# SERVQUAL MODEL AND ANALYTIC HIERARCHY PROCESS ON THE EXPRESSWAY SERVICE QUALITY ASSESSMENT

## การใช้แบบจำลอง SERVQUAL และวิธี ANALYTIC HIERARCHY PROCESS (AHP) ในการประเมินคุณภาพการให้บริการของทางพิเศษแห่งประเทศไทย

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**Abstract**

Expressway is a common mean of transportation for Bangkok commuters due to the traffic congestion problem. Because of the higher toll rate on expressway, the service quality of the expressway, therefore, has received a greater emphasis. The identification of user satisfaction is important for improvement of the service quality of the expressway which is managed by the Expressway Authority of Thailand (EXAT). This study attempts to identify the service quality of the expressway and seeks for the most important service criteria. For that, the utilization of SERVQUAL approach with gap analysis model to compare expectation and perception on services are applied along with the Analytic Hierarchy Process (AHP) method to assess the weights of different service criteria. The results provide a better understanding about the expectation of expressway users and how to meet their satisfactions by minimizing the identified gap. In addition, the results provide suggestions on which service factors the EXAT needs to put greater emphasis on, in order to achieve the highest standard for expressway services.

**Keywords:** Service Quality, Analytic Hierarchy Process (AHP), Expressway Authority of Thailand (EXAT), SERVQUAL

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**บทคัดย่อ**

ทางพิเศษแห่งประเทศไทย หรือทางด่วน เป็นเส้นทางหลักเส้นทางหนึ่งที่ผู้ใช้รถใช้ถนนในกรุงเทพมหานครและปริมณฑลเลือกใช้เพื่อหลีกเลี่ยงการจราจรที่ติดขัด แต่เนื่องจากทางด่วนมีการเรียกเก็บค่าบริการที่ค่อนข้างสูง ดังนั้น มาตรฐานการให้บริการที่ดีจึงเป็นสิ่งที่จำเป็น งานวิจัยนี้มุ่งเน้นที่จะพัฒนาแนวทางการวัดระดับความพึงพอใจของผู้ใช้บริการทางด่วน โดยใช้หลักการของแบบจำลอง SERVQUAL ที่จำแนกปัจจัยหลักในการวัดระดับความพึงพอใจของการให้บริการออกเป็น 5 ด้าน และยังสามารถใช้วัดช่องว่างระหว่างสิ่งที่ผู้ใช้บริการคาดหวังและสิ่งที่ได้รับได้อีกด้วย อย่างไรก็ดีปัญหาหนึ่งของ SERVQUAL ที่เห็นได้ชัดคือ การที่ SERVQUAL ให้น้ำหนักปัจจัยหลัก 5 ด้านที่ใช้วัดระดับความพึงพอใจในการให้บริการเท่าๆ กัน ดังนั้น งานวิจัยนี้จึงพยายามแก้ปัญหาดังกล่าว โดยนำวิธี Analytic Hierarchy Process (AHP) มาประเมินค่าความสำคัญที่แตกต่างกันของแต่ละปัจจัย โดยอาศัยความคิดเห็นจากกลุ่มผู้เชี่ยวชาญ ผลของงานวิจัยนี้จะช่วยให้การทางพิเศษแห่งประเทศไทยเข้าใจถึงปัญหาในการให้บริการขององค์กร ว่าควรต้องปรับปรุงการให้บริการในด้านใดเป็นหลัก และแบบจำลองนี้สามารถนำไปประยุกต์ใช้กับองค์กรที่ให้บริการอื่นๆ ในวงกว้างได้ต่อไป โดยนักวิจัยมีความเชื่อมั่นว่าการประยุกต์ใช้ AHP กับ SERVQUAL ร่วมกันจะทำให้ผลที่ได้รับแม่นยำกว่าการใช้ SERVQUAL เพียงอย่างเดียว

**คำสำคัญ:** ระดับความพึงพอใจในการให้บริการ Analytic Hierarchy Process (AHP) การทางพิเศษแห่งประเทศไทย SERVQUAL

## Introduction

The major problem of Bangkok traffic congestion is the limited road space and the fast growing of number of vehicles registered in Bangkok (Tanaboriboon, Quium & Changsingha, 1993: 207-223; Burapatana & Ross, 2011: 25-42). According to Transport Statistics Sub-Division, Planning Division of Department of Land Transport, in 2013 (Department of Land Transport, 2013) the total roads space in Bangkok only supports 1.6 million vehicles. There are about 8 millions of registered vehicles are accumulated in the Bangkok Metropolis which is about 5 times of the roads space. In consequence, the expressway network has become one of the important alternatives for commuters to reduce their traveling times.

Nowadays, the service quality has become a serious issue of discussion as people are more concerned about receiving the highest utility or satisfaction level on what they have paid for. With the same reasons, the service quality of the expressway has received a greater emphasis as the toll rate on expressway is higher than before. There is a tendency to increase the toll rate every now and then. The purpose of this paper is to evaluate the service quality of expressways by combining the AHP and SERVQUAL techniques.

A group of experts were interviewed for obtaining weight of importance for each factor and how it affects the overall satisfaction level. Their judgments were collected in pairwise comparison manner. Then, the weights of all criteria were applied to SERVQUAL model. Questionnaire surveys of expressway users

were conducted at the expressway service area to obtain the information as the inputs for SERVQUAL model. The results of the SERVQUAL model suggest the gap between what the expressway users expect and what can be realized in the current situation.

## Literature Review

1. The Expressway Authority of Thailand (EXAT)

The Expressway Authority of Thailand (EXAT) is a state-owned enterprise, under Ministry of Transport, established in 1973 (as announced by the Revolutionary Council No. 290) (Expressway Authority of Thailand EXAT, 2013). EXAT takes all responsibilities for all services and problems which occur on expressways. The systems operated under EXAT are primarily in the Bangkok area, and some nearby provinces. The system first opened to service in 1981. And the system currently consists of seven completed sub-systems, as illustrated in Figure 1, covering a total distance of 198.43 kilometers. The expressway system consists of (in order of completion):

Chalerm Maha Nakhon Expressway (First Stage Expressway System); length 27 kilometers.

Si Rat Expressway (Second Stage Expressway System); length 38.46 kilometers.

Chalong Rat Expressway (Ramindra - At Narong Expressway); length 28.16 kilometers.

BuraphaWithi Expressway (Bang Na Expressway); length 32 kilometers.

UdonRatthaya Expressway (Bang Pa-in - Pak Kret Expressway); length 55 kilometers

Third stage expressway System, S1 section (At Narong - Bang Na); length 4.67 kilometers.

Bang Phli - Suk Sawat Expressway (South Kanchanaphisek ring road); length 22.53 kilometers.

As the expressways have become more important for urban travel, the number of users of expressways is ever increasing. In 2013, the Expressway Authority of Thailand (EXAT) Governor, reported that the expressway commuters currently make 190,000 trips daily on the expressways (Expressway Authority of Thailand EXAT, 2013).

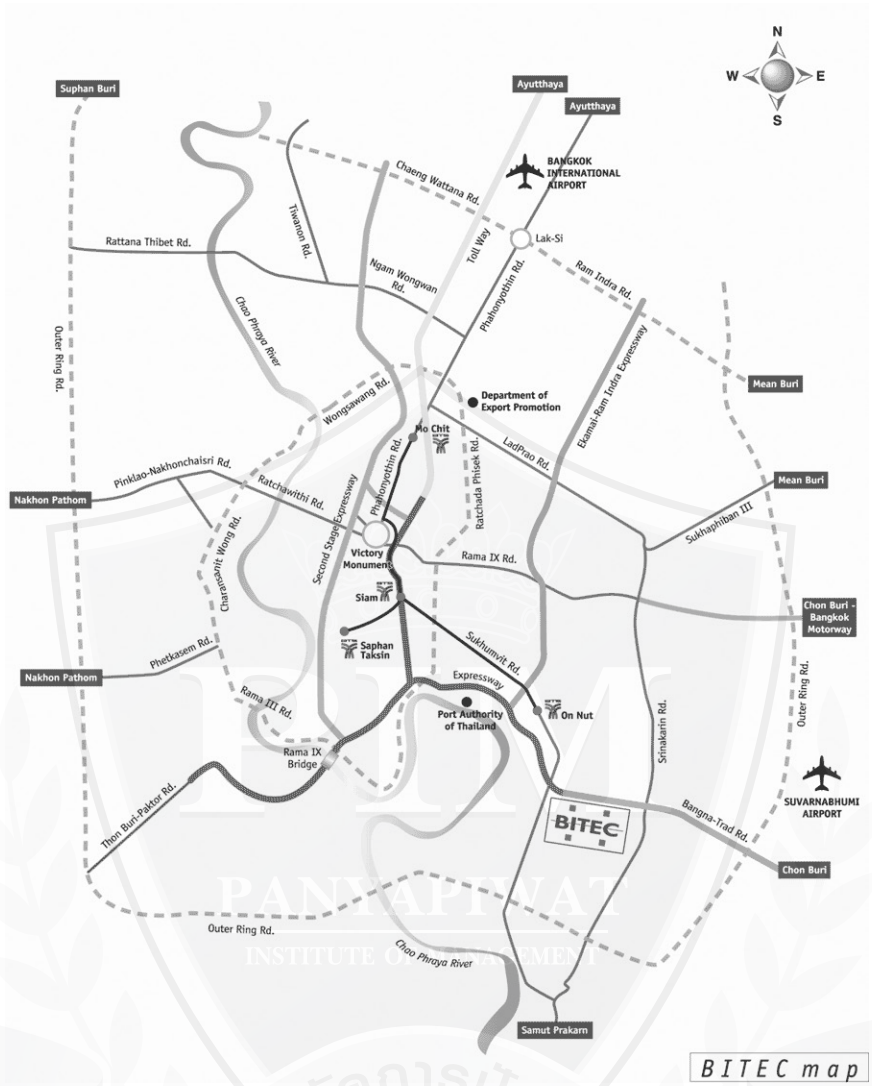


**Figure 1** Bangkok Expressways

**Source:** The 24th International Foods & Drinks, Hotels, Bakery Exhibition (2016)

2. Service Quality Model (SERVQUAL)

SERVQUAL is one of the most famous tools used for measuring service quality from the customers' perspective. It measures the scale of 'quality' in the service sectors. Service quality was defined by Parasuraman, Berry & Zeithaml (1990: 34-44) as a consumer's overall judgment or attitude towards the service. Such consideration of service is important, and it has been realized that by achieving higher service quality it would lead to an increased customer satisfaction, which yields an increase in business (Zeithaml, Berry & Parasuraman, 1996: 31-46). Service quality has gained popularity, and became an important research topic, mainly due to its close relationship with customer satisfaction (Daugherty, Stank & Ellinger, 1998: 35-51; Innis & La Londe, 1994: 1-27; Stank et al., 2003: 27-55).

As the basis of its service quality measurement instrument, SERVQUAL uses five dimensions: Tangible, Reliability, Responsiveness, Assurance, and Empathy (Parasuraman, Zeithaml & Berry, 1988: 12-37), as follows:

Reliability: The ability to perform the promised service dependably and accurately

Assurance: The knowledge and courtesy of employees, and their ability to convey trust and confidence

Tangible: The appearance of physical facilities, equipment, personnel and communication materials

Empathy: The provision for caring, and individualized attention to customers

Responsiveness: The willingness to help customers and to provide prompt service

In this paper, there are four dimensions which are Reliability, Assurance, Tangible, and Responsiveness that would be considered as the criteria in the Expressway Service Quality, due to the type of service of the EXAT that is aimed to be a venue for a mass public transportation. Therefore, the 'Empathy' aspect provided to specific customers could be difficult to provide and provisioned.

According to Parasuraman, Zeithaml & Berry (1985: 41-50), customers generally have a tendency to compare the service they 'perceive' with the service they 'expect'. If the perception does not fit to the expectation then a gap will increase. This measures the gap between customer's expectation and experience, and the basic assumption of measurement was that customers can evaluate a firm's service quality by comparing their perceptions with their expectations. Therefore, this study employed a questionnaire survey to obtain customers' opinions about their perceptions and expectations through the 1 to 5 Likert's scale, for which 1 means the lowest satisfaction level and 5 means the highest satisfaction level, respectively.

3. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) (Saaty, 1980) is a powerful tool, which can be used to make decisions when multiple and conflicting objectives/criteria are present, and both qualitative and quantitative aspects of those decisions need to be considered. Common application themes of AHP include selecting the best alternative, planning and development, and optimization (Vaidya & Kumar, 2006: 1-29). By using the AHP, dimensions of service quality can be identified about which one should be acquired the most attention, in order to create a sustainable competitive advantage.

After structuring the problem as a hierarchy and identifying criteria which contribute to the overall goal (service quality), as shown in Figure 2, experts were asked to rate the weight of importance between pairs of service dimensions, e.g. 'tangibles' versus 'reliability'. This is to indicate whether they felt that one dimension was 'equally important', 'more important than' or 'less important than' another dimension, by using the Saaty's rating scale table (as in Table 1) in the form of a pair-wise comparison matrix.

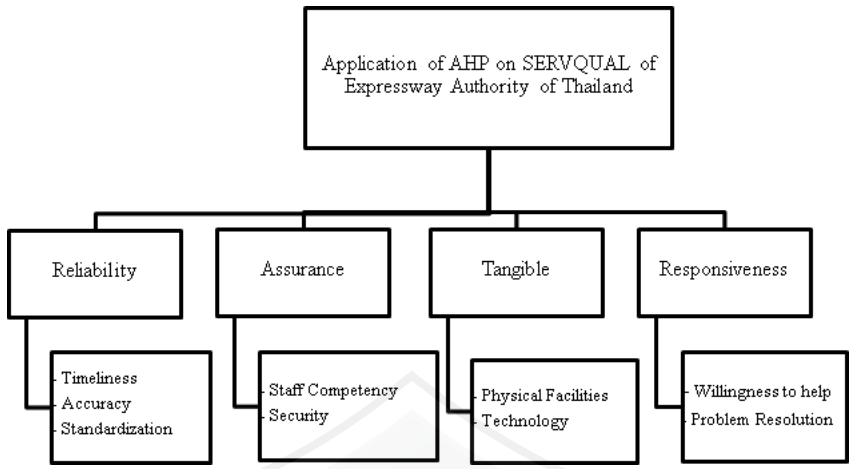


**Figure 2** AHP Model for Measuring Service Quality of Thailand Expressway.

**Table 1** Saaty's Rating Scale Table

| Intensity of importance | Definition | Explanation |
|---|---|---|
| 1 | Equally important | Two factor contribute equally to the objective |
| 3 | Somewhat more important | Experience and judgment slightly favor one over the other |
| 5 | Much more important | Experience and judgment strongly favor one over the other |
| 7 | Very much more important | Experience and judgment strongly favor one over the other. Its importance is demonstrated in practice |
| 9 | Absolutely more important | The evidence favoring one over the other is of the highest possible validity |
| 2,4,6,8 | Intermediate values | When compromise is needed |

**Source:** Saaty (1980)

In the matrix of pair-wise comparisons: $A = [a_{ij}]$ represents the value of the expert's preferences between pairs of criteria ($A_i$ vs. $A_j$, for all i, j=1,2,..,n). They are usually chosen based upon a given scale table. Given n criteria $\{A_1,A_2,,,,A_n\}$, a decision maker compares pairs of criteria for all possible pairs, and a comparison matrix A is obtained, where the element $a_{ij}$ shows the preference weight of criterion obtained by comparing $A_i$ with $A_j$, as shown in Equation 1.

$$A = [a_{ij}] = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1j} & \cdots & a_{1n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{i1} & a_{i2} & \cdots & a_{ij} & \cdots & a_{in} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nj} & \cdots & a_{nn} \end{bmatrix} \quad (1)$$

Where, $a_{ji} = 1/a_{ij}$

The next step is to convert the matrix into a rank of criteria, using the eigenvector approach. Saaty (1980), developed the Eigenvalue Method (EM), in order to synthesize a pair-wise comparison matrix, and to obtain a priority weight vector for several decision criteria and alternatives.

The weights are denoted by $\{w_1, w_2,...,w_n\}$ and the matrix of the ratios of all weights by (As shown in Equation 2): Then, matrix A is multiplied by the vector formed by each weighting w, as shown in Equation 3:

$$W = \left[\frac{w_i}{w_j}\right] = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_j & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_j & \cdots & w_2/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ w_i/w_1 & w_i/w_2 & \vdots & w_i/w_j & \cdots & w_i/w_1 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_j & \cdots & w_n/w_n \end{bmatrix} \quad (2)$$

$$Aw = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_j & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_j & \cdots & w_2/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ w_i/w_1 & w_i/w_2 & \vdots & w_i/w_j & \cdots & w_i/w_1 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_j & \cdots & w_n/w_n \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ \vdots \\ \\ \vdots \\ 1 \end{bmatrix} = n \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_j \\ \vdots \\ w_n \end{bmatrix} = \quad (3)$$

As $a_{ij}$ is a subjective rating given by the decision-maker, there must be a distance between them and the actual values $w_i / w_j$. Thus, $A_w = n_w$ cannot be calculated directly.

Therefore, Saaty (1980) suggested using the maximum Eigenvalue. Once the weighting scheme is determined (As shown in matrix A), the relationship can be solved by the linear equation (or use approximation methods) as shown in Equation 4:

$$Aw = \lambda_{max} w:$$

that is, $(A - \lambda_{max} I)\, w = 0$ (4)

If this equation has a nonzero solution for w, then $\lambda$max which is a scalar, is said to be an Eigenvalue or characteristic value of A: which is an n x n matrix of pair-wise comparisons and w (which is an n x 1 matrix), and is said to be an Eigenvector belonging to $\lambda$. I is the identity matrix, a diagonal matrix, with the main diagonal terms equal to 1 and 0, elsewhere.

The final step is to estimate Saaty's Eigenvector method using the Consistency Ratio technique. Saaty proposed what is called the 'Consistency Ratio', which is a comparison between Consistency Index (CI) and Random Consistency Index (RI), or as shown in Equation 5:

$$CR = CI / RI$$
$$= (\lambda_{max} - n) \div (n - 1) / RI \quad (5)$$

Where,

$\lambda_{max}$ = Maximum Eigenvalue of the priority matrix,
n = Number of elements in the matrix,
RI = Random Consistency Index computed for matrices of order n.

Different-order random matrices are given by Lee, Fawcett & Briscoe (2002: 374-387) and Saaty (1995).

If the value of Consistency Ratio is smaller or equal to 10%, the inconsistency is acceptable. If the Consistency Ratio is greater than 10%, then it is needed to consider revising our subjective judgments.

**Survey development and data collection**

To obtain the importance of each attribute in the AHP model, five experts in the transportation related area were interviewed. Two of the experts are professors from two different Universities with background in Transportation Management. The other two experts are executives in the Ministry of Transports (MoT). Their responsibilities are to look after the service levels of highways and roads in Thailand. The last expert came from the Department of Highways (DoH). His responsibility is to manage the service level of Motorways, which are the other toll-way sections under supervision of the DoH.

Then, their judgments in each dimension were used to construct the AHP matrix, in order to find the most important dimension of expressway services. In this study, adapted from SERVQUAL, there are four dimensions for the experts that are used to evaluate

the importance of the service quality of the EXAT's performance. Their pairwise comparison judgments were based upon a nine-point relational scale of importance: similar to the one used in the original AHP instrument (Saaty, 1980).

After the comparison matrix is obtained, the net weight of each attribute is calculated using the AHP approach. Next, these net weights are multiplied by the average scores obtained from SERVQAUL questionnaire that provides the results in scale of 1 to 5. Alongside with the interview of the experts, a questionnaire survey of the expressway users was conducted. The questionnaire consists of two parts. The first part is a SERVQUAL questionnaire, which asked customers who use the expressways to rate their preferences for expressway services, based upon scales of expectation and perception. This process helps determine which dimensions of SERVQUAL achieve the greatest interest from customers. The second part of the questionnaire is an open question for respondents to write their opinions or suggestions.

The 'Taro Yamane' formula is used to suggest the sample size of expressway drivers to be interviewed in this project, as follows in Equation 6 (Yamane, 1967):

$$n = \frac{N}{1 + Ne^2} \qquad (6)$$

Where,

n = The sample size,

N = The population size

E = Allowable error of 5%

According to Yamane (1967), at the 95% confidence level, the sample size is suggested to be at least 400 participants for the study. Therefore, the questionnaires were distributed to 400 respondents.

The sampling techniques utilized in this research were cluster sampling technique combined with simple random sampling.

Different service areas on the expressways were considered to be different clusters. The research team has randomly selected two services areas to administer the questionnaire survey, which are Bangsue and Bangna service areas.Then, two hundred questionnaires were randomly distributed to expressway users in each service area on weekdays and weekends.

After data is collected from both experts and expressway users, the net score of each attribute is obtained and evaluated to identify which aspects should be considered as important expressway service quality, as a reflection of both the experts and expressway users' judgments.

## Methodology and Results

1. AHP and Expert's Opinions

Step 1

After Expert's judgments were obtained, the matrix is formed. The matrix, as depicted in Table 2, displays numerical values (based upon the nine-point importance scales) denoting the importance of the service dimension, by pair-wise comparison.

**Table 2** Pairwise Comparison Matrix

| Criteria | Reliability | Tangible | Assurance | Responsiveness |
|---|---|---|---|---|
| **Reliability** | 1 | 1.2079 | 1.5047 | 3.3010 |
| **Tangible** | 0.82787 | 1 | 0.7752 | 3.6296 |
| **Assurance** | 0.6645 | 1.2899 | 1 | 2.9090 |
| **Responsiveness** | 0.3029 | 0.2755 | 0.34375 | 1 |

From a rough observation from the judgment values in the comparison matrix, most of the experts have rated Reliability highly. On the other hand, Responsiveness was rated with only few scores.

Step 2

The matrix is computed by using the AHP method in excel, and completed by the following steps (shown in Table 3):

(1) Squaring the matrix

(2) Computing the eigenvector

a. sum the rows

b. sum the row totals

c. divide the row summations by the row totals

(3) Repeat these processes until the eigenvector solution does not change from the previous one, in order to obtain the important weight of each dimension.

(4) Divide eigenvector 1 with eigenvector 2, to check the difference in eigenvector value. If there is not much difference, then the value is considered valid.

**Table 3** Eigenvector Obtained from AHP Calculation.

| Criteria | Eigenvector |
|---|---|
| Reliability | 0.3494 |
| Tangible | 0.2768 |
| Assurance | 0.2818 |
| Responsiveness | 0.0918 |

Step 3

Consistency Ratio computation is completed by the following steps:

(1) Sum each column

(2) Divide each column with total sum of each column

(3) Sum each row

(4) Divide each total row with size of matrix (4)

(5) Use Multiplication Function (=MMULT ()) to get Consistency Measure of each dimension

(6) Average all Consistency Measure and then subtract with size of matrix (4) to get CI

(7) The size of matrix is 4, from table 4, the RI = 0.89 (Saaty, 1980).

(8) Divide CI with RI to get Consistency Ratio:

(9) CI = 0.0127931

(10) RI = 0.89

Consistency Ratio (CI/RI) = 0.0143743

The Consistency Ratio of this matrix equals to 0.01 which is less than 10% or 0.1. Therefore, the inconsistency is acceptable.

After the results of AHP are obtained, the 'Expert Choice' software is used to validate whether the results obtained from step 2 is correct, or not. Expert Choice is a decision making software that enables teams to prioritize alternatives in the AHP model, in order to obtain the best choice of confidence for important organizational decisions. The results from manual calculations were confirmed by the results obtained from Expert Choice software, as shown in Figures 3 and 4.

**Table 4** Random Consistency Index (RI)

| **Size of matrix (or n)** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Random consistency index** | 0.0 | 0.0 | 0.52 | 0.89 | 1.11 | 1.25 | 1.35 | 1.40 | 1.45 | 1.49 |

**Source:** Saaty (1980)

| | Reliability | Tangible | Assurance | Responsiveness |
|---|---|---|---|---|
| Reliability | | 1.208 | 1.505 | 3.301 |
| Tangible | | | 1.29 | 3.63 |
| Assurance | | | | 2.909 |
| Responsiveness | Incon: 0.01 | | | |

**Figure 3** AHP Calculation by Expert Choice Software.

| Priorities with respect to: Goal | |
|---|---|
| Reliability | 0.349 |
| Tangible | 0.277 |
| Assurance | 0.282 |
| Responsiveness | 0.092 |
| Inconsistency = 0.01 with 0 missing judgment | |

**Figure 4** AHP Results Obtained from Expert Choice Software.

According to the validation process, the results and the ranks from both methods can be validated to be the same. Regarding the final scores, that are shown in Table 3 and Figure 4, the Reliability aspect achieved the greatest importance score, amongst the four dimensions, and Responsiveness received the lowest score. This means that the participants valued 'Reliability' as the most important expressway service, followed by Assurance, Tangible and Responsiveness, respectively.

Step 4

For the SERVQUAL questionnaire, scores is combined from each criterion's questions, and then the geometric mean was used to obtain the final customer satisfaction scores

Step 5

Combine the results from the AHP method with the SERVQUAL scores by

(1) Multiplying importance of weight by perception, and expectation, separately.

(2) Subtracting the weighted expectation score from the weighted perception score, to obtain the different gap values.

Tables 5 and 6 show the results of the net scores after the weights of service from AHP were combined with final scores from the SERVQUAL questionnaire survey, on Expectation and Perception aspects, respectively.

**Table 5** Net Scores Obtained from Combination of Expectation of Expressway Users and Eigenvector from the AHP Approach.

| Criteria | Expectation | Eigenvector | Expectation*Eigenvector |
|---|---|---|---|
| Reliability | 4.2076 | 0.3494 | **1.4703** |
| Tangible | 3.7785 | 0.2768 | **1.0460** |
| Assurance | 3.7238 | 0.2818 | **1.0496** |
| Responsiveness | 3.4582 | 0.0918 | **0.3176** |

**Table 6** Net Scores Obtained from Combination of Perception of Expressway Users and Eigenvector from the AHP Approach.

| Criteria | Perception | Eigenvector | Perception*Eigenvector | Gap Scores |
|---|---|---|---|---|
| Reliability | 3.6904 | 0.3494 | **1.2895** | **0.1807** |
| Tangible | 3.1675 | 0.2768 | **0.8769** | **0.1691** |
| Assurance | 3.2324 | 0.2818 | **0.9111** | **0.1384** |
| Responsiveness | 2.8669 | 0.0918 | **0.2632** | **0.0543** |

**Note:** Gap score = (Expectation*Eigenvector) – (Perception*Eigenvector)

It is obvious that reliability aspect achieves the highest rank in both customer perception and expectation, among the four dimensions. Nevertheless, when finding the gap scores by subtracting 'Perception' score from 'Expectation' score, Reliability yielded the highest gap between perception and expectation followed by Tangible, and Assurance. The lowest gap is Responsiveness.

## Discussion and Conclusion

As service is important in any business, its quality needs to be highly considered. Service providers often assess their service quality to understand how well they perform at meeting customer satisfaction, improve their services. Normally, to measure the service quality level in different aspects of service provided, SERVQUAL is a standard technique. However, one drawback of SERVQUAL is that it treats all the different aspects of service quality the same way. In reality, because of the different natures of service organization, some service aspects may be much important than the others. Therefore, it is essential to identify the difference level of importance in different service aspects in SERVQUAL.

The AHP technique is applied to analyze the different levels of importance in different service dimensions of the Expressway Authority of Thailand (EXAT). According to SERVQUAL theory the factors of expressway services are considered to preside in four service dimensions, which are: (a) reliability, (b) tangible, (c) assurance, and (d) responsiveness.

The utilization of AHP helped find the different important levels of service dimension for EXAT. From the above analysis, Reliability achieved the greatest weight of importance of 0.3494 or 34.94%, followed by Assurance at the weight of 0.2768 or 27.68%, Tangible at the weight of 0.2818 or 28.18% and Responsiveness at the weight of 0.0918 or 9.18%, respectively. Therefore, Reliability is the most highly considered dimension which EXAT specifically focus upon. Thereafter, the weight of service from AHP was combined with each dimension's final score from the SERVQUAL survey as can be shown in Table 5 and 6. After the combination, Reliability still achieved the highest rank in both customer perception and expectation, amongst the four dimensions. This shows that both customers and experts place the greatest emphasis on this dimension.

However, after the Gap scores is determined, in Table 7, by finding the differences between 'Perception' scores and 'Expectation' scores, Reliability yielded the highest gap score of 0.1807, followed by Tangible at the score of 0.1691, Assurance at the score of 0.1384, and Responsiveness at the score of 0.0543. This expresses concern of customers that, in their opinion, Reliability aspect is the most important criterion. Yet, it is in their concern that the Reliability aspect of Expressway service still does not match with their expectations.

On the other hand, the criterion that obtains the lowest gap is Responsiveness at the score of 0.0543. Therefore, no matter which dimension EXAT places greater importance upon, users

still feel some difference between what they perceive and what they expect.

From these results, EXAT should focus on the improvement of their service quality pertaining to 'Reliability', in order to reduce the gap between perception and expectation, and to give customers greater satisfaction and gain better trust in the service. Improvements to Reliability could be accomplished through the improvements in many aspects, such as, Timeliness, Accuracy, Standardization, and etc. With regard to the service of the expressways, most customers rarely have an opportunity to be in contact with EXAT staff, so they may not be aware of the Responsiveness of EXAT staff.

In addition, this study suggests EXAT to understand their strengths and weaknesses in order to improve service performance, not only with regard to responsiveness, but also other dimensions as well. Despite the gaps between perception and expectation being very small (less than 1), in order to keep customers using the services continuously, EXAT may need to regularly evaluate and identify their service problems to improve their performances provided to customers.

The technique presented in this paper that combines AHP and SERVQUAL can be applied to many different scopes of problem. The main drawback of this combination technique resides in the complication of AHP, which requires involvement of experts and the agglomeration of their opinions. Nevertheless, the combination of these two techniques could greatly assist the evaluation process to become a much more accurate evaluation system, when compared to the use of SERVQUAL alone. This is especially true in the service environment that customers place greater emphasis on one or two aspects of service areas. Therefore, the results of gap analysis that helps identify which service areas require greater attention would be more accurate, so the organization could apply their efforts and budget accordingly.

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