scale into service quality measurement, then so the perceived service quality indicates how much customers are satisfied with a service regardless of the type scale. Therefore, the most reliable way to measure the degree of customer satisfaction through the performance between expectations and perceptions is to use a ratio scale between the two. This can be stated as "Service Quality (SQ) = Perception (P) / Expectation

(E)". The service quality for each dimension is calculated for each respondent by using the geometric mean as follows:

$$SQ_j = \left\{ \prod_{i=1}^{n_j} (P_{ij} / E_{ij}) \right\}^{1/n_j} \quad (6)$$

where the terms are defined in Eq. (1)

Because there is an average ratio scale, a global service quality score is also calculated by taking the geometric mean score for the five dimensions in SERVQUAL. Scores that are greater than one (100%) represent better-than-expected service, while scores lower than one show poorer than expected quality. A score of one implies that the quality is satisfactory. Note that the minimum score in a rating scale should be always larger than zero ($S_{low} > 0$) to preserve the consistency of ratio scale in Eq. (5).

The proposed model efficiently assesses services delivered and does so dynamically, depending on customer expectations. Table 1 shows the results generated by using a ratio-based scale and compares them with the results from gap-based model. It can be seen intuitively that customers' satisfaction is not equal, even though service quality generated by gap-based model is the same between two organizations. But service quality by a ratio-based model is generated in accordance with customer satisfaction. Consequently, the ratio-based scale is more customer-oriented service quality measurement than gap-based scale.

Table 1. Comparison of results between gap-based SERVQUAL and Ratio-based SERVQUAL

Organization	A	B
Expectation	4	7
Perception	3	6
Gap-based SERVQUAL	-1	-1
Ratio-based SERVQUAL	0.75	0.86

5. Empirical test and results

Checking the validity of the proposed logic and model, the empirical test was executed as follows. A total of 53 subjects visiting a fast food store completed a questionnaire to identify service quality. The questionnaire used by Cronin and Taylor (1992) was modified

to reflect the needs for this research focus. In particular, the interview was divided into two parts, before and after interviews. The before interview focused on obtaining customers' expectations of previous encounters, including the prior level of purchase intention, expectation of overall service quality, and expectation of customer satisfaction, whereas after interviews obtained perceived service quality and other perception.

Table 2 presents the correlations, summary statistics, and reliabilities for the measures of interest. The reliabilities of measures of interest are acceptable within limits of acceptability (0.88~0.95), which strongly support the validity of the empirical test. Moreover, the correlation between identically generated scales - performance-only scales, gap scales, or ratio scales, are moderate (0.646~0.870). There are three highly significant results: (1) correlation between gap score and ratio score of each measure are close to certainty 1(0.962~0.990), that is, transformation of scores does not influence statistical analysis, (2) correlations between identical generated scales are usually higher than those with different generated scales, and (3) especially, gap-based or ratio-based SERVQUAL scale have high correlation with corresponding scores of other measurements. The result (3) means that using identically generated scales, SERVQUAL model also has high convergent validity as contrasted with former research. Here we conclude that the reason why non-difference score measure and SERVPEX model have better performance than SERVQUAL is the use of identically generated scales.

As the above results show, the limitations of gap score argued by former researchers originates from the use of differently generated scales. Furthermore, using ratio-based scale, customers' evaluation could be correctly interpreted without distortion of superior diagnostic capacity of the original SERVQUAL model.

6. Implications

The implications of this research highlight that the superior diagnostic capacity of SERVQUAL model reflects a good performance. Using the identically generated scales, now eliminates the limitations of gap-based SERVQUAL scale originated from using differently generated scales. The only difference between gap-based model and ratio-based model is how to calculate service quality using customers' expectations and perceptions to correctly interpret customers' evaluation.

The credible performance of these results generated by alternative service quality measurements (i.e., SERVPERF) results from the questionnaire design. That is, the respondents are usually apt to evaluate performance perception, purchase intention, customer

Table 2. Correlations, summary statistics, and reliabilities

Correlations																Summary statistics					Coefficient Alpha
service quality				purchase intention				overall service quality				customer satisfaction			Mean	variance	Skewness	Kurtosis			
	(1) expectation	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	4.567	0.700	0.058	0.725	0.95
	1.000																5.607	0.497	0.000	-0.765	0.94
service quality	(2) perception	0.392	1.000														-1.040	0.734	-0.719	0.798	0.93
	(3) gap	-0.439	0.654	1.000													0.820	0.021	-0.562	0.401	0.94
	(4) ratio	-0.357	0.714	0.990	1.000												5.679	0.568	0.055	-0.393	
	(5) expectation	0.468	0.088	-0.299	-0.268	1.000											4.491	1.909	-0.275	-0.616	0.88
	(6) perception	0.002	0.646	0.629	0.660	0.360	1.000										-1.189	2.964	0.069	-0.015	
	(7) gap	-0.364	0.554	0.840	0.846	-0.434	0.685	1.000									0.814	0.096	0.618	0.777	
	(8) ratio	-0.334	0.548	0.809	0.828	-0.265	0.781	0.962	1.000								6.000	0.577	-0.274	-0.458	
	(9) expectation	0.721	0.281	-0.318	-0.279	0.358	-0.077	-0.354	-0.334	1.000							4.679	1.261	-0.596	1.544	0.89
	(10) perception	0.122	0.787	0.667	0.712	0.052	0.523	0.464	0.459	0.199	1.000						-1.321	1.568	0.765	1.353	
overall service quality	(11) gap	-0.380	0.505	0.805	0.817	-0.196	0.514	0.649	0.631	-0.501	0.749	1.000					0.790	0.052	0.900	2.750	
	(12) ratio	-0.330	0.548	0.805	0.828	-0.171	0.526	0.641	0.631	-0.414	0.801	0.987	1.000				5.943	0.285	-0.062	0.695	
	(13) expectation	0.514	0.215	-0.213	-0.200	0.398	0.054	-0.259	-0.224	0.502	0.010	-0.330	-0.313	1.000			4.660	1.229	-0.159	0.056	0.91
	(14) perception	0.190	0.870	0.760	0.798	0.016	0.688	0.652	0.662	0.033	0.709	0.604	0.614	0.179	1.000		-1.283	1.515	-0.203	-0.025	
customer satisfaction	(15) gap	-0.229	0.642	0.815	0.842	-0.239	0.581	0.747	0.735	-0.289	0.628	0.750	0.748	-0.474	0.781	1.000	0.790	0.040	-0.001	0.065	
	(16) ratio	-0.226	0.666	0.836	0.868	-0.218	0.620	0.770	0.768	-0.281	0.658	0.771	0.780	-0.401	0.820	0.988	1.000	0.790	0.040	0.065	

satisfaction, and other important measures with respect to ideal point (i.e., when customers evaluate performance perception by a seven-point scale and performance-only model, each item's expectation is fixed at seven point). We can confirm these views from interviewing the respondents on how they made selection. Alternative measurements (i.e., non-difference score and SERVPEX) may also have good performance, resulting from the above phenomenon.

Consider the following modified one-item ratio-based SERVQUAL model (MQ) that includes the concept of the classic attitudinal model ideal point :

$$MQ_j = \frac{P_j / I_j}{E_j / I_j} \quad (7)$$

where terms are defined in Eq. (1) and (3). Notice that the right side of Eq. (7) is not multiplied by -1 so that increased value of MQ are associated with increased perceived quality while EP model is multiplied by -1. The P_j / I_j component, which replaces perception in Eq. (6), expresses proportional performance perception with respect to ideal performance I . The E_j / I_j component, which replaces expectation in Eq. (6), also expresses proportional expectancy norm with respect to ideal performance I . Under the assumption that P_j and E_j are measured by the SERVQUAL scale, and I is measured by a similar seven-point scale (just as Teas (1993)), the general characteristics of the MQ_j measure are as follows : whenever $1 \leq I \leq 7$, MQ_j is perfectly correlated with SQ_j as specified in Eq. (6). Therefore, the two measurement expressions are equivalent regardless of the value of ideal point.

The ratio-based SERVQUAL scale specification is compatible with the "feasible ideal point". Hence, a number of complex theoretical and definitional problems presented by Teas (1993) are solved through the modification of SERVQUAL scale. Moreover, the ratio-based model basically supports the superior diagnostic capacity of SERVQUAL model.

7. Conclusion and future research

The objective of this research was (1) to highlight that the use of both expectation and perception of a service delivery in measuring service quality, (2) to represent the ratio-based

SERVQUAL scale to correctly interpret customers' evaluation of a service, and (3) to show that as Cronin and Taylor (1992) and other researchers stated, the inferiority of SERVQUAL model comes from the fallacy of statistical analysis. In particular, this research has identified that the inclusion of expectation strengthens the superior diagnostic capacity in the measurement of service quality.

Future research is needed to determine the efficiency of any proposed model with variations in scale settings. Since the measurement of service quality could be dependent upon the type of service and customers, future research should also focus on the specific service industries. Furthermore, the variance of results should be examined with due regard to Likert-type scale (i.e., 5-point, 7-point, or 9-point scale).

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