

Customers' Behavior Analysis Before and During the Chinese New Year: An Empirical Study from A Supermarket in Taiwan

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Abstract— This study intends to use the transaction data from a database of a supermarket to analyze customers' behaviors for the Chinese new year holiday empirically. The database of a supermarket branch store was analyzed to know whether or not customers behave statistically different based on purchase frequencies and money spent. The results show that both male and female customers increase their money spent on the preparation for the Chinese new year holiday. Customers with different age groups spend differently in general. Moreover, vegetables and fruits and seafood are the most purchased items on the preparation for the Chinese new year holiday, whereas fresh meat reaches the peak during the Chinese new year holiday. Understanding customer behaviors enables supermarket management to prepare the merchandize items earlier so as to meet various customer needs for the Chinese new year holiday.

Index Terms—supermarket, Chinese new year, demographic variable, customer relationship management, customers' behavior

I. INTRODUCTION

Chiang [1] stated that a data-driven approach enables companies to increase sales and profits nowadays. When a large amount of customers' business and marketing data are available, performing data analytics enables companies to enhance companies' marketing strategies, retain and attract more customers, and increase profits [2,3,4]. Rokaha et al. [5] pointed out that supermarkets can establish their own databases for data collection to better understand their customers. In other words, customer databases which contain useful information about customers can be analyzed to provide better marketing strategies based on customer profiles can be developed [2,5].

Min [6] pointed out that catering supermarket services to the customers' changing needs and life style is a key to survive in the competitive marketplace. In addition, realizing

customers' profiles and deploying the information to target value customers are even more important than fully understanding their needs. When the transaction data are available, these data can be analyzed to discover new information about sales-purchase activities in the supermarket [7]. Customer behaviors can be traced and depicted based on purchase goods and patterns [7]. Wen et al. [8] concluded that a comprehensive understanding of customer behaviors is essential for the company to develop marketing strategies. In doing so, direct marketing strategies can be performed to meet customer needs [9].

Some studies related to supermarkets were found. For instance, Rowley [9] described how Tesco loyalty scheme was performed through a case study. Li et al. [2] constructed a dynamic customer relationship management model based on customers' previous transaction management patterns for a local supermarket. Min [6] used the surveys to collect the supermarket customers' demographic data and then applied decisions trees to evaluate their shopping behaviors and develop the profiles of loyal customers. Tanaka et al. [10] employed RFM (recency, frequency, and monetary) model to categorize customers from the Japanese supermarkets into different clusters based on their purchase behaviors from the database.

Hegde and Suresh [11] used the supermarket survey data to analyze the customers' behaviors based on the Apriori algorithm by considering some factors including customer economic status, the number of times a customer visits the supermarket, and the location of the supermarket. Malagueño et al. [12] also used the survey data to examine a conceptual framework which positioned relational justice as a mediator in the relationship between key customer categorization and supplier performance, moderated by the length of the relationship in a British supermarket. Larsen et al. [13] analyzed in-store customers' behaviors focusing on shoppers with carts through 240 observations from 15 supermarkets. Gao et al. [14] used eye movement information in front of the shelf with the eye tracker to analyze consumer shopping behaviors in the supermarket qualitatively. Salahli [15] applied fuzzy logic to investigate customers' needs from a large shopping center using various parameters such as the amount of purchasing products, the type of products, and the proportion of the product types in the basket. Finally, Nguyen [16] collected the data through the receipts from random customers after shopping from several chain stores of supermarket retailers to perform customer segmentation.

Based upon the above researches, no studies have been

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found to use the transaction data of a supermarket for analysis. Li et al. [2] pointed out that customer relationship can be managed through capturing customer information by using the customer databases effectively. When a supermarket analyzes customers' data from the database, different marketing strategies can be developed to increase promotion opportunities and product enhancements [5,17].

In addition to the use of the database from a supermarket, rare researches were found to examine whether customers' purchase behaviors are different in holidays. Waturandang et al. [18] used a qualitative approach to collect data with an open ended questionnaire to find factors affecting customers' purchase decisions before Christmas along with an in-depth interview and focus group discussion with 10 participants. In the Chinese society, the Lunar new year (Chinese new year) is essential for family members gathering together. That is, family members might purchase a wide variety of merchandizes before and during the Chinese new year holiday. From the viewpoint of the supermarket management, it would be of interest to know if the purchase behaviors would be different in terms of purchase frequencies and money spent for each merchandize item in different time periods. In doing so, the preparation of merchandize items can be made in advance to meet various customer needs. In this study, a case that uses a database of a supermarket branch store in Taiwan is conducted empirically and purchase behaviors before and during the Chinese new year holiday are evaluated to determine whether customers behave differently and how their differences are.

II. RESEARCH METHOD

This study uses the data from a supermarket in central Taiwan. The information for each transaction is composed of date of transaction, day of the week, member card number, gender, age, purchase quantity, purchase amount, merchandize item, and specific merchandize item. In order to evaluate customers' behaviors before and during the Chinese new year holiday, the setting of this study is described below. In Year 2020, the Chinese new year is on January 25, and the Chinese new year eve is on January 24. Traditionally, the preparation for the Chinese new year is before January 24 in Taiwan because the majority of supermarkets are closed in the afternoon on the Chinese new year eve in order for their employees to have their reunion dinner with their family members at night. The preparation for the Chinese new year usually requires a week including a weekend due to the current working and life style. Thus, the theme is designed as follows. The preparation for the Chinese new year holiday is from January 17 to January 23, 2020. In order to have the same time lengths for evaluations and computations, the Chinese new year holiday is from January 24 to January 30, 2020. Moreover, two ordinary shopping periods are designed in this study for the comparison purpose, i.e., January 3-9 and January 10-16. In order to reduce the complexity of data for customer behavior analysis, seventeen major merchandize items are used to replace specific merchandize items.

TABLE I
DEMOGRAPHIC INFORMATION OF CUSTOMERS FROM JANUARY 3 TO JANUARY 30

Variable	Frequency (Times)	Total Amount (NT Dollars)	Percentage of Total Amount (%)
Gender			
Male	49,896	5,061,998	71.5
Female	19,801	2,014,400	28.5
Age Group			
24 years and below	1,210	104,886	1.5
25-34 years	4,533	378,761	5.4
35-44 years	15,081	1,423,380	20.1
45-54 years	21,308	2,212,265	31.3
55-64 years	17,261	1,865,708	26.4
65 years and above	10,304	1,091,398	15.4
Date of Purchase			
January 3-9, 2020	13,128	1,216,661	17.2
January 10-16, 2020	14,038	1,366,136	19.3
January 24-30, 2020	23,012	2,342,114	33.1
January 17-23, 2020	19,519	2,151,487	30.4
Merchandise Item			
Item 1 (Vegetables and fruits)	13,660	1,154,192	16.3
Item 2 (Seafood)	3,292	599,902	8.5
Item 3 (Fresh meat)	5,120	614,110	8.7
Item 4 (Cooked food)	7,520	721,735	10.2
Item 5 (Desserts)	4,112	297,789	4.2
Item 6 (Fresh milk and juice)	5,061	430,742	6.1
Item 7 (Hot pot ingredients)	8,731	790,574	11.2
Item 8 (Candy and biscuit)	6,419	486,344	6.9
Item 9 (Coffee and tea beverages)	3,323	361,342	5.1
Item 10 (Rice and salt)	1,039	135,256	1.9
Item 11 (Sanitary products)	2,771	346,761	4.9
Item 12 (Bread)	4,019	184,273	2.6
Item 13 (Tobacco, alcohol, and tea)	2,658	620,674	8.8
Item 14 (Toys and stationary)	306	23,441	0.3
Item 15 (Clothes and beauty)	657	143,579	2.0
Item 16 (Kitchen supplies)	745	119,199	1.7
Item 17 (Miscellaneous)	264	46,485	0.7

From January 3 to January 30, 2020, there are 69,697 transactions made with the total amount of 7,076,398 New Taiwan (NT) dollars. In this study, customers' ages are classified into 24 years and below, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65 years and above. Table I summarizes the descriptive statistics of customers in terms of their gender, age group, date of purchase, and merchandize item. Female customers have higher shopping frequencies and spend much more money than male customers. The consumers with 45-54 years old have the highest purchase frequency and total amount of money spent followed by the consumers with 55-64 years old. During the Chinese new year holiday, customers visit the supermarket more often and purchase more. In addition, the preparation for the Chinese new year holiday has the second highest purchase frequency and total amount spent. Vegetables and fruits (Item 1), hot pot ingredients (Item 7), and cooked food (Item 4) are the most purchased merchandize items in terms of frequencies and total amount spent from January 3 to January 30, 2020.

III. RESULTS

One-way analysis of variance (ANOVA) is a good tool to determine if customers with different demographic variables behaves statistically different [17,19]. The purpose of this study is to observe if customers with different gender and age group behave statistically different in purchase frequencies and money spent of merchandize items per visit among four different dates of purchase. Table II shows that the average purchase frequencies for both male and female customers among four different time periods are not statistically different, where the abbreviation of SD is the sample standard deviation of the purchase frequency. That is, gender is not a critical variable to influence purchase behaviors in this supermarket. However, gender affects the average purchase amount per visit among four time periods statistically as shown in Table III, where the abbreviation of SD is the sample standard deviation of the purchase amount per visit. The post hoc analysis indicates that male customers have higher money spent per visit on January 17-23 than on the ordinary shopping periods in order to prepare for the Chinese new year holiday. In addition, male customers spend more money per visit on January 24-30 than those on January 3-9. In contrast, female customers spend the highest money per visit on January 17-23 among four different time periods. Therefore, female customers have the highest money spent per visit compared with that on January 3-9, January 10-16, and January 24-30 statistically. Besides, female customers spend more money per visit on January 24-30 than those on January 3-9.

Table IV shows that customers with different age groups do not have different average purchase frequencies statistically except for customers whose ages are 25-34 years. That is, the frequencies among 24 years and below, 35-44 years, 45-54 years, 55-64 years, and 65 years and above are not different in four time periods. On the other hand, customers whose ages are 25-34 years increase their frequency during the Chinese new year holiday (January 24-30) than one of the ordinary shopping periods (January 10-16) statistically. In contrast to the average purchase frequency, age group plays an essential role to influence

average purchase amount per visit depicted in Table V. Specifically, customers whose ages are 24 years and below and 25-34 years spend more money per visit during the Chinese new year holiday than two ordinary shopping periods based on the post hoc analysis. Customers whose ages are 45-54 years tend to spend more on the preparation for the Chinese new year holiday than two ordinary shopping periods statistically. Besides, they spend more during the Chinese new year holiday than one of the ordinary shopping periods (January 3-9). No within group differences are found for the 35-44 years old group based on the post hoc analysis. In addition, both 25-34 years old and 55-64 years old groups could spend more on the preparation for the Chinese new year holiday than one of the ordinary shopping periods (January 3-9).

On the other hand, the behaviors of customers whose ages are 65 years old and above are somewhat different. That is, they spend less during the Chinese new year holiday and one of the ordinary shopping periods (January 3-9) but spend a lot more on the preparation for the Chinese new year holiday statistically based on the post hoc analysis. From the descriptive statistics, customers with 24 years old and below tend to increase their purchase frequency on January 17-23 compared with the other five age groups. On the other hand, customers with 24 years old and below have the highest average purchase amount per visit on January 24-30 compared with the other three time periods. In contrast, customers whose ages are 35-44, 45-54, 55-64, and 65 and above have the highest average purchase amount per visit on January 17-23 compared with the other three time periods. Therefore, customers with 35 years old and above spend more money per visit during the preparation of the Chinese new year, whereas customers with 24 and below and 25-34 spend more money per visit during the Chinese new year holiday.

Table VI summarizes the merchandize items purchased among four different time periods. Clothes and beauty (Item 15) are bought more frequently before and during the Chinese new year holiday (on January 17-23 and January 24-30) statistically. Cooked food (Item 4) is bought more frequently before the Chinese new year holiday than two ordinary shopping periods statistically. Vegetables and fruits (Item 1), seafood (Item 2), and desserts (Item 5) are purchased more frequently statistically before the Chinese new year holiday than during the Chinese new year holiday and one of two ordinary shopping periods (January 3-9).

Table VII indicates that the average purchase amount per visit on Items 1, 2, 3, 4, 5, 7, 8, 9, and 16 are statistically different. Specifically, vegetables and fruits (Item 1), seafood (Item 2), and candy and biscuit (Item 8) are the most spent merchandize items per visit before the preparation for the Chinese new year holiday statistically. That is, these three items can be seen as the necessities for the Chinese new year holiday, and customers would increase money spent before the Chinese new year eve. Customers increase their money spent per visit in fresh meat (Item 3) during the Chinese new year holiday than before the Chinese new year holiday and two ordinary shopping periods statistically. Customers also increase their money spent per visit in cooked food (Item 4).

TABLE II
ANOVA RESULTS ON GENDERS IN TERMS OF AVERAGE PURCHASE FREQUENCY

Gender	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
Male	1.34 (1.01)	1.36 (1.11)	1.34 (0.98)	1.37 (1.06)	1.038	.375	
Female	1.34 (1.32)	1.34 (1.27)	1.35 (1.17)	1.37 (1.29)	1.925	.123	

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

TABLE III
ANOVA RESULTS ON GENDERS IN TERMS OF AVERAGE PURCHASE AMOUNT PER VISIT

Gender	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
Male	93.30 (130.71)	97.32 (141.15)	103.85 (142.42)	108.35 (169.35)	9.165	< .001	3 > 1; 4 > 1; 4 > 2
Female	92.44 (146.17)	97.32 (160.38)	100.93 (146.29)	110.92 (263.79)	20.571	< .001	3 > 1; 4 > 1; 4 > 2; 4 > 3

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

TABLE IV
ANOVA RESULTS ON AGE GROUP IN TERMS OF AVERAGE PURCHASE FREQUENCY

Age Group	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
24 and below	1.27 (1.10)	1.26 (0.85)	1.36 (1.40)	1.51 (1.92)	1.774	.150	
25-34	1.21 (0.79)	1.21 (0.61)	1.29 (0.85)	1.24 (0.70)	2.850	.036	3 > 2
35-44	1.36 (1.74)	1.32 (1.34)	1.32 (0.92)	1.37 (1.43)	1.558	.197	
45-54	1.34 (0.94)	1.39 (1.33)	1.36 (1.23)	1.40 (1.34)	2.064	.103	
55-64	1.35 (1.21)	1.36 (1.22)	1.35 (1.10)	1.37 (1.14)	0.355	.786	
65 and above	1.35 (0.98)	1.37 (1.09)	1.36 (1.19)	1.37 (0.95)	0.177	.912	

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

TABLE V
ANOVA RESULTS ON AGE GROUPS IN TERMS OF AVERAGE PURCHASE AMOUNT PER VISIT

Age Group	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
24 and below	70.77 (82.36)	79.06 (101.77)	102.99 (135.33)	89.98 (113.34)	5.297	.001	3 > 1; 3 > 2
25-34	71.24 (81.45)	77.36 (84.53)	94.45 (127.74)	85.53 (110.52)	10.795	< .001	3 > 1; 3 > 2; 4 > 1
35-44	87.10 (141.85)	88.35 (126.98)	94.67 (125.33)	104.70 (407.19)	4.192	.006	No within group differences
45-54	93.63 (122.94)	99.78 (156.41)	104.93 (161.19)	112.09 (180.31)	11.623	< .001	3 > 1; 4 > 1; 4 > 2
55-64	101.16 (158.96)	106.32 (179.97)	107.46 (147.64)	114.09 (185.26)	4.124	.006	4 > 1
65 and above	100.87 (178.57)	105.40 (180.24)	98.60 (138.57)	116.80 (174.71)	7.408	< .001	4 > 1; 4 > 3

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

TABLE VI
ANOVA RESULTS ON MERCHANDIZE ITEMS IN TERMS OF AVERAGE PURCHASE FREQUENCY

Age Group	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
1 Vegetables and fruits	1.37 (0.99)	1.42 (1.35)	1.39 (1.10)	1.48 (1.48)	4.907	.002	4 > 1; 4 > 3
2 Seafood	1.10 (0.33)	1.24 (1.47)	1.14 (0.43)	1.23 (0.84)	4.636	.003	4 > 1; 4 > 3
3 Fresh meat	1.21 (0.55)	1.24 (0.63)	1.32 (0.66)	1.27 (0.61)	6.991	< .001	3 > 1; 3 > 2
4 Cooked food	1.30 (0.93)	1.32 (0.88)	1.37 (0.93)	1.40 (1.03)	3.955	.008	4 > 1; 4 > 2
5 Desserts	1.15 (0.45)	1.23 (0.63)	1.20 (0.55)	1.29 (0.75)	8.935	< .001	4 > 1; 4 > 3; 2 > 1
6 Fresh milk and juice	1.27 (1.06)	1.26 (1.15)	1.22 (0.71)	1.25 (0.84)	0.791	.499	
7 Hot pot ingredients	1.27 (0.85)	1.29 (0.73)	1.24 (0.70)	1.26 (0.66)	1.592	.189	
8 Candy and biscuit	1.30 (0.97)	1.26 (0.74)	1.21 (0.66)	1.22 (0.68)	3.936	.008	1 > 3
9 Coffee and tea beverages	1.38 (1.21)	1.32 (1.25)	1.28 (0.82)	1.29 (1.26)	1.247	.291	
10 Rice and salt	1.27 (0.99)	1.33 (0.77)	1.55 (2.15)	1.25 (0.78)	3.009	.029	No within group differences
11 Sanitary products	1.44 (1.90)	1.32 (1.06)	1.37 (1.15)	1.42 (1.54)	0.812	.487	
12 Bread	1.70 (2.16)	1.75 (2.37)	1.65 (1.23)	1.64 (2.04)	0.684	.561	
13 Tobacco, alcohol, and tea	1.77 (2.90)	1.59 (2.08)	1.49 (1.18)	1.66 (1.63)	2.517	.057	
14 Toys and stationary	1.07 (0.25)	1.24 (0.58)	1.38 (1.55)	1.27 (0.92)	0.864	.460	
15 Clothes and beauty	1.12 (0.47)	1.24 (0.68)	3.14 (5.18)	2.79 (4.45)	7.089	< .001	3 > 1; 3 > 2; 4 > 1; 4 > 2
16 Kitchen supplies	1.15 (0.53)	1.31 (1.11)	1.26 (0.85)	1.32 (0.91)	0.896	.443	
17 Miscellaneous	1.17 (0.55)	1.22 (0.51)	1.27 (0.66)	1.20 (0.69)	0.298	.827	

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

TABLE VII
ANOVA RESULTS ON MERCHANDIZE ITEMS IN TERMS OF AVERAGE PURCHASE AMOUNT PER VISIT

Age Group	January 3-9 Average (SD)	January 10-16 Average (SD)	January 24-30 Average (SD)	JANUARY 17-23 AVERAGE (SD)	F	P-VALUE	POST HOC ANALYSIS
1 Vegetables and fruits	73.83 (94.29)	81.94 (139.66)	79.38 (140.80)	101.56 (434.59)	8.039	< .001	4 > 1; 4 > 2; 4 > 3
2 Seafood	147.36 (233.25)	172.98 (300.04)	172.60 (184.90)	220.26 (339.56)	10.487	< .001	4 > 1; 4 > 2; 4 > 3
3 Fresh meat	105.89 (93.68)	117.47 (121.11)	130.47 (95.35)	117.53 (97.62)	13.327	< .001	3 > 1; 3 > 2; 3 > 4
4 Cooked food	65.95 (88.46)	78.65 (123.30)	123.84 (168.67)	96.59 (126.32)	63.791	< .001	3 > 1; 3 > 2; 3 > 4; 4 > 1; 4 > 2
5 Desserts	75.42 (57.25)	73.30 (62.87)	65.51 (49.56)	78.95 (65.35)	12.155	< .001	1 > 3; 2 > 3; 4 > 3
6 Fresh milk and juice	86.36 (76.45)	83.64 (76.35)	86.39 (71.34)	83.91 (70.67)	0.528	.663	
7 Hot pot ingredients	100.52 (159.20)	91.76 (88.48)	83.77 (75.64)	92.88 (93.01)	10.030	< .001	1 > 3; 4 > 3
8 Candy and biscuit	72.36 (102.94)	73.82 (96.03)	68.94 (77.47)	85.34 (98.62)	11.090	< .001	4 > 1; 4 > 2; 4 > 3
9 Coffee and tea beverages	104.51 (222.55)	97.58 (154.17)	102.59 (167.61)	126.58 (237.49)	3.619	.013	4 > 3
10 Rice and salt	129.97 (123.04)	131.85 (142.36)	116.49 (126.42)	141.52 (128.26)	2.034	.107	
11 Sanitary products	133.93 (172.28)	118.06 (119.33)	128.69 (147.89)	121.27 (156.97)	1.414	.237	
12 Bread	43.12 (42.53)	46.87 (50.15)	48.02 (34.44)	45.38 (37.29)	2.592	.051	
13 Tobacco, alcohol, and tea	221.39 (310.38)	228.66 (327.92)	223.44 (289.99)	257.93 (382.55)	1.865	.133	
14 Toys and stationary	77.20 (80.79)	74.77 (83.01)	77.59 (72.75)	76.68 (66.87)	0.020	.996	
15 Clothes and beauty	182.81 (190.30)	129.98 (132.04)	243.19 (401.42)	227.90 (315.67)	2.603	.051	
16 Kitchen supplies	141.52 (147.22)	235.64 (450.25)	126.89 (141.50)	141.24 (159.44)	7.009	< .001	2 > 1; 2 > 3; 2 > 4
17 Miscellaneous	166.32 (343.52)	118.18 (114.95)	204.36 (355.28)	199.08 (324.28)	0.833	.477	

Note: 1: January 3-9; 2: January 10-16; 3: January 24-30; 4: January 17-23 in post hoc analysis

They spend the most money during the Chinese new year holiday followed by the preparation for the Chinese new year holiday. It is interesting to know that customers spend fewest money per visit in desserts (Item 5) during the Chinese new year holiday statistically. Hot pot ingredients (Item 7) have a similar pattern of desserts. holiday. That is, during the Chinese new year holiday, the money spent on hot pot ingredients has been reduced. Moreover, kitchen supplies (Item 16) might be bought a lot more on the ordinary shopping period (January 10-16) which is close to the preparation for the Chinese new year.

By descriptive statistics from Table VII on January 17-23, tobacco, alcohol, and tea (Item 13) has the highest average purchase amount per visit followed by clothes and beauty (Item 15) and seafood (Item 2). It is worth noting that the average purchase frequencies for tobacco, alcohol, and tea (Item 13) and seafood (Item 2) are equivalent. That is, customers only spend much more money on January 17-23. However, customers tend to shop more frequent and spend more money on clothes and beauty (Item 15) on January 17-23 as well as on January 24-30. The supermarket management can pay much attention to these special customer needs before the preparation of the Chinese new year and during the Chinese new year holiday.

IV. DISCUSSION

It is no surprise that both male and female customers would increase their money spent per visit before the Chinese new year holiday or even during the Chinese new year holiday for female customers. In addition, customers whose ages are 65 years and above tend to spend more before the

Chinese new year holiday, while customers whose ages are 24 years and below would increase their money spent during the Chinese new year holiday.

The 25-34 years old and 45-54 years old groups in general would increase their money spent before and during the Chinese new year holiday. For the Chinese tradition, the elderly parents prepare the necessities to celebrate the Chinese new year holiday and welcome family members (children and/or even grandchildren) to come back for joining together. On the other hand, 25-34 and 45-54 years old groups might be the groups who have their parents (and parents-in-law) and/or children. When they come back to visit their parents as well as parents-in-law, they might increase their expenditures. Therefore, the money spent for these two groups might be significant before and during the Chinese new year holiday.

When the information from Tables VI and VII is summarized, some interesting findings are found in general. Vegetables and fruits (Item 1) and seafood (Item 2) are the most purchased merchandize items in terms of frequencies and money spent per visit on the preparation for the Chinese new year holiday. That is, customers are interested in Item 1 (vegetables and fruits) and Item 2 (seafood) with higher purchase frequencies and money spent. In contrast, the need for fresh meat (Item 3) reaches the peak during the Chinese new year holiday for both frequencies and money spent per visit. The results show that customers increase their frequencies and money spent on fresh meat during the Chinese new year holiday rather than two ordinary shopping periods. In addition, cooked food (Item 4) shows a similar pattern of fresh meat. Customers tend to purchase cooked food more frequently and spend more money before and

during the Chinese new year holiday. Specifically, the highest money spent for cooked food is incurred during the Chinese new year holiday. In practice, cooked food might be more convenient for each family. For the inventory viewpoints, supermarket management needs to particularly pay much attention to Items 1, 2, 3, and 4 on January 17-23 and January 24-30 since customers increase their purchase frequencies and money spent on these particular items.

V. CONCLUSIONS

This study uses the transaction data of a database from a supermarket branch in Taiwan to analyze customer behaviors before and during the Chinese new year holiday. In the past, no such empirical researches were found to demonstrate how customers behave in holidays. In contrast, this study empirically shows customers shop differently in terms of their average frequencies and average money spent in holidays by employing one-way analysis of variance. By combining the information, customer behaviors can be understood that enable supermarket management to prepare the right merchandize items in advance so as to meet various customer needs before and during the Chinese new year holiday.

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