Developing Universally Applicable Service Quality Assessment Model Based on the Theory of Consumption Values, and Using Fuzzy Linguistic Preference Relations to Empirically Test Three Industries

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Abstract: Service quality is an important factor for a successful company. The SERVQUAL model is widely used. However, it has been controversial over the past 30 years. This research aims to develop a service quality measurement model that can be supported in conceptualization and universal applicability, and uses this model to identify the most important key factors of service quality for three industries. First, based on the theory of consumption values, this study used conceptualization and the modified Delphi method to develop a service quality assessment model—the consumption values-based service quality model (CV-SQ). The CV-SQ model was then used in conjunction with the fuzzy linguistic preference relations (Fuzzy LinPreRa) method to address MCDM problems. The findings suggested that the most important key factors of service quality comprised safety in the aviation companies, innovativeness in the travel agencies, and comfort in the hotels. The CV-SQ model can be supported by theoretical and empirical tests in conceptualization and universal applicability, and has made theoretical contributions to service quality management. The research results have provided practical contributions to the improvement of service quality in the three industries. What is more noteworthy is the weight of epistemic value ranked first and second among the three industries, but it had not been included in any service quality aspect classification schemes during the past three or four decades.

Keywords: service quality assessment model; theory of consumption values; fuzzy linguistic preference relations (Fuzzy LinPreRa); multi-criteria decision-making (MCDM)

1. Introduction

To successfully run a business, service quality is very important [1–3]; it is a central determinant of consumers’ intentions toward firms [4] (p. 49). Analysis of key service quality factors allows the manager of an enterprise to know which determinants of service quality should be improved as a first priority in order to ensure customer satisfaction [5] (p. 458). Because service quality is a prerequisite of consumer satisfaction [6–8], and consumers’ intention to buy is affected by service quality [9], the use of a service quality assessment model with universal applicability and good reliability and validity is very important in research on service quality [10]. Therefore, developing new tools for assessing service quality is the primary task of managers and scholars [11]. The SERVQUAL model developed by Parasuraman, Zeithaml [12] is perhaps the most widely accepted service...
In the past 30 years, however, numerous scholars have questioned the universal applicability of service quality assessment scales developed employing the SERVQUAL model to research on various industries, e.g., [6,16–22]. Because the SERVQUAL model was developed employing a research sample from the appliance maintenance, banking, long-distance telephone call, securities brokerage, and credit card industries, the aspects and attributes of this model are limited to the characteristics of those industries. As a consequence, when the SERVQUAL model is applied, it must typically be revised to match the characteristics of the industry being studied before the resulting service quality attributes can be appropriately used in research, e.g., [23–29]. This suggests that the SERVQUAL model’s universal applicability is insufficient. In addition, the model’s conceptualization and empirical effectiveness are also controversial [11,18,20,30–32]. However, in order to solve these insufficiency and controversy of the SERVQUAL model, some studies have proposed new service quality measurement models or methods, e.g., [11,15,22,32–35]. However, these studies ignore that the measurement of service quality is based on the consumer’s judgment of consumption values [36,37], and the service quality measurement model or method should be developed based on the viewpoint of consumption values [38,39], so that theoretical and empirical tests can support both conceptualization and universal applicability. Jebarajakirthy, Das [37] pointed the application of the theory of consumption values provides a better assessment model of the customer service satisfaction. Goncalves, Lourenco [40] pointed to evidence suggesting that a multidimensional conceptualization of the theory of consumption values shows more predictive ability on the consumers’ values than a one-dimensional approach. Therefore, this research is based on the theory of consumption value and fills the gaps in the past research by completing two research purposes: (1) developing a service quality measurement model that can be supported by theoretical and empirical tests in both conceptualization and universal applicability; (2) using this model to identify the most important key factors of service quality for the three industries.

In practice, there is much service quality content needed by consumers but not included among the service quality aspects of the SERVQUAL model. For example, hotels must provide consumers convenient and comfortable beds and bathing equipment to ensure that customers obtain a high level of comfort. Online travel agencies must satisfy consumers’ wish to rely on technology. The inter-city bus industry must provide satellite positioning on their buses, so that customers can monitor their progress and highway conditions in real-time, which will give customers a sense of immediacy. These examples reveal that when applied to service quality in the industries in question, the SERVQUAL model will not be able to measure the service quality attributes of comfort, technology, and immediacy, and its research contributions and management implications will be subject to challenge. As a consequence, a service quality assessment model developed based on any one industry will be limited by the characteristics of that industry, and cannot necessarily be applied to other industries. In light of these circumstances, this research deeply feels that if we can use a prescient theory that takes consumer values as the starting point and has wider universal applicability as the theoretical basis of the research, then derive an assessment model for the content of service quality, and then verify the universal applicability of the model’s service quality aspects and attributes based on the empirical result, it will boost the universal applicability of the model to research and practice involving various types of industries and, thus, enhance the contributions and management implications of such research. The theory of consumption values, proposed by Sheth, Newman [41], is such a prescient theory that possesses both universal applicability and the ability to clearly explain consumer value.

Specifically, this research aims to solve three questions: (1) What theory can be used as the basis to develop a service quality measurement model that can be theoretically supported in terms of conceptualization and universal applicability? (2) What aspects and attributes should this model have? (3) How can the conceptualization and universal applicability of this model be supported by empirical tests? In response to these issues, this
research conducted the following studies: First, used the theory of consumption values as its theoretical basis, used conceptualization and the modified Delphi method to analyze the underlying attributes of value aspects, and developed a service quality assessment model, namely the theory of consumption values-based service quality model (CV-SQ). Second, the consistency test of the universal applicability of the CV-SQ model from the perspective of consumers is carried out. Third, to verify the universal applicability of the model to various industries, the study employed fuzzy linguistic preference relations (Fuzzy LinPreRa) to perform multi-criteria decision-making (MCDM) in an analysis of key service quality factors in the aviation companies, travel agencies, and hotels. The findings show that the most important key factors of service quality comprised safety in aviation companies (weight of 0.0847), innovativeness (0.0746) in travel agencies, and comfort (0.0797) in hotels.

Mishra, Rani (p. 2) suggested that the imprecision resulting from use of the fuzzy set theory to handle MCDM problem, as proposed by Zadeh, provides an important benefit. Because service quality is an abstract concept that is difficult to define and assess, if service quality is measured on the basis of precise numerical variables, the results will commonly be very imprecise. In contrast, use of the linguistic variables in fuzzy set theory to perform assessment can be an effective method. According to Hsu and Tang (p. 11), the Fuzzy LinPreRa method is a consistent fuzzy preference expression method offering the features and advantages of fuzzy linguistic variables, and it can be used to explain the linguistic fuzziness that decision-makers express in assessing preference relationships. As a result, this helped the MCDM method increase applicability and value. The use of fuzzy linguistic variables by the respondents as assessment values allowed them to respond appropriately to the fuzziness of the questions. According to Wang and Chen (p. 3755), the fuzzy linguistic preference relationship method can be used to establish a pairwise comparison matrix with reciprocals and consistency. The method proposed in that study obtained consistent decision-making grades from only n − 1 pairwise comparisons, which is consistent with the findings of Kahraman, Cebeci, Kahraman, Ruan. The Fuzzy LinPreRa method is an improved simplified practical method derived from the fuzzy analytical hierarchy process (FAHP). Hsu, Chen (p. 4) pointed out that “In FAHP, for a pairwise comparison matrix that includes n alternatives, as many as n(n − 1)/2 comparisons are requested. Keeping aside the complexity of the entire process, the evaluation results produced by different experts could also be inconsistent. Compared with the FAHP, Fuzzy LinPreRa is simpler, for a pairwise comparison matrix that includes n alternatives only needs to be compared n − 1 times, and can avoid the problem of inconsistent evaluation outcomes”. Triangular fuzzy numbers are most widely used among commonly seen linguistic variables. The crisp analytical hierarchy process (AHP) cannot reflect the thinking style in capturing the expert’s knowledge; the triangular fuzzy importance scale can cover the uncertainty of assigning crisp concepts in related decision-making topics. Therefore, it is often used in MCDM studies, e.g., [54–56].

This research puts forward a new view of service quality based on the theory of consumption value. The CV-SQ model developed based on this new view can be supported by theoretical and empirical tests in conceptualization and universal applicability, which has made a theoretical contribution to service quality management. From the consumer’s perspective, this study uses the CV-SQ model to analyze the weights of key factors of service quality for three industries and proposes strategies to improve service quality based on the research results, which provides practical contributions to the improvement of service quality for these three industries. What is more noteworthy is the weight of the epistemic value ranked first and second among the three industries, but it had not been included in any service quality aspect classification schemes during the past three or four decades. This research fills this long-term research gap, which also makes a theoretical contribution to service quality management. Finally, based on the research results, the
management implications, research limitations, and future research recommendations are put forward.

2. Literature Review

2.1. Service Quality Assessment Models

Providing a high level of service quality can enable an enterprise to achieve good market positioning [45]. With regard to the content of service quality, many scholars have proposed various generally similar perspectives, such as: service quality is a precondition for customer satisfaction [57]; service quality is the difference between consumers' expectations before receiving a service and view after receiving that service [12], where customers will feel dissatisfaction when the latter is worse than the former [58]; service quality is the subjectively perceived value determined by consumers [59], and consumers' perceived value has a major impact on satisfaction [60], when consumers perceive that their expectations of value have been realized, they will have a positive view of the service quality [61]; the main purpose of evaluating service quality is to measure service performance and provide the most valuable service for all customers [62], because service quality will affect consumers' perceived value and satisfaction [63], and because consumers' perceived value is closely linked with their satisfaction [60] (p. 614), many research results have clearly indicated that consumers' perceived value has a significant correlation with service quality e.g., [64–66].

Measuring service quality aims to determine the aspects and attributes of experience quality and customer satisfaction [57]. However, the aspects and attributes of service quality may vary depending on the nature of the industry in question [20]. As a consequence, the service quality assessment model developed for any particular industry will tend to be limited to the characteristics of that industry, and cannot be applied to other industries. A service quality assessment model will express the factor structure of the service or industry it was developed to assess [18] (p. 130). Taking the widely used SERVQUAL model as an example, its five aspects cannot be effectively applied to all industries [19] (p. 7). In addition, numerous studies have made theoretical and practical criticisms of the interpretation and verification the SERVQUAL model [20]. Furthermore, since many services are intangible and highly customized [67] (p. 3), application of the model to these services will be restricted by the industry's characteristics. The SERVQUAL model has consequently been questioned by many scholars.

It can be seen from the foregoing account that since the substance of service quality and the purpose of measuring service quality are derived from consumption values, which in turn are elements where it is necessary to enhance customer satisfaction. In addition, if a service quality assessment model has been developed to target a certain industry, like the SERVQUAL model, that model's universal applicability will be subject to question. This study believes that the aspects and attributes of service quality should be conceptualized from the perspective of consumption values, and the aspects and attributes of service quality should not be developed from the perspective of a certain industry. A service quality assessment model developed on this basis will not be restricted by the characteristics of the industry, that is, it can be universally applicable to the service industry. In addition, it is more consistent with most scholars' definitions of service quality and will be generalizable to research and practical applications.

2.2. Theory of Consumption Values

The theory of consumption values [41] is one of the chief theories in the literature concerning consumer behavior and marketing [68]. The value that consumers perceive after the act of consumption, and the result of an overall assessment of the product or service quality after evaluating the cost of that product or service is the consumption value [69]. A summary look at consumption value classifications (Table 1) reveals that the value
items proposed by Sheth, Newman [41] have relatively little overlap, are not overly simplified, and are not too abstract because these value items cover a broad range of aspects, they are widely used in relevant research, e.g., [70–76]. The application of the theory of consumption values to explain consumers’ choices is a complex process involving multiple values. Consumers may consider various and diverse values when purchasing products or services, and these values are factors influencing consumers’ purchasing motivation. The theory of consumption values proposes five consumption values influencing consumers’ choices (Figure 1), consumers’ decisions may be influenced by any one, or all, of these five consumption values [41] (p. 160). “Each of the values in the theory of consumption values is compatible with the constituent elements of the models proposed by scholars such as Maslow [77], Maslow [78], Katona [79], Katz [80] and Hanna [81]” [41] (p. 160). This study consequently chose to employ the theory of consumption values as its theoretical basis, and used this theory to develop a universal applicability service quality assessment model that can be utilized to gauge consumers’ values.

![Figure 1. The five values influencing consumer choice. Source: Sheth, Newman [41] (p. 160).](image)

| Author                          | Consumption Values Classification                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------|
| Hirschman and Holbrook [82]    | Experience consumption value, Rational consumption value.                                        |
| Zeithaml [69]                  | Low price, whatever one wants in a product, what the consumer gets for what she or he gives, the quality the consumer receives for the price paid. |
| Sheth, Newman [41]             | Functional Value, Conditional Value, Social Value, Emotional Value, Epistemic Value.              |
| Burns [83]                     | Product value, Use value, Possession value, Full value.                                            |
| Kotler [84]                    | Product value, Service value, Personal value, Image value.                                         |
| Flint, Woodruff [85]           | Actual value, Desired value.                                                                     |
| Yang and Lin [86]              | Functional Value, Social Value, Emotional Value, Epistemic Value, Fashion Value.                 |
| Wang, Wang [87]                | Function value (price), Function value (quality), Social Value, Emotional Value.                 |
| Qasim, Yan [88]                | Function value (price), Function value (quality), Social Value, Conditional Value, Epistemic Value, Emotional Value. |
| Karjaluoto, Glavee-Geo [89]    | Functional Value, Social Value, Epistemic Value, Emotional Value.                                |

2.3. Service Quality and Consumption Values

Consumption values refer to the value assigned to a product or service when consumers weigh the service quality they have received against the cost of that product or service after an act of consumption [90]. Emphasis is placed on creation of various value factors in the case of services [91], and consumption values can be used for assessment of
both tangible product quality or intangible service quality. Sheth, Newman [41] provide a review of the literature indicates that consumption values must always be taken into consideration when assessing service quality. This study lists the service quality aspects proposed by several scholars, and employs conceptual analysis to classify these aspects so that their content matches the content of values in the theory of consumption values (Table 2) [41]. The results indicate that none of the service quality aspect classification schemes proposed by scholars during recent decades has entirely encompassed the five values in the theory of consumption values [41]; several service quality aspects are excessively abstract or vague, and other aspects are overlapping or impossible classify. It is also worth noting that epistemic value has been completely ignored during the past thirty years of research on service quality. Therefore, this study uses the five values in the theory of consumption values as the aspects of the service quality measurement model to fill this serious research gap.

Table 2. Classification of service quality aspects.

| Consumption Value Aspects Researcher | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value | Cannot Be Classified |
|------------------------------------|------------------|--------------|-------------------|-----------------|----------------|--------------------|
| Parasuraman, Zeithaml [92]         | Tangibility      | Proximity    | Responsiveness    | Goodwill        |                | Competence         |
|                                    | Reliability      | Courtesy     | Responsiveness    | Understanding   |                |                    |
|                                    | Safety           | Communication|                   | of customers    |                |                    |
| Parasuraman, Zeithaml [12]         | Tangibility      |              | Responsiveness    | Concern         |                |                    |
|                                    | Reliability      |              |                   |                 |                |                    |
|                                    | Authenticity     |              |                   |                 |                |                    |
| Schvaneveldt, Enkawa [93]          | Authenticity     |              |                   | Feelings        |                | Accountability     |
|                                    | Ease of use      |              |                   |                 |                |                    |
|                                    | Integrity        |              |                   |                 |                |                    |
|                                    | Environment      |              |                   |                 |                |                    |
| Cronin Jr and Taylor [18]          | Tangibility      |              | Responsiveness    | Empathy         |                | Guarantee          |
|                                    | Reliability      |              |                   |                 |                |                    |
| Gerhard, CHRISTO [94]              |                  |              |                   |                 |                |                    |
|                                    |                  |              |                   |                 |                | Extrinsic aspects  |
|                                    |                  |              |                   |                 |                | Intrinsic aspects  |
| Robledo [95]                       | Tangibility      |              | Concern for       |                |                |                    |
|                                    | Reliability      |              | customers         |                |                |                    |
| Brady and Cronin Jr [96]           | Environment      |              |                   |                |                |                    |
|                                    | Interaction      |              |                   |                |                | Results            |
| Zeithaml [97]                      | Efficiency       |              |                   |                |                | Realizability       |
|                                    | Reliability      |              |                   |                |                |                    |
|                                    | Privacy          |              |                   |                |                |                    |
| Petrick [98]                       | Reputation       |              |                   |                |                | Quality             |
|                                    |                  |              |                   |                |                | Monetary cost       |
|                                    |                  |              |                   |                |                | Action cost         |
| Khan [99]                          | Reliability      |              | Responsiveness    | Empathy         |                | Guarantee           |
|                                    | Tangibility      |              |                   |                 |                | Ecological materials|
| Lee and Lin [100]                  | Reliability      |              | Responsiveness    | Trustworthi-    |                |                    |
|                                    |                  |              |                   | ness            |                |                    |
| Parasuraman, Zeithaml [101]        | Reliability      |              | Responsiveness    | Trustworthi-    |                | Guarantee           |
|                                    | Ease of naviga-  |              |                   | ness            |                | Price information   |
|                                    | tion            |              |                   |                 |                | Website aesthetics  |
|                                    | Efficiency       |              |                   |                 |                |                    |
|                                    | Safety           |              |                   |                 |                |                    |
|                                    | Privacy          |              |                   |                 |                |                    |
|                                    | Customization    |              |                   |                 |                |                    |
| Abdullah [102]                     | Reliability      |              | Empathy           | Non-academic    |                |                    |
|                                    |                  |              |                   | aspects         |                |                    |
3. Research Method

3.1. Conceptualization of CV-SQ’s Potential Attributes

This study first performed an in-depth, detailed review of the literature concerning the various values in service quality and the theory of consumption values [41]. Afterwards, taking the substance of these values as the basis for analysis, we performed systematic, rigorous analysis, inference, and classification concerning customers’ possible backgrounds, events, and intrinsic value needs during the consumption process. Following intensive discussion and brainstorming by the three authors, linkage was made between service quality and the significance of the values in the theory of consumption values, which enabled conceptualization of the specific categories and special implications of consumers’ value needs and desired service quality. A database of the potential CV-SQ attributes was then obtained by finding suitable potential attributes at each point of intersection. Lastly, the three authors anonymously voted on each of the attributes in the database of potential CV-SQ attributes without mutual interaction, and those attributes not receiving a majority of votes were deleted, allowing the creation of a potential CV-SQ attribute classification table (Table 3). The conceptualization method, used to analyze the implications at the liking points in order to obtain the latent attributes, is derived from the conceptualization and typology descriptions provided by Hoyer and MacInnis [104], MacInnis [105], and Peronard and Ballantyne [106]. Accordingly, the attributes at one particular intersection point are homogeneous with heterogeneity among them with the advantage of high construct and external validity without confusions inter-attribute.

Table 3. Potential CV-SQ attributes classification table.

| Aspects | Attributes | Service Quality | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|---------|------------|-----------------|--------------|-------------------|-----------------|-----------------|
|         | Functional Value |             | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|         | Respect | Influence | Recommendation | Praise | Communicability | Adaptability | Responsiveness | Mobility | Immediacy | Concern | Attentiveness | Pleasure | Memorability | Sharing | Dependability | Innovativeness | Knowledge | Prospective | Technological |
|         | Comfort | Efficiency | Safety | Multifunctionality |             |               |               |               |           |           |               |               |               |           |               |           |               |               |           |             |             |

3.2. Use of the Modified Delphi Method to Confirm the Attributes of CV-SQ Aspects

After a questionnaire was compiled, on the basis of Table 3, 15 experts from academia and industry in Taiwan (Appendix A) were invited to determine the appropriateness of each value aspect attribute using the modified Delphi method [107]. Murry Jr and Hammons [107] suggested that the open questionnaire typically administered during the first round of the Delphi method can be replaced by a structured questionnaire developed directly from the relevant literature or expert interviews. This would preserve the original spirit and advantages of the Delphi method, while omitting the complicated and time-consuming procedures involved in the first-round open questionnaire. Dalkey [108] recommended that the expert group in the Delphi method have at least 10 members. During
the process of using the modified Delphi method, this study used a two-part scale to let the expert group express its views. According to the consistency test for individual items used by Murry Jr and Hammons [107] when more than 75% of respondents' views are the same, this indicates that a consensus has been reached concerning that item. The expert group was composed of managers from industry and university professors with 12–28 years of professional experience, and the experts' backgrounds were in fields such as service quality management, consumer behavior, service marketing, and customer relations management. The experts' years of experience and fields of expertise were sufficiently representative, and their professional fields were different but mutually complementary. This study, therefore, was able to take a broad perspective and perform a focused analysis of the attributes developed from the values obtained from service quality and the theory of consumption values. After recovering the experts' questionnaires, the data were examined, and a formal CV-SQ attribute classification table (Table 4) was compiled from those attributes that at least 75% of the experts felt were appropriate, which allowed the content of the CV-SQ attributes to be inferred (Table 5).

Table 4. CV-SQ attributes classification and consistent data (%).

| Aspects Attributes | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|--------------------|------------------|--------------|-------------------|-----------------|-----------------|
| Service Quality    | Comfort 100      | Respect 100  | Adaptability 93   | Attentiveness 100| Innovative 100  |
|                    | Efficiency 100   | Recommendation 80 | Mobility 87 | Pleasure 93 | Knowledge 93 |
|                    | Safety 100       | Praise 93    | Immediacy 100    | Dependability 93 | Technology 100 |

Table 5. Content of CV-SQ attributes.

| Consumption Value Aspect | Attributes | Content of Attribute                                                                 |
|--------------------------|------------|---------------------------------------------------------------------------------------|
| Functional Value         | 1. Comfort | Lets consumers feel both convenience and comfort.                                      |
|                          | 2. Efficiency | Lets consumers feel speed and precision.                                               |
|                          | 3. Safety    | Lets consumers feel that their life, property, and personal information are completely safe. |
| Social Value             | 1. Respect  | Lets consumers feel valued and treated with respect.                                   |
|                          | 2. Recommendation | After using the service, consumers are happy to recommend and share it.               |
|                          | 3. Praise    | After using the service, consumers can receive others’ recognition and praise.         |
| Conditional Value        | 1. Adaptability | The company can respond to unforeseen situations with agility.                       |
|                          | 2. Mobility  | The company can quickly and satisfactorily take action in the event of any change.     |
|                          | 3. Immediacy | The company the promptest and most effective service.                                  |
| Emotional Value          | 1. Attentiveness | Lets consumers feel great consideration.                                              |
|                          | 2. Pleasure   | Lets consumers feel happiness.                                                        |
|                          | 3. Dependability | Makes consumers feel trust and dependability.                                        |
| Epistemic Value          | 1. Innovative | Makes consumers feel unique, novel service.                                           |
|                          | 2. Knowledge  | Makes consumers feel they have complete, up-to-date knowledge about the service.      |
|                          | 3. Technology | Makes consumers feel that the service is high-tech and avant-garde.                  |

3.3. Reliability and Validity

After using the modified Delphi method, this study analyzed the content of the CV-SQ attribute classification table (Table 4) in order to verify its reliability.

Step 1: Scoring based on the degree of agreement among the three authors and 15 experts concerning the attributes in the CV-SQ attribute classification table (Table 6).
Table 6. Scoring based on content analysis of the CV-SQ attribute classification table.

| Aspect          | Attribute | Grade Distribution Based on Evaluation by 15 Expert Participants (E) and 3 authors (R) |
|-----------------|-----------|-------------------------------------------------------------------------------------|
|                 |           | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree | 50% or More of the Same |
|                 |           | E | R | E | R | E | R | E | R | E | R |
| Functional Value| Comfort   | 1 | 14 | 3 | +2 | +2 |
|                 | Efficiency| 1 | 2 | 13 | 2 | +2 | +2 |
|                 | Safety    | 1 | 15 | 2 | +2 | +2 |
| Social Value    | Respect   | 1 | 14 | 3 | +2 | +2 |
|                 | Recommendation | 1 | 2 | 1 | 1 | 11 | 2 | +2 | +2 |
|                 | Praise    | 1 | 14 | 3 | +2 | +2 |
| Conditional Value| Adaptability | 1 | 1 | 9 | 5 | 2 | +1 | +2 |
|                 | Mobility  | 1 | 2 | 13 | 2 | +2 | +2 |
|                 | Immediacy | 1 | 2 | 12 | 3 | +2 | +2 |
| Emotional Value | Attentiveness | 2 | 1 | 3 | 10 | 2 | +2 | +2 |
|                 | Pleasure  | 2 | 8 | 1 | 5 | 2 | +1 | +2 |
|                 | Dependability | 1 | 1 | 2 | 11 | 3 | +2 | +2 |
| Epistemic Value | Innovation | 1 | 14 | 3 | +2 | +2 |
|                 | Knowledge | 15 | 3 | +2 | +2 |
|                 | Technology | 15 | 3 | +2 | +2 |

Step 2. In reference to the content analysis formula of Holsti [109], the calculation formulas for mean degree of mutual agreement and reliability employing the results in which more than 50% of the first group of scorers in Table 6 (15 experts, referred to as “E”) gave the same scores and results in which more than 50% of the second group of scorers (the three authors, referred to as “R”) gave the same scores are as follows:

Function 1

\[ B = 2 \times \frac{X}{Y_1 + Y_2} \]

\[ B = \text{degree of mutual agreement} \]

\[ X = \text{number of identical grades of two groups of evaluators} \]

\[ Y_1 = \text{the supposed number of number for group 1} \]

\[ Y_2 = \text{the supposed number of agreements for group 2} \]

Function 2

\[ \text{Reliability} = \frac{n \times B}{1 + (n - 1) \times B} \]

\[ n = \text{number of evaluator groups} \]

According to Table 6, there were 13 attributes that met the threshold of 50% and more similarity in group 1 and 2. They then went into the functions above, which generated the following results:

Function 1: \[ B = 2 \times \frac{13}{(15 + 15)} = 0.87 \]

Function 2: \[ \text{Reliability} = 2 \times 0.87 = \frac{1 + (2 - 1) \times 0.87}{1 + (n - 1) \times B} = 0.93 \]

The two foregoing steps enabled the calculation of the reliability of the CV-SQ attribute classification table as 0.93. This indicated that the degree of agreement of the 15 experts and three authors concerning the attributes in the CV-SQ attribute classification table (Table 4) had a high degree of consistency. As for validity, since the 15 experts participating in the modified Delphi method all had high levels of education, this consisted of company managers and university professors and associate professors, and had 12–28 years of experience in their professional fields, it could be inferred that the CV-SQ attribute classification table had a high level of expert validity. With regard to content validity, this study adopted a consumer value perspective reflecting a majority of scholars’ service quality definitions. Taking the content of the theory of consumption values [41] as a basis, the CV-SQ model was developed through use of conceptual analysis and the modified Delphi method, and therefore possesses content validity. After completing reliability and validity testing, the
CV-SQ model (Figure 2) was constructed in accordance with the 15 attributes in the CV-SQ attribute classification table (Table 4).

Figure 2. CV-SQ: Theory of consumption values-based service quality model.

4. Empirical Testing of the CV-SQ Model by Using the Aviation Companies, Travel Agencies, and Hotels

This study developed a questionnaire based on the 15 attributes in the CV-SQ attribute classification table (Table 4), and provided a detailed description of the five aspects and 15 attributes in the questionnaire. This helped the respondents to understand the content of the attributes, and ensured that they provided correct responses. The questionnaire was aimed at “heavy consumers” (consumption experts) of the services of the aviation companies, travel agencies, and hotels. Heavy consumers engaged in more frequent consumption than ordinary consumers, and consequently have deeper impressions and more extensive experience of service quality. Among the consumer public, heavy consumers have a high degree of representativeness, and can be considered consumption experts. Aviation companies’ heavy consumers are defined as taking an average of at least 10 flights each year during the most recent three years; travel agencies’ heavy consumers are defined as having used the services of travel agencies at least 10 times each month during the most recent half year period; and hotels’ heavy consumers are defined as having stayed in hotels an average of at least 10 days during the most recent three years. The data for this study were collected through online surveys from 30 March to 10 May 2021, and a question for screening heavy consumers was inserted at the beginning of the questionnaire to ensure that all respondents are heavy consumers. Only respondents who answered affirmatively to the screening questions were invited to continue filling in the remaining questions. Apart from obtaining respondents in representative professions, this study also employed quota sampling in order to achieve geographical representativeness. This involved obtaining 80 valid questionnaires each from heavy consumers with each
industry in northern, central, and southern Taiwan, which resulted in a total of 720 valid questionnaires for the three industries from heavy consumers. After compiling data from the questionnaires, first, we conducted a consistency test on the universal applicability of the CV-SQ model, and after confirming that the universal applicability of the model obtains unanimous agreement from heavy consumers, Fuzzy LinPreRa [42] was employed to perform empirical MCDM analysis, in order to determine the most important key factor in the service quality of the aviation companies, travel agencies, and hotels.

4.1. Test the Consistency of the Universal Applicability of the CV-SQ Model

From the perspective of heavy consumers in the aviation companies, travel agencies, and hotels, a consistency test is conducted on the universal applicability of the CV-SQ model. The universal applicability of each attribute in the model gets more than 75% consistency (Table 7). According to the consistency test, for individual items used by Murry Jr and Hammons [107] when more than 75% of respondents’ views are the same, this indicates that a consensus has been reached concerning that item. The results therefore indicated the content of each CV-SQ attribute was highly consistent with consumers’ service quality needs and desires in each industry, and thus, shed light that the universal applicability of this model is supported by empirical tests.

| Aspects Attributes | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|--------------------|------------------|--------------|------------------|----------------|----------------|
| Service Quality    |                  |              |                  |                |                |
| Comfort            | Respect          | Adaptability | Attentiveness     | Innovative     |                |
| 100 a, 98 t, 100 h | 99 a, 100 t, 100 h | 100 a, 100 t, 99 h | 100 a, 100 t, 100 h | 100 a, 100 t, 100 h |
| Efficiency         | Recommendation   | Mobility      | Pleasure          | Knowledge      |                |
| 100 a, 99 t, 99 h  | 94 a, 88 t, 96 h  | 99 a, 98 t, 97 h | 100 a, 99 t, 100 h | 99 a, 100 t, 99 h |
| Safety             | Praise           | Immediacy     | Dependability     | Technology     |                |
| 100 a, 95 t, 100 h | 98 a, 95 t, 99 h | 100 a, 100 t, 100 h | 100 a, 98 t, 98 h | 100 a, 100 t, 100 h |

Remarks: a Aviation companies, t Travel agencies, h Hotels.

4.2. Fuzzy Linguistic Preference Relations (Fuzzy LinPreRa)

Zadeh [44] proposed the fuzzy sets theory by arguing that there is a certain degree of fuzziness existing in human beings’ subjective perceptions and understandings of things around us. An adoption of the fuzzy logic on human perceptions of things may compensate for the blind spots created by traditional binary logics (0 and 1) which swing between propositional answers of true or false. Fuzzy sets are sets of objects without clear boundaries or definite characteristics. Membership function describes the degree to which a certain attribute in a set belongs to a sub-set, which ranges from 0 to 1.

Linguistic variables can be used to assess how consumers’ needs affect their objective impressions and conscious preferences during various decision-making processes involving various aspects and attributes. Linguistic variables refer to terms from natural language used as variables, and can be used in situations that are vague, abstract, or difficult to define [110]. An example of the use of linguistic variables is the use of terms such as “equally important,” “slightly more important,” “important,” “quite important,” and “extremely important” assessment values conveying the importance of a certain guideline. This study used the triangular fuzzy importance scale (Figure 3) proposed by Tolga, Demircan [53] to perform measurements employing linguistic variables. This scale and a nine-point linguistic scale were used to construct a fuzzy linguistic preference relationship matrix. The respondents’ linguistic assessment sets were indicated as $N_k =\{\text{equally important; slightly more important; important; very important; extremely important}\}$, (k = 1, 2, ..., 5). Triangular fuzzy numbers completely retain the uncertainty information [111].
“It contained more parameter information, quantified and reduced the uncertainty of parameters, provided more comprehensive results, and compensated for the deficiency of deterministic evaluation” [112] (p. 1). “The main priority of this method compared to other existing MCDM is that it is a more effective way of dealing with the uncertainties in projects as the application of the opinions is made based on a group decision” [54] (p. 1). See Table 8 for the respondents’ assessments of the aspects and attributes in the CV-SQ model.

Table 8. Fuzzy number definitions.

| Linguistic Variables           | Designation | Triangular Fuzzy Number | Triangular Fuzzy Reciprocal Scale |
|--------------------------------|-------------|--------------------------|----------------------------------|
| Demonstrated importance       | DI          | (2, 5/2, 3)              | (1/3, 2/5, 1/2)                  |
| Very strong importance        | VSI         | (3/2, 2, 5/2)            | (2/5, 1/2, 2/3)                  |
| Strong importance             | SI          | (1, 3/2, 2)              | (1/2, 2/3, 1)                    |
| Moderate importance           | MI          | (1/2, 1, 3/2)            | (2/3, 1, 2)                      |
| Equal importance              | EI          | (1, 1, 1)                | (1, 1, 1)                        |

Source: Tolga, Demircan [53] (p. 101).

The following are Fuzzy LinPreRa calculation procedures:

The selected set was defined as $C = \{C_1, C_2, ..., C_n\}$, which was then transformed into the fuzzy positive reciprocal matrix $\tilde{A} = \tilde{a}_{ij}, \tilde{a}_{ij} \in [\frac{1}{9}, 9]$. Let triangular fuzzy number $\tilde{a}_{ij}$ represent the results of pairwise comparisons of attributes (fuzzy positive reciprocal matrix $\tilde{A}$), which was used to develop the consistent fuzzy linguistic preference relations matrix $\tilde{P}_k = (\tilde{P}_{ij}^{(k)})_{n \times n}$ ($k = 1, 2, 3, ..., m$) with $n - 1$ assessments $(p_{12}^{(k)}, p_{23}^{(k)}, p_{34}^{(k)}, ..., p_{(n-1)n}^{(k)})$.

$$\tilde{C} = \begin{bmatrix} \tilde{1} & \tilde{c}_{12} & \ldots & \tilde{c}_{1n} \\ \tilde{c}_{21} & \tilde{1} & \ldots & \tilde{c}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{c}_{n1} & \tilde{c}_{n2} & \ldots & \tilde{1} \end{bmatrix}, \quad \tilde{P}_k = \begin{bmatrix} \tilde{1} & \tilde{c}_{12} & \ldots & \tilde{c}_{1n} \\ \tilde{c}_{12}^{-1} & \tilde{1} & \ldots & \tilde{c}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{c}_{n1}^{-1} & \tilde{c}_{n2}^{-1} & \ldots & \tilde{1} \end{bmatrix}$$

$$\tilde{C}ij = \begin{cases} \tilde{1}, & i = j \\ \tilde{1}, & i < j \\ \tilde{1}^{-1}, & i > j \end{cases}, \quad \tilde{P}_k = \begin{cases} \tilde{p}_{ij}, & i = j \\ \tilde{p}_{ij}^L, & i < j \\ \tilde{p}_{ij}^R & i > j \end{cases}$$

By comparison with dimension $j$, $i$ is more important.
By comparison with dimension $j$, $i$ is less important.

Expert evaluation value $\tilde{p} = (\tilde{p}_{ij}) = (p_{ij}^L, p_{ij}^M, p_{ij}^R), \tilde{P}_k = (p_{ij}^{(k)})_{n \times n}$ ($k = 1, 2, 3, ..., m$)
where L is the number on the left side of the triangular fuzzy number, M is the central number in the triangular fuzzy number, and R is the number on the right side of the triangular fuzzy number.

Following functions (1) to (7), by deriving the fuzzy linguistic variable preference values embedded in the matrix, a complete consistent fuzzy linguistic preference relations matrix was established.

\[
\bar{P}_{ij} = g(\bar{a}_{ij}) = \frac{1}{2} \left( 1 + \log_{\frac{A_i}{A_j}} \right)
\]  

(1)

Formulas (2)–(4) are now used to obtain the triangular fuzzy number in each field of the upper triangle in the matrix.

\[
P_{ij}^L + P_{ji}^R = 1, \quad \forall i, j, k \in \{1, \ldots, n\},
\]

(2)

\[
P_{ij}^M + P_{ji}^M = 1, \quad \forall i, j, k \in \{1, \ldots, n\},
\]

(3)

\[
P_{ij}^R + P_{ji}^L = 1, \quad \forall i, j, k \in \{1, \ldots, n\},
\]

(4)

Formulas (5)–(7) are now used to obtain the triangular fuzzy number in each field of the lower triangle in the matrix.

\[
P_{ij}^L = \frac{j - i + 1}{2} - P_{i(l+1)}^R - P_{(l+1)(l+2)}^R - \cdots - P_{(j-1)}^R
\]

(5)

\[
P_{ij}^M = \frac{j - i + 1}{2} - P_{i(l+1)}^M - P_{(l+1)(l+2)}^M - \cdots - P_{(j-1)}^M
\]

(6)

\[
P_{ij}^R = \frac{j - i + 1}{2} - P_{i(l+1)}^L - P_{(l+1)(l+2)}^L - \cdots - P_{(j-1)}^L
\]

(7)

By applying the functions (8)–(10), all the fuzzy linguistic variable preference values \(\bar{P}_{ij}\) in the consistent fuzzy linguistic preference relations matrix were within the range between 0 and 1, and the fuzzy linguistic preference matrix obtained using conversion function corresponding to the fuzzy set was uniformly within a certain scope, which maintained the consistency of addition and positive reciprocal numbers (\(c\) denotes the minimum value in the consistent fuzzy linguistic preference relations matrix).

\[
f(x^L) = \frac{x^L + c}{1 + 2c}, \quad c \in [-c, 1 + c]
\]

(8)

\[
f(x^M) = \frac{x^M + c}{1 + 2c}, \quad c \in [-c, 1 + c]
\]

(9)

\[
f(x^R) = \frac{x^R + c}{1 + 2c}, \quad c \in [-c, 1 + c]
\]

(10)

Function (11) was adopted to calculate all participants’ opinions by averaging participants’ ratings of each attribute.

\[
\bar{P}_{ij} = \frac{1}{m} \sum_{k=1}^{m} \bar{P}_{ij}^{(k)}, \quad \forall i, j,
\]

(11)

Function (12) calculated the mean of \(\bar{P}_i\), the averages of item i (where \(n\) is the number of attributes).
Weights normalization, the weight vector of attribute \( i \), was obtained through Function (13).

\[
\tilde{\mathbf{P}}_i = \frac{\sum_{j=1}^{n} \tilde{P}_{ij}}{n}, \quad \forall i,
\]

(12)

Weight of each attribute was generated through Function (14). Defuzzified weights \( D_i (i = 1, 2, 3, \ldots, n) \) were derived based on each element \( x(i = 1, 2, 3, \ldots, n) \), and then ranked in order.

\[
D_i = \frac{1}{3} \left( w_i^f + w_i^m + w_i^b \right)
\]

(14)

**4.3. Analysis Most Important Key Factor of Service Quality**

After the valid questionnaires' data is filed, the next step was to use the foregoing formulas to calculate the weights of the defuzzified numbers of the various aspects and attributes of the aviation companies (Appendix B), travel agencies (Appendix C), and hotels (Appendix D). It was found that the most important service quality aspect for aviation companies was functional value, which had a weight of 0.2228, and the most important service quality attribute was safety, which had a weight of 0.0847 (Table 9). The most important service quality aspect for the travel agencies was epistemic value, which had a weight of 0.2171, and the most important service quality attribute was innovativeness, which had a weight of 0.0746 (Table 10); the most important service quality aspect for the hotels was also functional value, which had a weight of 0.2201, and the most important service quality attribute was comfort, which had a weight of 0.0797 (Table 11). Figures 4–6 are comparisons of the weights of service quality in the three industries. The research results show that the CV-SQ model can measure the service quality weight of different service industries, and its universal applicability is again supported by empirical tests. While it can be seen from the three tables of service quality weights that the weight of epistemic value ranked first in the case of the travel agencies, and ranked second in the case of both the aviation companies and hotels, this aspect has not been included in any service quality classification schemes during at least the past 30 years (see Table 2). This research finding illustrates the important position of epistemic value in service quality and fills this long-standing research gap.

**Table 9. Aviation companies service quality weights.**

| Aspects         | Attributes         | Relative Weights | Rank |
|-----------------|--------------------|------------------|------|
| Name            | Weights | Rank | Name | Weights | Rank | Weights | Rank |
| Functional Value| 0.2228   | 1 | Comfort | 0.3005 | 3 | 0.0670 | 6 |
|                 |          |    | Efficiency | 0.3194 | 2 | 0.0712 | 5 |
|                 |          |    | Safety | 0.3800 | 1 | 0.0847 | 1 |
| Social Value    | 0.1809   | 5 | Respect | 0.3571 | 1 | 0.0646 | 7 |
|                 |          |    | Recommendation | 0.3065 | 3 | 0.0554 | 15 |
|                 |          |    | Praise | 0.3364 | 2 | 0.0609 | 14 |
| Conditional Value| 0.1874  | 3 | Adaptability | 0.3414 | 1 | 0.0640 | 8 |
|                 |          |    | Mobility | 0.3314 | 2 | 0.0621 | 11 |
### Table 10. Travel agencies service quality weights.

| Aspects     | Attributes | Weights | Rank | Relative Weights | Rank |
|-------------|------------|---------|------|------------------|------|
| Functional Value | Comfort    | 0.3107  | 3    | 0.0608           | 14   |
|             | Efficiency | 0.3470  | 1    | 0.0679           | 7    |
|             | Safety     | 0.3424  | 2    | 0.0670           | 8    |
| Social Value | Respect    | 0.2921  | 3    | 0.0520           | 15   |
|             | Recommendation | 0.3431  | 2    | 0.0611           | 13   |
|             | Praise     | 0.3648  | 1    | 0.0650           | 10   |
| Conditional Value | Adaptable | 0.3382  | 1    | 0.0660           | 9    |
|             | Mobility   | 0.3293  | 3    | 0.0642           | 12   |
|             | Immediacy  | 0.3324  | 2    | 0.0648           | 11   |
| Emotional Value | Attentiveness | 0.3345  | 2    | 0.0716           | 4    |
|             | Pleasure   | 0.3221  | 3    | 0.0690           | 5    |
|             | Dependability | 0.3434  | 1    | 0.0735           | 3    |
| Epistemic Value | Innovation | 0.3435  | 1    | 0.0746           | 1    |
|             | Knowledge  | 0.3148  | 3    | 0.0683           | 6    |
|             | Technology | 0.3417  | 2    | 0.0742           | 2    |

### Table 11. Hotels service quality weights.

| Aspects     | Attributes | Weights | Rank | Relative Weights | Rank |
|-------------|------------|---------|------|------------------|------|
| Functional Value | Comfort    | 0.3621  | 1    | 0.0797           | 1    |
|             | Efficiency | 0.3044  | 3    | 0.0670           | 9    |
|             | Safety     | 0.3334  | 2    | 0.0734           | 4    |
| Social Value | Respect    | 0.3681  | 1    | 0.0654           | 10   |
|             | Recommendation | 0.3165  | 2    | 0.0562           | 14   |
|             | Praise     | 0.3154  | 3    | 0.0560           | 15   |
| Conditional Value | Adaptability | 0.3414  | 1    | 0.0597           | 11   |
|             | Mobility   | 0.3314  | 2    | 0.0579           | 12   |
|             | Immediacy  | 0.3272  | 3    | 0.0572           | 13   |
| Emotional Value | Attentiveness | 0.3531  | 1    | 0.0751           | 3    |
|             | Pleasure   | 0.3251  | 2    | 0.0691           | 6    |
|             | Dependability | 0.3217  | 3    | 0.0684           | 8    |
| Epistemic Value | Innovation | 0.3558  | 1    | 0.0765           | 2    |
|             | Knowledge  | 0.3189  | 3    | 0.0685           | 7    |
|             | Technology | 0.3254  | 2    | 0.0699           | 5    |
Figure 4. Weights comparison of the service quality aspects in the three industries.

Figure 5. Weights comparison of the service quality attributes in the three industries.
5. Conclusions and Recommendations

5.1. Discussion

Since most past service quality assessment models were developed to address a specific industry, they are limited to that industry’s specific characteristics, and do not have universal applicability. In addition, service quality assessment models developed from a strictly corporate perspective cannot be used to measure those key service quality factors that are truly most important to consumers. In keeping with the trend in 21st century marketing research of taking consumers’ thinking as paramount, as noted by Dev and Schultz [113], service quality assessment models must be developed on a basis of consumers’ values if they are to measure the key service quality factors of greatest importance to consumers. In order to fill this gap, this research is based on the theory of consumption values to develop a CV-SQ model that can be supported by theoretical and empirical tests in conceptualization and universal applicability; unlike past service quality assessment models that must be modified in view of the industry to be studied, the 15 service quality attributes in the CV-SQ model can express most consumer service quality demands. This model’s universal applicability can consequently be applied to a majority of industries, and can help most industries find their most important key factor of service quality and thereby help them to improve customer satisfaction.

While past service quality research has employed fuzzy multi-criteria decision-making (FMCDM) methods, these studies have largely used this method to analyze service quality and performance in individual industries, e.g., [46,114], or performed ranking analysis of service quality, e.g., [115–117]. This study, therefore, filled the gap created by the absence of studies employing the Fuzzy LinPreRa method to solve the MCDM problem of the universal applicability of a service quality assessment model. It was only necessary to compile a questionnaire with \( n - 1 \) items when using the Fuzzy LinPreRa method, which greatly reduced the number of comparisons needed, and also avoided inconsistencies when the experts completed the questionnaires [42]. This method was, thus, shown to be more efficient and correct than other FMCDM methods, which also requires consistency testing. Because Fuzzy LinPreRa can avoid the problem of inconsistent evaluation results [51,118], and because it uses triangular fuzzy numbers, so it can completely retain the uncertainty information [111]. Therefore, its research results are easier to have higher reliability and validity than AHP, and easier to have higher reliability than FAHP.
The pairwise comparison matrix of Fuzzy LinPreRa only needs to be compared \( n - 1 \) times \([51,118]\), and no fine-tuning step is required after analysis \([118]\), which is more efficient than AHP and FAHP. Because of these characteristics and advantages, this study uses Fuzzy LinPreRa in the CV-SQ framework to verify the most important key factors for the service quality of the three industries, which confirmed its scientific results.

In the past, because there was no universally applicable service quality measurement model, many studies could only be modified with the SERVQUAL model, e.g., \([28,119–121]\), and these studies used AHP or FAHP to analyze service quality, so they still needed to be tested with consistency. Compared with the universally applicable CV-SQ service quality measurement model proposed by this research, it can be universally applied to various service industries without modification. The universal applicability of the CV-SQ model has received support from the perspective of experts and consumers, and also received support from empirical tests of aviation companies, travel agencies, and hotels conducted by this research. In terms of research methods, this research uses Fuzzy LinPreRa, and there is no need to perform a consistency test to have consistency, which makes the research process efficient and also makes the research results reliable and valid.

5.2. Management Implications

Based on the research results, this research proposes strategies to improve service quality for three industries, as a practical guideline for business managers when improving service quality: The most important key factor affecting aviation companies service quality was safety. Airlines should allocate sufficient resources to the improvement of the functional value of their flight safety. For example, one possibility is to use the advanced Aero Mobile Satellite System (AMSS) to monitor aircraft engines and prevent flight safety accidents. The most important key factor of service quality in the travel agencies was innovativeness. Travel agencies should devote adequate resources to improving their itineraries and developing novel service experiences, which will cause consumers to appreciate the epistemic value of innovation. For instance, online travel agency systems will immediately display the most suitable ticket, hotel, and suggested travel itineraries after consumers enter their desired times and locations. The most important key factor for service quality in hotels was comfort. Hotels should use sufficient resources to enhance the convenience and comfort of lodging facilities, which will cause consumers to feel the functional value of comfort. For instance, hotels can use the Internet of Things in the form of cloud management modules in conjunction with devices provided by the hotel or consumers’ own mobile devices to provide users with more comfortable, personalized lodging service.

The weight of epistemic value ranked first among heavy consumers of travel agencies’ services, and ranked second among heavy consumers of aviation companies’ and hotels’ services. This indicates that consumers have high expectations of and place considerable value on innovative, knowledge, and technological services—all of which are epistemic values—during the travel planning, air travel, and lodging stages. It is very important to offer innovative services. Novel services can ensure that consumers have a happy experience and a high level of satisfaction, and are a key factor in acquiring consumer loyalty \([122]\). Superior, innovative services can boost consumer satisfaction \([123]\), and effective, professional knowledge services can ensure a company’s competitive advantage and represent an important means of creating value activities \([124]\). Technology can also help hotels to meet consumers’ needs \([125]\). The results of the study and relevant literature reveal that not only can epistemic value meet consumers’ expectations and win their favor, but also show that it can create a competitive advantage and boost consumer satisfaction and loyalty.

Different industries’ most important key factors of service quality will differ. When seeking to improve their key service quality factors, managers in different industries can rely on the CV-SQ model to assess the weights of the service quality aspects and attributes in the eyes of their target customers; they can then use the resulting information to allocate...
resources appropriately, and draft action plans. After their action plans have been implemented for a period of time, the companies can conduct customer satisfaction surveys in order to achieve the strategic assessment of improvement in their key service quality factors and consumer satisfaction.

5.3. Research Contributions

There are three theoretical contributions of this research: First, it proposed a new service quality assessment perspective based on the theory of consumption values. This perspective can more effectively convey consumers’ needs and expectations of service quality. Second, the universal applicability of each attribute of the CV-SQ model has been unanimously agreed by more than 75% of experts and heavy consumers; it can be universally applied to different service industries, and overcomes the limitation of past service quality assessment models that can only assess the characteristics of certain industries. Third, the study discovered that the weight of epistemic value was highest in the case of travel agencies, and second-highest in the case of the aviation companies and hotels. The most surprising aspect of this finding is that epistemic value had not been included in any of the service quality classification schemes published during the past three or four decades (see Table 2). Future research and practice should pay closer attention to this major discovery. There are 2 practical contributions in this research: First, this study’s empirical analysis of three industries found that the most important key factors of service quality consisted of safety (0.0847) in the case of aviation companies, innovativeness (0.0746) in the case of travel agencies, and comfort (0.0797) in the case of hotels. Based on the research results, we propose strategies that improve service quality, and they can enable these three industries to improve their key service quality factors. Second, provides corporate managers with a universally applicable CV-SQ service quality assessment model. It does not need to be modified again; any service companies can use it to analyze the most important key factor of service quality. This can help companies to achieve greater customer satisfaction by directing their companies’ limited resources to those key factors most in need of improvement.

5.4. Recommendations for Future Research

Six limitations and recommendations of this study: First, the methodology of this research assumes that service quality attributes are not dependent on each other, and future research can assume that service quality attributes are interdependence in order to use CV-SQ to carry out related research of methods such as Decision-Making Trial and Evaluation Laboratory (DEMATEL) and DEMATEL-based Analytic Network Process (DANP). Second, the statistical sample is limited to Taiwan, and future research can be extended to other countries. Third, empirical tests in this study are only limited to aviation companies, travel agencies, and hotels. In future research, the scope of researches can be expanded to other service industries (e.g., high-speed rail, hospitals, banks). Fourth, while this study performed cross-sectional analysis, we recommend future research to conduct longitudinal analysis geared to understanding whether the most important key factor of service quality emphasized by consumers changes with time or is due to the effect of certain interfering factors. Fifth, future research can use the CV-SQ model to analyze differences in a certain industry’s most important key factor of service quality in the eyes of different consumer groups. This will allow companies to enhance service quality by targeting the needs of different groups of consumers, and can also enable researchers to analyze key service quality factors and satisfaction at a particular case company. Finally, although the weight of epistemic value was first or second highest among the three industries examined in this study, this aspect had not been included in service quality classification systems during past decades (see Table 2). Therefore, the five values of the theory of consumption values can be used in DEMATEL analysis to determine the degree of mutual influence between epistemic value and the other four values, which further verify the importance of epistemic value to service quality.
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Appendix A

Table A1. Experts’ background information.

| No. | Gender | Education   | Years of Experience | Professional Background                                                                 | Title                      |
|-----|--------|-------------|---------------------|----------------------------------------------------------------------------------------|----------------------------|
|     |        |             |                     | Industry                                                                               |                            |
| 1   | M      | Master’s   | 19                  | Customer complaint management, service quality improvement management                | Customer service manager  |
| 2   | M      | Bachelor’s | 13                  | Innovation service project management, service quality improvement project management| Project manager           |
| 3   | F      | Master’s   | 23                  | Service quality audit                                                                 | Customer service senior manager |
| 4   | M      | Master’s   | 15                  | Service quality management, services marketing management                              | Customer service manager  |
| 5   | M      | Master’s   | 20                  | Customer relations management, services marketing management                           | Sales manager              |
| 6   | F      | Bachelor’s | 12                  | Consumer behavior analysis, service quality management                                 | Customer service manager  |
| 7   | M      | Ph.D.      | 27                  | Organizational management, service quality management                                  | General manager            |
|     |        |             |                     | Academia                                                                               |                            |
| 8   | M      | Ph.D.      | 20                  | Customer relations management, consumer behavior, service marketing strategies        | Professor                  |
| 9   | M      | Ph.D.      | 18                  | Service quality management, consumer behavior research                                | Associate prof.           |
| 10  | F      | Ph.D.      | 17                  | Marketing management, service quality management, MCDM                                 | Professor                  |
| 11  | F      | Ph.D.      | 13                  | administration, customer relations management                                          | Associate prof.           |
| 12  | M      | Ph.D.      | 28                  | Consumer behavior research, marketing management, multivariate analysis               | Professor                  |
| 13  | F      | Ph.D.      | 22                  | Marketing strategies, research methods, service quality management                    | Professor                  |
Appendix B

Table A2. Aviation companies’ weights of aspects of the service quality.

| Function 4–11 | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|---------------|------------------|--------------|-------------------|-----------------|----------------|
| Functional Value | 0.50 0.50 0.50 | 0.34 0.39 0.45 | 0.29 0.40 0.53 | 0.22 0.41 0.60 | 0.26 0.49 0.74 |
| Social Value | 0.55 0.61 0.66 | 0.50 0.50 0.50 | 0.45 0.51 0.58 | 0.38 0.52 0.65 | 0.42 0.61 0.79 |
| Conditional Value | 0.47 0.60 0.71 | 0.42 0.49 0.55 | 0.50 0.50 0.50 | 0.43 0.50 0.57 | 0.47 0.59 0.71 |
| Emotional Value | 0.40 0.59 0.78 | 0.35 0.48 0.62 | 0.43 0.50 0.57 | 0.50 0.50 0.50 | 0.54 0.59 0.64 |
| Epistemic Value | 0.26 0.51 0.74 | 0.21 0.39 0.58 | 0.29 0.41 0.53 | 0.36 0.41 0.46 | 0.50 0.50 0.50 |
| total | 2.18 2.81 3.39 | 1.83 2.25 2.70 | 1.96 2.32 2.71 | 1.89 2.34 2.78 | 2.19 2.78 3.37 |
| Function 4–12 | 0.44 0.56 0.68 | 0.37 0.45 0.54 | 0.39 0.46 0.54 | 0.38 0.47 0.56 | 0.44 0.56 0.67 |
| Function 4–13 | 0.22 0.22 0.23 | 0.18 0.18 0.18 | 0.20 0.19 0.19 | 0.19 0.19 0.19 | 0.22 0.22 0.23 |
| Function 4–14 | 0.2228 | 0.1809 | 0.1874 | 0.1872 | 0.2217 |
| rank | 1 5 3 4 2 |

Table A3. Aviation companies’ weights of attributes of the functional value.

| Function 4–11 | Comfort | Efficiency | Safety |
|---------------|---------|------------|--------|
| Comfort | 0.50 0.50 | 0.47 0.53 | 0.58 0.51 | 0.63 0.72 |
| Efficiency | 0.42 0.47 | 0.53 0.50 | 0.50 0.50 | 0.54 0.60 | 0.64 |
| Safety | 0.28 0.37 | 0.49 0.36 | 0.40 0.46 | 0.50 0.50 | 0.50 |
| total | 1.21 1.34 | 1.51 1.34 | 1.43 1.54 | 1.55 1.72 | 1.85 |
| Function 4–12 | 0.40 0.45 | 0.50 0.45 | 0.48 0.51 | 0.52 0.57 | 0.62 |
| Function 4–13 | 0.29 0.30 | 0.31 0.33 | 0.32 0.31 | 0.38 0.38 | 0.38 |
| Function 4–14 | 0.3005 | 0.3194 | 0.3800 |
| rank | 3 2 1 |

Table A4. Aviation companies’ weights of attributes of the social value.

| Function 4–11 | Respect | Recommendation | Praise |
|---------------|---------|----------------|-------|
| Respect | 0.50 0.50 | 0.38 0.42 | 0.47 0.37 | 0.47 0.57 |
| Recommendation | 0.53 0.58 | 0.62 0.50 | 0.50 0.48 | 0.55 0.60 |
| Praise | 0.43 0.53 | 0.63 0.40 | 0.45 0.52 | 0.50 0.50 | 0.50 |
| total | 1.47 1.60 | 1.75 1.28 | 1.37 1.48 | 1.35 1.53 | 1.67 |
| Function 4–12 | 0.49 0.53 | 0.58 0.43 | 0.46 0.49 | 0.45 0.51 | 0.56 |
| Function 4–13 | 0.36 0.36 | 0.36 0.31 | 0.30 0.30 | 0.33 0.34 | 0.34 |
| Function 4–14 | 0.3571 | 0.3065 | 0.3364 |
| rank | 1 3 2 |
### Table A5. Aviation companies’ weights of attributes of the conditional value.

| Function 4–11 | Adaptability | Mobility | Immediacy |
|---------------|--------------|----------|-----------|
|               |              |          |           |
| Adaptability  | 0.50         | 0.50     | 0.50      |
| Mobility      | 0.46         | 0.52     | 0.57      |
| Immediacy     | 0.41         | 0.52     | 0.63      |
| total         | 1.37         | 1.54     | 1.70      |
| Function 4–12 | 0.46         | 0.51     | 0.57      |
| Function 4–13 | 0.34         | 0.34     | 0.34      |
| rank          | 1            | 2        | 3         |

### Table A6. Aviation companies’ weights of attributes of the emotional value.

| Function 4–11 | Attentiveness | Pleasure | Dependability |
|---------------|--------------|----------|---------------|
|               |              |          |               |
| Attentiveness | 0.50         | 0.50     | 0.50          |
| Pleasure      | 0.46         | 0.53     | 0.57          |
| Dependability | 0.39         | 0.51     | 0.61          |
| total         | 1.36         | 1.54     | 1.69          |
| Function 4–12 | 0.45         | 0.51     | 0.56          |
| Function 4–13 | 0.33         | 0.34     | 0.34          |
| rank          | 1            | 3        | 2             |

### Table A7. Aviation companies’ weights of attributes of the epistemic value.

| Function 4–11 | Innovation | Knowledge | Technology |
|---------------|------------|-----------|------------|
|               |            |           |            |
| Innovation    | 0.50       | 0.50      | 0.50       |
| Knowledge     | 0.49       | 0.55      | 0.59       |
| Technology    | 0.42       | 0.53      | 0.63       |
| total         | 1.41       | 1.57      | 1.72       |
| Function 4–12 | 0.47       | 0.52      | 0.57       |
| Function 4–13 | 0.34       | 0.35      | 0.35       |
| rank          | 1          | 3         | 2           |

### Appendix C

### Table A8. Travel agencies’ weights of aspects of the service quality.

| Function 4–11 | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|---------------|------------------|--------------|-------------------|----------------|-----------------|
|               |                  |              |                   |                |                 |
| Functional    | 0.50             | 0.50         | 0.50              | 0.50           | 0.50            |
| Social Value  | 0.49             | 0.55         | 0.60              | 0.50           | 0.50            |
| Conditional   | 0.39             | 0.50         | 0.63              | 0.50           | 0.50            |
| Emotional     | 0.29             | 0.45         | 0.63              | 0.40           | 0.50            |
| Epistemic     | 0.22             | 0.45         | 0.68              | 0.22           | 0.39            |
| total         | 1.88             | 2.45         | 3.04              | 2.07           | 1.82            |
| Function 4–12 | 0.38             | 0.49         | 0.61              | 0.41           | 0.49            |
| Function 4–13 | 0.19             | 0.20         | 0.21              | 0.18           | 0.18            |
| rank          | 3                | 5            | 4                 | 2              | 1               |
Table A9. Travel agencies’ weights of attributes of the functional value.

| Function 4–11 | Comfort | Efficiency | Safety |
|---------------|---------|------------|--------|
| Comfort       | 0.50    | 0.50       | 0.50   |
| Efficiency    | 0.40    | 0.44       | 0.50   |
| Safety        | 0.36    | 0.45       | 0.55   |
| total         | 1.26    | 1.39       | 1.55   |
| Function 4–12 | 0.42    | 0.46       | 0.52   |
| Function 4–13 | 0.31    | 0.31       | 0.32   |
| Function 4–14 | 0.3107  | 0.3470     | 0.3424 |
| rank          | 3       | 1          | 2      |

Table A10. Travel agencies’ weights of attributes of the social value.

| Function 4–11 | Respect | Recommendation | Praise |
|---------------|---------|----------------|--------|
| Respect       | 0.50    | 0.50           | 0.50   |
| Recommendation| 0.38    | 0.42           | 0.47   |
| Praise        | 0.29    | 0.38           | 0.50   |
| total         | 1.17    | 1.31           | 1.47   |
| Function 4–12 | 0.39    | 0.44           | 0.48   |
| Function 4–13 | 0.29    | 0.29           | 0.30   |
| Function 4–14 | 0.2921  | 0.3431         | 0.3648 |
| rank          | 3       | 2              | 1      |

Table A11. Travel agencies’ weights of attributes of the conditional value.

| Function 4–11 | Adaptability | Mobility | Immediacy |
|---------------|--------------|----------|-----------|
| Adaptability  | 0.50         | 0.50     | 0.50      |
| Mobility      | 0.46         | 0.51     | 0.57      |
| Immediacy     | 0.39         | 0.51     | 0.62      |
| total         | 1.36         | 1.52     | 1.69      |
| Function 4–12 | 0.45         | 0.51     | 0.56      |
| Function 4–13 | 0.34         | 0.34     | 0.34      |
| Function 4–14 | 0.3382       | 0.3293   | 0.3324    |
| rank          | 1            | 3        | 2         |

Table A12. Travel agencies’ weights of attributes of the emotional value.

| Function 4–11 | Attentiveness | Pleasure | Dependability |
|---------------|--------------|----------|---------------|
| Attentiveness | 0.50         | 0.50     | 0.50          |
| Pleasure      | 0.46         | 0.52     | 0.57          |
| Dependability | 0.37         | 0.49     | 0.60          |
| total         | 1.33         | 1.52     | 1.67          |
| Function 4–12 | 0.44         | 0.51     | 0.56          |
| Function 4–13 | 0.33         | 0.34     | 0.34          |
| Function 4–14 | 0.3345       | 0.3221   | 0.3434        |
| rank          | 2            | 3        | 1             |
Table A13. Travel agencies’ weights of attributes of the epistemic value.

| Function 4–11 | Innovation | Knowledge | Technology |
|---------------|------------|-----------|------------|
| Innovation    | 0.50       | 0.50      | 0.50       |
| Knowledge     | 0.49       | 0.55      | 0.59       |
| Technology    | 0.40       | 0.50      | 0.50       |
| total         | 1.39       | 1.55      | 1.69       |
| Function 4–12 | 0.46       | 0.52      | 0.56       |
| Function 4–13 | 0.34       | 0.35      | 0.35       |
| Function 4–14 | 0.3435     | 0.3148    | 0.3417     |

Table A14. Hotels’ weights of aspects of the service quality.

| Function 4–11 | Functional Value | Social Value | Conditional Value | Emotional Value | Epistemic Value |
|---------------|------------------|--------------|-------------------|-----------------|-----------------|
| Functional Value | 0.50 0.50 0.50 0.35 0.39 0.44 | 0.26 0.38 0.51 0.30 0.48 0.65 | 0.25 0.49 0.73 |
| Social Value   | 0.56 0.64 0.70 0.44 0.44 0.58 | 0.50 0.50 0.54 0.60 0.65 0.49 | 0.61 0.72       |
| Conditional Value | 0.49 0.62 0.74 0.44 0.44 0.58 | 0.50 0.50 0.54 0.60 0.65 0.49 | 0.61 0.72       |
| Emotional Value | 0.35 0.52 0.70 0.29 0.41 0.55 | 0.35 0.40 0.46 0.50 0.50 0.45 | 0.51 0.58       |
| Epistemic Value | 0.27 0.51 0.75 0.22 0.40 0.60 | 0.28 0.39 0.51 0.42 0.49 0.55 | 0.50 0.50 0.50  |
| total         | 2.17 2.76 3.35 1.79 2.20 2.67 | 1.81 2.17 2.55 2.21 2.67 3.06 | 2.08 2.70 3.31  |
| Function 4–12 | 0.43 0.55 0.67 0.36 0.44 0.53 | 0.36 0.43 0.51 0.44 0.53 0.61 | 0.42 0.54 0.66  |
| Function 4–13 | 0.22 0.22 0.22 0.18 0.18 0.18 | 0.18 0.17 0.17 0.22 0.21 0.21 | 0.21 0.22 0.22  |
| Function 4–14 | 0.2201 0.1776 0.1747 0.2126 0.2149 | 0.1776 0.1747 0.2126 0.2149 |
| rank          | 1     | 4     | 5     | 3     | 2     |

Table A15. Hotels’ weights of attributes of the functional value.

| Function 4–11 | Comfort | Efficiency | Safety |
|---------------|---------|------------|--------|
| Comfort       | 0.50    | 0.50       | 0.50   |
| Efficiency    | 0.54    | 0.59       | 0.63   |
| Safety        | 0.45    | 0.54       | 0.64   |
| total         | 1.49    | 1.63       | 1.77   |
| Function 4–12 | 0.50    | 0.54       | 0.59   |
| Function 4–13 | 0.36    | 0.36       | 0.36   |
| Function 4–14 | 0.3621  | 0.3044     | 0.3334 |
| rank          | 1      | 3          | 2      |

Table A16. Hotels’ weights of attributes of the social value.

| Function 4–11 | Respect | Recommendation | Praise |
|---------------|---------|----------------|-------|
| Respect       | 0.50    | 0.50           | 0.50  |
| Recommendation| 0.53    | 0.58           | 0.62  |
| Praise        | 0.48    | 0.57           | 0.68  |
| total         | 1.52    | 1.66           | 1.80  |
| Function 4–12 | 0.51    | 0.55           | 0.60  |
| Function 4–13 | 0.37    | 0.37           | 0.37  |
| Function 4–14 | 0.3681  | 0.3165         | 0.3154|
| rank          | 1      | 2              | 3     |
Table A17. Hotels’ weights of attributes of the conditional value.

| Function 4–11 | Adaptability | Mobility | Immediacy |
|---------------|--------------|----------|-----------|
| Adaptability  | 0.50         | 0.50     | 0.50      |
| Mobility      | 0.46         | 0.52     | 0.57      |
| Immediacy     | 0.41         | 0.52     | 0.63      |
| total         | 1.37         | 1.54     | 1.70      |
| Function 4–12 | 0.46         | 0.51     | 0.57      |
| Function 4–13 | 0.34         | 0.34     | 0.34      |
| rank          | 1            | 2        | 3         |

Table A18. Hotels’ weights of attributes of the emotional value.

| Function 4–11 | Attentiveness | Pleasure | Dependability |
|---------------|--------------|----------|---------------|
| Attentiveness | 0.50         | 0.50     | 0.50          |
| Pleasure      | 0.49         | 0.55     | 0.59          |
| Dependability | 0.44         | 0.55     | 0.65          |
| total         | 1.42         | 1.60     | 1.75          |
| Function 4–12 | 0.47         | 0.53     | 0.58          |
| Function 4–13 | 0.35         | 0.36     | 0.35          |
| rank          | 1            | 2        | 3             |

Table A19. Hotels’ weights of attributes of the epistemic value.

| Function 4–11 | Innovation | Knowledge | Technology |
|---------------|------------|-----------|------------|
| Innovation    | 0.50       | 0.50      | 0.50       |
| Knowledge     | 0.51       | 0.56      | 0.60       |
| Technology    | 0.45       | 0.55      | 0.64       |
| total         | 1.45       | 1.61      | 1.74       |
| Function 4–12 | 0.48       | 0.54      | 0.58       |
| Function 4–13 | 0.35       | 0.36      | 0.36       |
| rank          | 1          | 3        | 2           |

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