Analyzing Retailers' Perceptions of Service by Multivariate Analysis of Variance and Importance-Performance Analysis

An-Wen Lu, Ya-Hua Chang, and Hsin-Hung Wu

***Abstract*—With the intensified market competitiveness, it is essentially important for Taiwan Tobacco and Liquor Corporation to measure the retailers' perceptions of services. A questionnaire based on service quality model was developed, and multivariate analysis of variance (MANOVA) was applied to observe how demographic variables perceive among different service items and importance-performance analysis (IPA) was used to identify strengths and weaknesses as a whole. The results show that gender, business type, and bulk purchase category are the three major demographic variables that could have great impacts on retailers' satisfaction. In addition, IPA depicts that fifteen items are the major strengths and should be maintained in order to gain competitiveness in the market. In contrast to major strengths, stacking services on delivered goods and empty bottle recycling services were identified as two major deficiencies from retailers' viewpoints. Therefore, these two major weaknesses should be placed in the highest priority for improvement. The combination of MANOVA and IPA has not been seen in the research. The major advantage of the combination is to allow the management to observe if different demographic variables impact different services and, at the same time, to identify the major strengths and weaknesses of provided services for retailers based upon both perception and importance.**

***Index Terms*—Multivariate analysis of variance, importance-performance analysis, service quality, customer satisfaction.**

I. Introduction

Taiwan Tobacco and Liquor (TTL) Corporation in Taiwan originally a state-own enterprise has gradually transformed itself from a monopoly to open market and the privatization in order to gain the competitiveness after the market openness in tobacco and general wines since 2002. When the market is open, it indicates that the competition is intensified in the retailing market. Lee et al. [1] stated that measuring customer satisfaction is critically important because customer satisfaction is an overall attitude toward a product or service provider to see if the provided service quality has been met. In addition, when customer satisfaction has improved, customer retention, repurchase frequency, profitability, and, eventually, customer loyalty are to be enhanced [1], [2].

Service quality (SERVQUAL) model with five dimensions and twenty two questions proposed by Parasuraman et al. [3] has been widely used in practice to evaluate service quality or customer satisfaction for a wide variety of service areas [4]–[9]. Filiz [10] stated that customer satisfaction and service quality are often used together and interchangeably. In addition, SERVQUAL model can be applied to measure customer satisfaction. Therefore, this study intends to use SERVQUAL model as a basis to develop the questionnaire to survey the retailers who directly shop in a branch office in Taichung City, Taiwan for measuring service quality and customer satisfaction.

Several studies such as Chen *et al*. [11], Chen *et al*. [12], and Wu and Hung [13] have found that different demographic variables might have different perceptions about service quality or satisfaction. When the differences have been identified, the management can design different marketing strategies or provide different services to meet different needs. Thus, it would be essentially important for Taiwan Tobacco and Liquor Corporation to identify the differences for specified demographic variables. Analysis of variance (ANOVA), which focuses on uni-response problems, is typically used to identify if different demographic variables perceive different service quality or customer satisfaction [11]–[13]. On the contrary, multivariate analysis of variance (MANOVA) uses the variance-covariance between variables to measure the mean differences with several correlated dependent variables, which reduces the risk of Type I error [14]. This study intends to use MANOVA to observe how demographic variables perceive among different service items provided by Taiwan Tobacco and Liquor Corporation.

In addition to the differences identified by demographic variables, it would be of great interest for the management to identify the overall strengths and weaknesses of service quality provided by Taiwan Tobacco and Liquor Corporation as a whole. Importance-performance analysis (IPA) can be the tool to identify major strengths and weaknesses from customers' viewpoints [15]–[18]. With the use of IPA, the areas of needing improvement and effective performance can be found for improvement opportunities and strategic planning efforts [19]. This study intends to use IPA to identify the major strengths and weaknesses from retailers' viewpoints. With identified major weaknesses, enhancing those items could provide better services for retailers. When major strengths are found, these services should be relentlessly improved in order to gain competitiveness in the

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market.

II. Literature Review

A. Service Quality and SERVQUAL Model

Service quality has been defined as the extent to which a service meets customers' needs or expectations or can be conceptualized as the customers' overall impression of the relative inferiority or superiority of the service [10], [20]–[22]. In contrast, Gronroos [23] stated that service quality covers both the process of service delivery and its resulting outcomes. SERVQUAL model proposed by Parasuraman *et al*. [3] has five dimensions, including tangibles, reliability, responsiveness, assurance, and empathy, that reflect and measure both the process of service delivery and its outcomes, which can be applied to measure customer satisfaction [10]. The dimensions and questions in SERVQUAL model are depicted in Table I.

TABLE I: Items in SERVQUAL Model

Dimension	Item Description
Tangibles	They should have up-to-date equipment. Their physical facilities should be visually appealing. Their employees should be well dressed and appear neat. The appearance of the physical facilities of these firms should be in keeping with the type of services provided.
Reliability	When these firms promise to do something by a certain time, they should do so. When customers have problems, these firms should sympathetic and reassuring. These firms should be dependable. They should provide their services at the time they promise to do so. They should keep their records accurately.
Responsive-ness	They shouldn't be expected to tell customers exactly when services will be performed. It is not realistic for customers to expect prompt service from employees of these firms. Their employees don't always have to be willing to help customers. It is okay if they are too busy to respond to customer requests promptly.
Assurance	Customers should be able to trust employees of these firms. Customers should be able to feel safe in their transactions with these firm's employees. Their employees should be polite. Their employees should get adequate support from these firms to do their jobs well.
Empathy	These firms should not be expected to give customers individual attention. Employees of these firms cannot be expected to give customers personal attention. It is unrealistic to expect employees to know what the needs of their customers are. It is unrealistic to expect these firms to have their customers' best interests at heart. They shouldn't be expected to have operating hours convenient to all their customers.

SERVQUAL model, a concise multi-item scale with good reliability and validity, helps a wide variety of service and retailing organizations to understand customers' service expectations and perceptions and then further pinpoints areas that require the managerial attention and action to improve service quality [24]. SERVQUAL uses five easily understood dimensions to measure customers' service experience and has been extensively used or adapted to fit the characteristics or specific needs of a particular organization, such as e-learning experience, tourism destination, travel agents, education, healthcare industries, high speed rails, coach services, retailing industries, and banking industries [4], [5], [7]–[10], [18], [24]–[29]. Obviously, SERVQUAL model is very suitable to be used to measure service quality or customer satisfaction for the retailers of Taiwan Tobacco and Liquor Corporation.

B. Importance-Performance Analysis

Importance-performance analysis was originally developed by Martilla and James [30] and is viewed as one of the very useful tools that can provide the management insights to identify the strengths and weaknesses of an organization. IPA uses importance as an X-axis and performance as a Y-axis to form a two-dimensional grid as shown in Figure 1 [9], [17]. In practice, performance can be substituted by satisfaction. With four quadrants separated by X-axis and Y-axis, items or attributes can be categories into these four quadrants, including "keep up the good work" (Quadrant I), "possible overkill" (Quadrant II), "low priority" (Quadrant III), and "concentrate here" (Quadrant IV) [17]–[19].

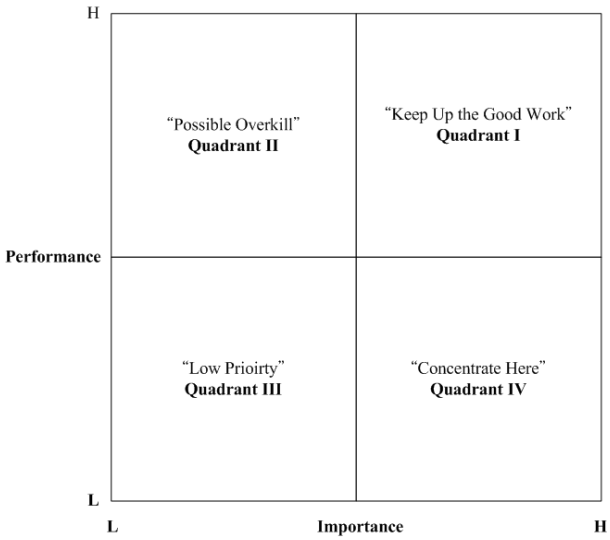

Fig. 1. Importance-performance analysis.

Items situated in different quadrants have different meanings. For instance, items located in Quadrant I have both high importance and performance indicating that these items can be viewed as the competitive advantages of an organization. These items can be relentlessly strengthened to gain competitiveness and increase the lead over rivalries in the marketplace. Items in Quadrant II have low importance but high performance indicating resources committed are excessive and should be deployed elsewhere. In addition, these items can be viewed as minor strengths for an organization. Items in Quadrant III have both low importance and performance and are viewed as the low priority for improvement and do not require additional efforts when the resources are limited. In fact, these items are classified into minor weaknesses. Finally, items in Quadrant IV have low

performance but high importance. This implies these items from customers' viewpoints are essentially important but their perceptions of performance are relatively low. That is, these items belong to major weaknesses for an organization. Besides, immediate attention for improvement is needed, and these items should be placed in the highest priority for improvement in order to reduce customer dissatisfaction [9], [19].

Importance-performance analysis has been applied in various areas to measure service quality or customer satisfaction, such as coach companies, telehealth services, convenience stores, high speed rails, healthcare, retailing industries, hospitality and tourism, and patient safety [5], [9], [18], [19], [29], [31]–[35]. It is believed that IPA is very suitable and practical to use in categorizing service quality in terms of strengths and weaknesses.

III. A Case Study

In order to evaluate how the retailers perceive the services provided by South Brach of Taichung Office in Taiwan Tobacco and Liquor Corporation, a questionnaire was developed based on SERVQUAL model proposed by Parasuraman *et al*. [3] and the characteristics of retailers who directly purchased from the store were also taken into account such that some service items were added or deleted to meet the needs in this study. Thus, the final questionnaire depicted in Table II has thirty two questions. Each respondent was asked to evaluate performance (satisfaction) and the importance for each question by a five-point Likert scale, where five and one represent highest satisfaction or importance and lowest satisfaction or importance, respectively. To further simplify the notations, I and S represents importance and satisfaction, respectively. That is, S2 is the second question of the satisfaction.

TABLE II: The Questions in the Study

Item	Content
1	Clean and decent dressed personnel by the sales office
2	Bright, spacious, and clean environment of the sales office
3	Clear advertising layout in the sales office
4	Convenience on purchase counters and ordering processes in the sales office
5	Smoothness of goods pick-up positions and moving lines
6	Product promotion news provided by the sales office
7	Convenience on the sales office location
8	Convenient parking space provided by the sales office
9	Friendly and energetic staff in the sales office
10	Staff with professional product knowledge in the sales office
11	Favorable marketing promotions informed initiated by the sales office
12	Instant reply on customers' purchase demands by the sales office
13	Confidence for new product sales (Attraction of the customers' purchase willingness)
14	Service attitude on customers' orders by the sales office
15	Operation capabilities on customers' product exchange processes by the sales office
16	Recycling operations on customers' empty containers by the sales office
17	Correctness on purchased items and quantity
18	Damage rate of product distribution
19	Response on incorrect customers' orders
20	Items and quantity accuracy for delivering orders
21	Orders' delivery processes (Goods arrival time)
22	Service level of returned tobacco and wines by service personnel
23	Ordered goods delivery and receiving processes
24	Stacking services on delivered goods by service personnel
25	Transport and empty bottle recycling services by service personnel
26	Convenience on assisting debit operations by financial institutions
27	Security and correctness of the debit payment system
28	Notification of price adjustment by the sales office
29	Reminders of purchase reward progress by the sales office
30	News provided through shop visits from time to time by the sales office
31	Reaction and communication channels for product issues by the sales office
32	Best customers' interests as the first priority by the sales office

The survey was conducted from September 9, 2014 to October 13, 2014 and distributed to the respondents who were willing to answer the questions by convenience sampling. A total of 200 questionnaires were issued, but 192 questionnaires were valid, representing a 96% response rate. The demographic information, including gender, age group, year of business operations, business type, average purchase amount of money, and bulk purchase category, is summarized in Table III.

TABLE III: Demographic Information in This Study

Variable	Frequency	Percentage
Gender		
Male	95	49.5
Female	97	50.5
Age Group		
21-35 years old	6	3.1
36-45 years old	40	20.8
46-55 years old	82	42.7
56 years old and above	64	33.3
Year of Business Operations		
Less than 1 year	4	2.1
1-10 years	46	24.0
11-20 years	73	38.0
21-30 years	48	25.0
31 years and above	21	10.9
Business Type		
Traditional grocery stores	140	72.9
Convenience stores	41	21.4
Supermarket stores	11	5.7
Average Purchase Amount of Money (in terms of New Taiwan dollars, NTD)		
Less than 5,000	12	6.3
5,000 to less than 10,000	45	23.4
10,000 to less than 20,000	85	44.3
20,000 to less than 30,000	22	11.5
30,000 and above	28	14.6
Bulk Purchase Category		
Tobacco	64	33.3
Beer	59	30.7
General Wine	69	35.9

The reliability of the questionnaires was measured by Cronbach's α. The reliability of satisfaction in the survey was 0.883, representing the internal consistency reliability is excellent [36]. With the Kaiser-Meyer-Olkin value of 0.786 and significant Bartlett's test of sphericity (p-value = 0.000), factor analysis for satisfaction questions could be performed. By applying SPSS 18.0 software, the parameters were as follows. Principal component analysis with correlation

matrix was chosen. The option of eigenvalues over one was selected. The rotation method was varimax. In our analysis, there were eight eigenvalues greater than one, and only two out of thirty two questions had the factor loading values less than 0.5, i.e., S7 and S21. The communality values of S7 and S21 were 0.564 and 0.501 greater than 0.5, indicating that these two items could be kept for further analysis [37].

The reliability of importance in the survey was 0.853, indicating the internal consistency reliability was excellent [36]. With the Kaiser-Meyer-Olkin value of 0.720 and significant Bartlett's test of sphericity (p-value = 0.000), factor analysis for importance questions could be performed. The factor loading values of I10 and I29 were 0.495 and 0.452, which were the only two values less than 0.5. In addition, the communality values of I10 and I29 were 0.462 and 0.632, showing I10 was recommended to be removed. To sum up, I10 and I21 were the only two items removed during the factor analysis process. The reliability of the remaining thirty importance questions were 0.842. In order to be consistent with the use of the questions throughout the study, the further analyses only use thirty questions excluding Items 10 and 21.

In multivariate analysis of variance, four commonly used test statistics, namely Wilk's likelihood ratio test, Pillai test, and Lawley-Hotelling test, and Roy's largest root, can be applied to determine if H_0: $\mu_1 = \mu_2 = \ldots = \mu_k$ is to be rejected, where k is the number of multivariate normal populations. Roy's largest root is more powerful than the other three tests when the mean vectors of dependent variables are collinear, while the other three tests have greater power than Roy's largest root when the mean vectors are more diffuse [38]. To determine if the mean vectors of dependent variables are collinear, conditional index (CI) can be an index to estimate [39]. Larger CI values indicate a more serious effect of collinearity. Specifically, there exists collinearity if CI value is between 15 and 30. A moderate to high effect of collinearity exists if CI value falls between 30 and 100. Finally, the collinearity is serious when CI value is greater than 100 [39].

The first part of this study intends to observe how different demographic variables impact the perceptions of thirty service items provided by Taiwan Tobacco and Liquor Corporation. That is, thirty items were the dependent variables. The effects of collinearity ranging from 15 to 137 indicate that the collinearity exists. Therefore, Roy's largest root was chosen to detect if H_0 is to be rejected. Table IV summarizes the MANOVA test statistics of applying Roy's largest root with $\alpha = 0.05$, where p values of gender, age group, year of business operations, business type, average purchase amount of money, and bulk purchase category were less than 0.05.

TABLE IV: MANOVA TEST STATISTICS BY ROY'S LARGEST ROOT

Effect	Value	F	Sig.
Gender	.444	1.789	.012
Age Group	.591	2.420	.000
Year of Business Operations	.694	2.861	.000
Business Type	.496	2.014	.003
Average Purchase Amount of Money	.462	1.907	.006
Bulk Purchase Category	.414	1.682	.022

The next step is to examine how demographic variables with statistical significance affect these thirty items. In order to show the results more specifically, the descriptions are discussed in terms of gender, age group, year of business operations, business type, average purchase amount of money, and bulk purchase category. For genders, there were seven items showing the satisfaction differences between males and females, i.e., S1, S2, S4, S7, S14, S15, and S18 (Table V). Males perceive significant higher satisfaction than females. For the other items, there were no significant differences between males and females.

TABLE V: GENDER ON SEVEN SERVICE ITEMS WITH SIGNIFICANCE

Variable	Type III Sum of Squares	Mean Square	F	Sig.	Male Avg.	Female Avg.
S1	.707	.707	4.808	.030	4.232	4.124
S2	1.066	1.066	4.594	.034	4.463	4.289
S4	.925	.925	4.142	.043	4.337	4.237
S7	1.635	1.635	5.587	.019	4.232	4.113
S14	3.263	3.263	17.751	.000	4.411	4.237
S15	2.131	2.131	10.154	.002	4.400	4.175
S18	.812	.812	3.992	.047	4.379	4.278

TABLE VI: AGE GROUP ON SIX SERVICE ITEMS WITH SIGNIFICANCE

Item	Mean	SD	Mean Square	F	Sig.	Bonferroni Test
S2			1.103	3.462	.018	
1. 21-35	4.67	.516				
2. 36-45	4.43	.501				
3. 46-55	4.32	.468				
4. 56 and above	4.39	.492				
S13			3.815	3.365	.020	
1. 21-35	3.67	.816				
2. 36-45	3.40	1.257				
3. 46-55	3.72	1.046				
4. 56 and above	3.56	1.180				
S20			1.059	6.309	.000	
1. 21-35	4.50	.548				
2. 36-45	4.16	.423				
3. 46-55	4.22	.400				
4. 56 and above	4.33	.473				
S24			.950	3.351	.021	
1. 21-35	4.00	.632				
2. 36-45	3.95	.749				
3. 46-55	4.13	.465				
4. 56 and above	4.20	.540				
S29			.634	3.459	.018	
1. 21-35	4.33	.516				
2. 36-45	4.23	.423				
3. 46-55	4.20	.483				
4. 56 and above	4.31	.467				
S32			.786	3.672	.014	
1. 21-35	4.67	.516				
2. 36-45	4.35	.483				
3. 46-55	4.23	.453				
4. 56 and above	4.30	.460				

From descriptive statistics, different age groups have different perceptions. For instance, the age group of 21-35 years old has the highest satisfaction on S8 and S9 but has the lowest satisfaction on S26. The age group of 36-45 years old perceives the highest satisfaction on S3 and S14 but the lowest satisfaction on S13. The age group of 46-55 years old has the highest and lowest satisfactions on both S16 and S17 and S26, respectively. The age group of 56 years old and above has the highest and lowest satisfactions on both S2 and S3 and S26, respectively. It is interesting to note that three

out of four groups perceive the lowest satisfaction on S26. In fact, S26 is the lowest among all of the satisfaction items. MANOVA shows that age group has statistically significant effects on Items S2, S13, S20, S24, S29, and S32 as shown in Table VI, where SD stands for standard deviation. However, no mean differences in different age groups by Bonferroni test.

The highest satisfactions for year of business operations with less than 1 year, 1-10 years, 11-20 years, 21-30 years, and 31 years and above are S8, S4, S16 and S17, S17, and S23, respectively. In contrast to the highest satisfaction, the lowest satisfaction for year of business operations with 1-10 years is S13, while the lowest satisfaction for the rest of years of business operations is S26. The results depicted in Table VII show that year of business operations has significant effects on S1, S24, and S29, respectively. Bonferroni test shows 1-10 years of business operations has statistically higher satisfaction than more than 30 years of business operations on S1. No mean differences are found on S24 and S29.

TABLE VII: YEARS OF BUSINESS OPERATIONS ON THREE SERVICE ITEMS WITH SIGNIFICANCE

Item	Mean	SD	Mean Square	F	Sig.	Bonferroni Test
S1			.400	2.723	.031	
1. < 1 year	4.00	.000				
2. 1-10 years	4.35	.526				2 > 5
3. 11-20 years	4.15	.360				
4. 21-30 years	4.13	.334				
5. ≥ 31 years	4.05	.218				
S24			1.351	4.765	.001	
1. < 1 year	3.75	.500				
2. 1-10 years	4.02	.649				
3. 11-20 years	4.11	.542				
4. 21-30 years	4.15	.505				
5. ≥ 31 years	4.33	.577				
S29			.767	4.183	.003	
1. < 1 year	4.00	.000				
2. 1-10 years	4.17	.437				
3. 11-20 years	4.23	.457				
4. 21-30 years	4.29	.504				
5. ≥ 31 years	4.38	.498				

Different business types have different perceptions. Traditional grocery stores, convenience stores, and supermarket stores have the respective highest satisfaction on S2, S14, and S4 but have the consensus on the lowest satisfaction, i.e., S26. From Table VIII, business type has statistically significant effects on S4, S5, S6, S7, S13, S14, S26, S27, S28, S29, and S31. In addition, there are mean differences on S4, S5, S6, S14, and S28 by Bonferroni test. Specifically, supermarket stores have significantly higher satisfaction than traditional grocery stores on S4, S5, and S6. Convenience stores have statistically higher satisfaction than traditional grocery stores on S14. Finally, supermarket stores have the highest satisfaction statistically on S28.

When the average purchase amounts of money are less than 5,000, 5,000 to less than 10,000, 10,000 to less than 20,000, 20,000 to less than 30,000, and 30,000 and above, the highest satisfaction items are S2, S9, S17, S16, and S31, respectively. In contrast, the respective lowest satisfaction items are S13, S13 and S26, S26, S26, and S26. In fact, S13 and S26 are the two lowest satisfaction items by consensus. By MANOVA, the average purchase amount of money has statistically significant difference on S27 as shown in Table IX. However, no any mean differences have been found on S27 for post hoc analysis.

TABLE VIII: BUSINESS TYPE ON ELEVEN SERVICE ITEMS WITH SIGNIFICANCE

Item	Mean	SD	Mean Square	F	Sig.	Bonferroni Test
S4			1.163	5.209	.006	
1. Traditional	4.24	.489				3 > 1
2. Convenience	4.34	.480				
3. Supermarket	4.73	.467				
S5			1.702	5.099	.007	
1. Traditional	4.12	.556				3 > 1
2. Convenience	4.37	.662				
3. Supermarket	4.64	.505				
S6			.995	4.874	.009	
1. Traditional	4.28	.450				3 > 1
2. Convenience	4.32	.521				
3. Supermarket	4.64	.505				
S7			1.045	3.570	.030	
1. Traditional	4.14	.578				
2. Convenience	4.20	.511				
3. Supermarket	4.55	.522				
S13			5.256	4.637	.011	
1. Traditional	3.57	1.182				
2. Convenience	3.61	.891				
3. Supermarket	3.91	1.300				
S14			.898	4.887	.009	
1. Traditional	4.26	.443				2 > 1
2. Convenience	4.54	.505				
3. Supermarket	4.27	.467				
S26			6.901	6.602	.002	
1. Traditional	3.36	1.195				
2. Convenience	3.56	.976				
3. Supermarket	3.91	.831				
S27			2.112	3.552	.031	
1. Traditional	3.89	.854				
2. Convenience	4.12	.872				
3. Supermarket	4.27	.647				
S28			1.491	6.489	.002	
1. Traditional	4.20	.512				3 > 1
2. Convenience	4.22	.419				3 > 2
3. Supermarket	4.64	.505				
S29			.645	3.521	.032	
1. Traditional	4.23	.470				
2. Convenience	4.24	.435				
3. Supermarket	4.45	.522				
S31			.740	3.478	.033	
1. Traditional	4.24	.459				
2. Convenience	4.39	.494				
3. Supermarket	4.55	.522				

TABLE IX: THE AVERAGE AMOUNT OF MONEY ON ONE SERVICE ITEM WITH SIGNIFICANCE

Item	Mean	SD	Mean Square	F	Sig.	Bonferroni Test
S27			1.694	2.849	.026	
1. Less than 5,000	4.17	.389				
2. 5,000 to less than 10,000	4.31	.514				
3. 10,000 to less than 20,000	4.27	.497				
4. 20,000 to less than 30,000	4.18	.501				
5. 30,000 and above	4.43	.504				

For tobacco, beer, and general wine, the highest satisfaction items are S9, S2, and both S2 and S6, respectively. On the other hand, the respective lowest satisfaction items are S13, S26, and S26. Bulk purchase category has statistically significant effects on Items S19, S26, and S27 depicted in Table X. By further applying

Bonferroni test, the satisfaction of general wine is the lowest significantly on S19, S26, and S27.

TABLE X: BULK PURCHASE CATEGORY ON THREE SERVICE ITEMS WITH SIGNIFICANCE

Item	Mean	SD	Mean Square	F	Sig.	Bonferroni Test
S19			.994	4.954	.008	
1. Tobacco	4.36	.515				1 > 3
2. Beer	4.37	.522				2 > 3
3. General Wine	4.12	.323				
S26			5.767	5.517	.005	
1. Tobacco	3.77	1.004				1 > 3
2. Beer	3.56	1.149				2 > 3
3. General Wine	3.03	1.137				
S27			2.624	4.412	.014	
1. Tobacco	4.09	.904				1 > 3
2. Beer	4.12	.745				2 > 3
3. General Wine	3.71	.842				

TABLE XI: INFORMATION OF IMPORTANCE, SATISFACTION, AND QUADRANT

Item	Average Value of Importance	Average Value of Satisfaction	Quadrant
1	3.677	4.177	III
2	3.901	4.375	II
3	3.984	4.323	II
4	4.208	4.286	II
5	4.234	4.203	III
6	4.266	4.307	II
7	3.958	4.172	III
8	3.911	4.255	II
9	4.036	4.370	II
11	4.557	4.344	I
12	4.510	4.313	I
13	3.875	3.599	III
14	4.359	4.323	I
15	4.411	4.286	I
16	4.469	4.333	I
17	4.625	4.370	I
18	4.594	4.333	I
19	4.573	4.286	I
20	4.677	4.240	I
22	4.521	4.214	I
23	4.510	4.245	I
24	4.396	4.115	IV
25	4.479	4.130	IV
26	3.958	3.438	III
27	4.073	3.964	III
28	4.385	4.229	I
29	4.281	4.245	I
30	3.943	4.240	II
31	4.458	4.286	I
32	4.516	4.292	I

From the above results, male retailers seem to be more satisfied than female retailers generally. Retailers who are in traditional grocery stores have statistically lower satisfaction in some services. In addition, retailers who purchase general wine have the lowest satisfaction is some services. In summary, gender, business type, and bulk purchase category are the three major variables that could have greater impacts on retailers' perceptions of service provided by Taiwan Tobacco and Liquor Corporation.

For the second part of the study, the overall average values of importance and satisfaction (performance) are 4.278 and 4.209, respectively. Thus, these thirty items can be classified into four quadrants based on the overall average values of importance and satisfaction. The information regarding importance, satisfaction, and quadrant located is provided in Table XI with thirty questions. The IPA plot is illustrated in Fig. 2.

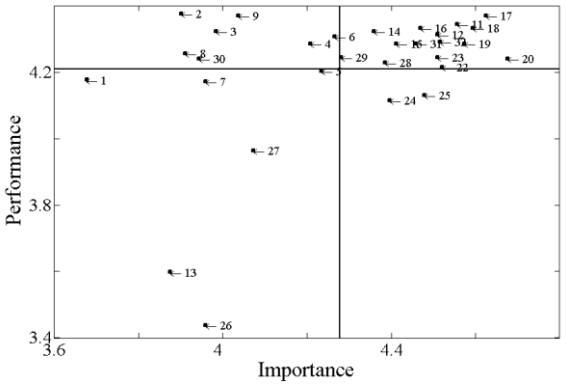

Fig. 2. Importance-performance analysis for thirty items.

Items 11, 12, 14, 15, 16, 17, 18, 19, 20, 22, 23, 28, 29, 31, and 32 are classified into Quadrant I, indicating that these fifteen items belong to the major strengths which should be further maintained in order to gain competitiveness in the market. There are seven items, including Items 2, 3, 4, 6, 8, 9, and 30 located in Quadrant II, showing that these items are the minor strengths. With limited available resources, these seven items might not be placed in the highest priority to gain competitiveness for Taiwan Tobacco and Liquor Corporation. In Quadrant III, Items 1, 5, 7, 13, 26, and 27 are viewed as minor weaknesses, which should be improved after major weaknesses. Finally, two items are found to be the major weaknesses, namely Items 24 and 25. Obviously, stacking services on delivered goods and empty bottle recycling services are of importance but low satisfaction from retailers' viewpoints. Therefore, these two items should be placed in the highest priority to reduce retailers' dissatisfaction in order to provide better services.

IV. CONCLUSIONS

Retailers perceive three highest satisfaction items on S2, S9, and S17. That is, the retailers are very satisfied in bright, spacious, and clean environment of the sales office, friendly and energetic staff in the sales office, and correctness on purchased items and quantity. In contrast, three lowest satisfaction items perceived by retailers are S26, S13, and S27, respectively. Thus, Taiwan Tobacco and Liquor Corporation needs to pay much attention to improve on both convenience and security of the debit payment system and confidence for new product sales (attraction of the customers' purchase willingness).

From MANOVA and post hoc analysis, males perceive higher satisfaction significantly than females on seven service items. For years of business operations, retailers with 1-10 years of business operations perceive significantly higher satisfaction than retailers with more than 30 years of business operations on S1. Generally, retailers in supermarket stores perceive higher satisfaction on S4, S5, S6, and S28, while retailers in traditional grocery stores perceive lower or even lowest satisfaction on S4, S5, S6, S14, and S28. For bulk purchase category, retailers who purchase general

wines have significantly lowest satisfaction on S19, S26, and S27. In general, male retailers seem to have higher perceptions of services than female retailers. Retailers in traditional grocery stores perceive relatively lower satisfaction. Besides, retailers who purchase general wine have relatively lower satisfaction. In fact, gender, business type, and bulk purchase category are the main variables to be noted in order to provide better services for retailers.

From IPA viewpoints, the main focus is the items located in Quadrant I and Quadrant IV. Fifteen items belonging to the major strengths should be further maintained to please retailers for Taiwan Tobacco and Liquor Corporation. On the other hand, two items are major weaknesses. Specifically, stacking services on delivered goods by service personnel and transport and empty bottle recycling services by service personnel are of great importance but of low satisfaction. Though these two services are outsourcing, poor performance would result in dissatisfaction from Taiwan Tobacco and Liquor Corporation. Therefore, these two items should be placed in the highest priority for improvement to particularly monitor the subcontractor's performance in a timely basis.

The combination of MANOVA and IPA allows Taiwan Tobacco and Liquor Corporation to observe if different demographic variables have different service perceptions as well as to identify the major strengths and weaknesses of provided services as a whole. Therefore, different marketing strategies can be designed to meet different retailers' needs in terms of demographic variables. At the same time, the overall performance of services based upon both perception and importance can be depicted. The services which are the major strengths should be maintained in order to be competitive in the market, while the services which are the major weaknesses should be improved in a timely basis in order to provide better services for retailers.

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