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Applying data mining for online CRM marketing strategy: an empirical case of coffee shop industry in Taiwan

Abstract

Purpose: The aim of this research is to propose a data mining approach for mining valuable markets for online customer relationship management (CRM) marketing strategy. The industry of coffee shop in Taiwan is employed as an empirical case study in this research.

Design/methodology/approach: Via a proposed data mining approach, the study used fuzzy clustering algorithm and apriori algorithm to analyze customers for obtaining more marketing and purchasing knowledge of online CRM systems.

Findings: The research found three hard markets and one fuzzy market. Furthermore, the study discovered two association rules and two fuzzy association rules.

Originality/value: However, industry of coffee shops has been always a fast-growing and competitive business around the world. Thus, marketing strategy is important for this industry. The results and the proposed data mining approach of this research can be used in the industry of coffee shop or other retailers for their online CRM marketing systems.

Keywords: data mining approach; coffee shops; fuzzy clustering algorithm; apriori algorithm; fuzzy association rules; online CRM marketing systems.

1. Introduction

The research discovers customer benefit markets and marketing rules (association rules) via the Fuzzy c-means (FCM) algorithm and data mining technologies. However, the research objective is to discover fuzzy & crisp customer rules for enhancing marketing systems.

Data mining technologies are employed on discovering knowledge of consumers. The application will be a trend for marketing strategy. For a long-run retailer, their transaction records may have a large-scale database which contains customer shopping records. Hence, for understanding customer shopping intentions, in that respect, many international businesses discover customer knowledge from their POS (point of sales) systems with big data (customer-shopping records) by the data mining technologies.

In data mining technologies, fuzzy theory and apriori algorithm can be used in analyzing various enterprises for business analytics. In the fuzzy clustering field, an observation can be assigned into two or many clusters (Manski, 1990). In contrast to the fuzzy clustering, the crisp clustering algorithm assigns an observation into a certain cluster for the purpose of market segmentation (Kotler et. al., 2016).

Therefore, as mentioned above, an observation may be assigned into more than one cluster in fuzzy clustering (Russell and Lodwick, 1999, Chiang, 2011). This study employed the fuzzy clustering algorithm to obtain the solution of this problem. The research proposes a data mining approach to find association rules with fuzzy clustering. As to the research methods, this work uses a fuzzy clustering algorithm and market basket analysis to process the collected data. The approach of this study can be employed in e-business marketing systems or online CRM (customer relationship management) system.

In coffee markets, the brewed coffee is one of the top 10 sales products around the world. BBC Travel (2014) pointed out that Taipei city is one of the top six coffee cities in the world. Hence, there were about 448 cups of brewed coffee purchased per person/year around the world in 2008. However, in Taiwan, there were about 80 cups of brewed coffee purchased in 2008. That is, the sales percentage of brewed coffee of Taiwan is approximately 17.865%

of the sales value of the world (Taiwan Coffee Association, 2008). However, according to the Ministry of Finance, Taiwan, ROC (2017), there were about 124 cups (person/year) of brewed coffee purchased in 2016. For the consumption of cups of brewed coffee in Taiwan, the growth rate was 55% from 2008 to 2016. As table 1.1 shows, the growth rates of all types of imported coffee beans in Taiwan were increasing from 2008 to 2011 and decreasing from 2012 to 2013. In 2014, the rate was increased. In accordance with mentioned above, the growth rates of the brewed coffee shoppers have grown up from 2013 to 2016 in Taiwan. In conclude, the industry of coffee shops is a very fast-growing industry in Taiwan. Nowadays, including convenience stores, there are more than ten thousand stores selling brewed coffee in Taiwan. Hence, it still can be enhanced toward a higher sales percentage. Thus, the industry of the coffee shop in Taiwan is the empirical case in this study.

Table 1. All types of coffee beans imported and growth rate in Taiwan

Year	2008	2009	2010	2011	2012	2013	2014
Total Imported-Kg	31,821,612	31,821,612	49,911,450	73,158,088	70,473,380	67,227,804	84,223,899
Growth Rate%	6.051	6.89	56.848	46.576	-3.670	-4.60	25.281

Data Source: Bureau of Foreign Trade, Taiwan, 2016

As previously mentioned, the growth rate of the brewed coffee market can still be enhanced in Taiwan. In 2008, more than 5.7 million populations were customers of brewed coffee, and more than 134.88 million dollars of commercial opportunity for coffee market in Taiwan yearly (Taiwan Coffee Association, 2008). Thus, some potential competitors entered this industry aggressively for this huge commercial opportunity. There were four convenience chain stores got involved into this market with providing low-prices products and convenient locations (Wang, 2008). Hence, in 2016, more than 2307.94 million dollars of commercial

opportunity for coffee market in Taiwan yearly (Ministry of Finance, Taiwan, ROC, 2017). However, the coffee shop chain of major cities in Taiwan must implement marketing projects for attracting new customer and retaining the existing customers.

To concluded, this research proposes a data mining approach for discovering the valuable fuzzy target market of coffee shop market, which employs the fuzzy clustering algorithm, and the improved market basket analysis to process the data for creating useful models/rules. The approach can be applied for other retailers, and the discovered models/rules can help the coffee shop for attracting new customers and retaining existed customers.

2. Literature Review

2.1 Fuzzy c-means (FCM algorithm)

In 1965, Zadeh mentioned about “the fuzzy sets are the basis of the fuzzy theories”. The fuzzy sets can be in quantitative forms for performing some uncertain concept of fuzziness. Hence, Dunn (1974) developed the fuzzy c-means algorithm (FCM) based upon the fuzzy concept of the fuzzy clustering (Ruspini, 1969). In the same year, Bezdek also developed the fuzzy c-means algorithm based upon the k-means algorithm.

Later on, Bezdek (1981) introduced an objective function for minimization of the FCM algorithm. Nowadays, most of the fuzzy clustering researches are based on the FCM algorithm. However, the FCM algorithm is a suitable algorithm for mining data structure effectively (Wei and Menel, 1994), and it is proper as a clustering method in a variety of industries as well.

The objective function of the fuzzy clustering can be applied for problem solving in many aspects. The fuzzy clustering can be executed by using non-linear programming theory for clustering analysis. The hard clustering is the origin of the traditional clustering algorithm that applies the Euclidean space to represent the vectors. Ruspini (1969) used the fuzzy clustering to create a hyper-plane for the vectors. Krishnapuram and Keller (1993) introduced the concept of the c-partition for releasing constraint. However, the speed convergence is not fast enough.

Dunn (1974) mentioned that the FCM algorithm is a proper algorithm for a round sharp cluster due to the centroid mode, and the FCM algorithm is a sensitive algorithm to its noise and outlier vectors.

2.2 Association Rules

Association rule analysis has been used for various aspects of management for many years. One of the most applied algorithms of association rules is apriori algorithm (Agrawal, Imielinski and Swami, 1993). The apriori algorithm is applied in a variety of studies. For the shopping behavior researches, Yang et al., (2006) used the apriori algorithm to analyze the online shopping behaviors of Taiwan's markets. The results showed the association rules that may help bundle sales for the online stores in Taiwan.

For the improvement research of apriori algorithm, Chiang (2008) employed the apriori algorithm on supervised targets. In Chiang's study, the objective was to find the taking-course behaviors of the community universities. The study used the fuzzy clustering algorithm to partition the students of community universities, it as well as generated fuzzy-association-rules. The rules could be applied on the curriculums of community universities.

For applications of the Apriori algorithm, Sarvari et al. (2016) employed k-means clustering, Apriori algorithm, SOM clustering algorithm and weighted RFM model to analyse shopping data from a global pizza restaurants chain for application of CRM system. Via the Apriori algorithm, their research extracted association rules and the best customer-purchase-behavior patterns. Also, the result was applied on some scenarios and found the best one. The best scenario showed that M (monetary) factor was the most important factor for clustering among the RFM analysis results. In the recommendation system field, Kim et al., (2008) applied segmentation and association-rule mining methods for digital library Hence, Liao et al. (2016) applied AHP model, Apriori algorithm with rough set theory on online

shopping customers for recommendation system. Their research found four preference association rules of online shoppers, and these rules can be applied on two patterns for online recommendation systems.

However, for retail industries, association rule is a useful data mining technology, which can help retailers to generate customer shopping-behaviour rules (Bilgic, 2015). These useful rules can be applied to marketing or CRM systems to effectively implement the target marketing strategy.

2.3 Coffee shop Researches in Taiwan

For understanding the coffee shop market in Taiwan, Wang (2000) divided Taipei coffee shop market into two markets as follows: (a) Professional oriented: coffee professional, good experience and service quality. (b) Satisfaction oriented: atmosphere, multi-functions, convenience, price oriented and brand.

For knowing the image of coffee shops in Taiwan, Wang (2003) found total image of the coffee shop was positively related with the shopping amount, re-shopping frequency and intention, and it was not related to staying time in store.

In 2004, Chan's research analyzed consumers for shopping lifestyle and characteristic in Taichung, Taiwan, which consists of consumer behavior, intention, information obtaining and store locations. For understand shoppers' factors, Huang (2005) found that some factors might gain the profits: higher education and average income, service quality of stores, perceptive value and royalty. Lin et al. (2007) found that emotional experience and economic capability affect customer satisfaction positively. Nevertheless, the customer satisfaction affects customer royalty positively.

In market analysis of coffee shops, Chiang (2010) found three customer benefit markets of the brewed coffee market in Taiwan. They were service oriented, professional oriented and cost oriented.

For understanding repurchase intentions of different type of customer, Lin (2016) applied multiple regression analysis to analyse customers of coffee chain stores. Lin's research found that store impression, perceived value and satisfaction have significant predictions for repurchase intentions.

2.4 Customer Relationship Management

Organizational consistency is an important key element for implementing the CRM successfully. For example, intentions and needs of customers must be arranged into a key functions of a company. Hence, the two factors can not only be implemented by a marketing department (Reinartz et al., 2004). Thus, for solving the problems of customer relationship via online CRM systems, businesses can shift from 'value exchange' to 'customer value' (Payne et al., 2017).

So that a successful online CRM should analyse customers' transactional data for understanding their intentions and needs. Thus, a successful CRM should be created by both customers and business (Kunz et al., 2017).

Nowadays, CRM is designed for a customer-centric system for business. It is also for a data-driven business which can help business to understand the future information of business and customers.

To concluded, the research is designed for online CRM, which is also a customer-centric system for helping businesses to analyze customers.

3. Methodologies

3.1 Research Logic

The main objective of this research is to filter the fuzzy target market of the industry of the coffee shop in Taiwan. This research applies fuzzy clustering and market basket analysis to discover the valuable fuzzy markets and association rules in fuzzy mode with customer benefit variables, socioeconomic variables and transaction data. The rules can be applied on the e-marketing or online CRM systems of the industry of coffee shops in Taiwan for improving the performances in businesses.

The research proposes a data mining approach for identifying fuzzy customer. The method aims at integration of classification/association and clustering algorithms. Therefore, the supervised apriori algorithm and fuzzy c-means (FCM) are adopted to process the collected data (Figure 1).

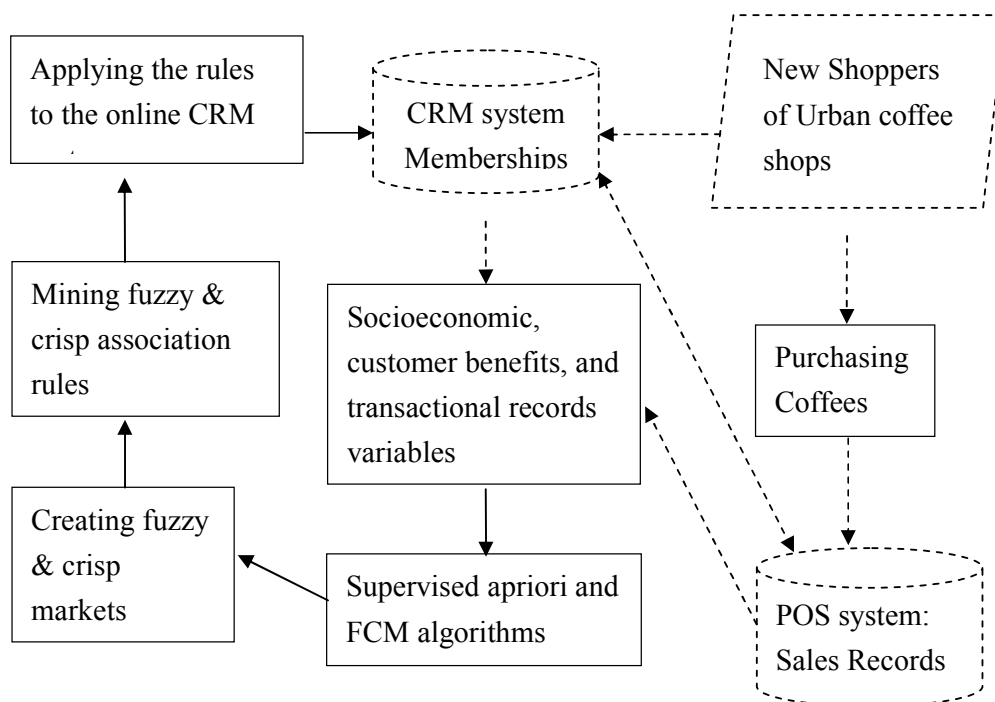


Figure 1. Research Logic (Solid Lines)

Data Source: This Research

3.2 Questionnaire Design and Sample Size

This study uses questionnaire method to collect data and the questionnaire includes customer benefits, socioeconomic and transactional variables. The customer benefit variables are according to the point of view of the coffee shop researches (section 2.3), the variables as well as referring to the opinions of scholars and managers in the industrial field of the coffee shop.

All collected data are the first class data from experienced objects with purposive sampling method. The sample size is measured by the formula as follows:

$n = \frac{Z^2_{\alpha/2} \times P(1-P)}{e^2}$, whereas, n is the sample size, which is under the following

conditions: confidence interval: 95% (Z:1.96), tolerance e: 0.05, P (population proportion): 0.5. (Bryman. & Bell, 2007)

3.3 Measurement of cluster validity

With regard to decide the number of clusters, this study adopts a measurement function for cluster validity $S = \frac{J}{n \times d_{\min}^2}$ (Xie and Beni, 1991) to be an effective measurement for the number of clusters. Equations $J = \sum_{i=1}^n \sum_{k=1}^t m_{ik}^{\phi} d_{ik}^2(x_i, c_k)$ and $\{d^2(c_i, c_k)\}$ obtain a minimum value of S, simultaneously, reaching the objective of FCM (Fuzzy c-means) or FCM (Fuzzy c-means) as well. For solving a minimum value of J, while d_{\min}^2 is the larger, S is the smaller.

3.4 Supervised Apriori Algorithm

The apriori algorithm (Agrawal et al., 1993) is the most popular algorithm for mining association rules, but it is an unsupervised algorithm. Chiang (2008) improved the algorithm to be the supervised apriori algorithm.

Steps of the supervised apriori algorithm are as follows:

1. Configuring the minimal support.
2. Using the cluster numbers to be the primary key to sort all possible combinations.
3. To scan the database and process every record in turn. The data in the first cluster will be processed with top priority.
4. Candidate Itemset: To create the candidate Itemsets in turn.
5. To record the Itemset which is larger than the minimum support; and to delete Itemset which is less than the minimum support.
6. Do exit while the data is finish.
7. Go to step 2.

8. End.

Support:

$$\text{Support} = (X/Y) * 100\% \quad (1)$$

where,

Support: Support of X

X: Times of X Itemset

Y: Numbers of all the data.

Confidence:

If A and B \rightarrow C

$$\text{Then, Confidence} = \text{Support}(A,B,C) / \text{Support}(A,B) * 100\% \quad (2)$$

where,

Confidence: Confidences of A and B \rightarrow C

Support (A, B, C) = Supports of A, B, C

Support (A, B) = Supports of A, B

4. Empirical Case Study

4.1 Background of the brewed coffee market in Taiwan

The USDA (United States Department of Agriculture, 2011) indicated that the most exporting countries for coffee beans are: Brazil, Vietnam, Colombia, and Indonesia. Hence, there are a total of 104,967 thousand 60-Kg bags of coffee beans exported in 2010/11.

In Taiwan, the brewed-coffee market has about 5.7 million US dollars market. There are about 4.091 billion US dollars for the coffee market products in Taiwan. It has about

2.0455 billion U.S. dollars for the market of industry of the coffee shop in Taiwan (Taiwan Coffee Association, 2008).

As mentioned above, the potential competitors enter this industry aggressively for this huge commercial opportunity. Four convenience chain stores have involved in this market aggressively since 2008. They are 7-Eleven City Coffee, Family Mart, Hi-Life, and OK convenience chain stores respectively. Their advantages are convenient locations inside all and lower prices, so that they affect the industry of the coffee shops in Taiwan (Wang, 2008). The forecasted growth rate of brewed coffee sales is less than 10% for the convenience shops. However, the growth rate for the whole coffee sales is 2% in Taiwan.

The 85-Degree-C Coffee Shop is the most popular coffee shops in Taiwan, which is a local coffee shop chain and has taken 30% share of this market, and it is a low - price coffee shop and has more than 320 branches in Taiwan. The other coffee shops are Starbucks (about 220 branches), Dante (about 160 branches), Ikari (about 65 branches), Barista (about 18 branches), Kohikan (about 37 branches), Mr. Brown (about 41 branches), IS (about 27 branches), and ZhenQuo (about 14 branches) coffee shops respectively. Relatively, there are more than 3000 branches of convenient stores with brewed coffee bars. Such as 7-Eleven city coffee, OK, Hi-Life and Family convenient chain stores. The brewed coffee products of the convenient stores affect the market of the coffee shops. As mentioned previously, there were about 30% share of brewed coffee market was taken by the 85-Degree-C coffee shop. But the 85-Degree-C is still being threatened by the other coffee shop chains and coffee bars of the convenience stores (InsightXplorer Market Research Consultant, 2008).

However, the most coffee shops provide coffee and tea products (including Chinese teas) in Taiwan, their categories of product are summarized as follows: (1) Coffee (2) Teas /Chinese Teas (3) Cakes (4) Cookies (5) Milks (6) Breads (7) Snacks (8) Juices (9) Innovative soft drinks.

4.2 Data Collection, Reliability and Validity and Sample Description

The purposive sampling method is adopted for data collection, and the data collection areas are in the most three major cities in Taiwan: Taipei, Taichung and Kaohsiung cities. The

research observations are the consumers of coffee shops.

For estimation of the sample size, the confidence interval was set within 95% (Standard Normal Distribution: $Z= 1.96$), P (population proportion) was assumed to be 0.5 (Bryman & Bell, 2007), and tolerance value e was assumed to be 0.05. The minimum sample size was 384 after calculation by the equation: $n = \frac{Z^2_{\alpha/2} \times P(1-P)}{e^2}$. The questionnaires were filled out in Jun., 2016. There were 1038 questionnaires filled out and 201 invalid questionnaires removed. The valid questionnaires were 837. Thus, the valid rate was 80.64%.

The questionnaires have been tested by the reliability test whose Cronbach α is 0.7915. That is, it shows the entire measurement of the reliability is well, because the value is larger than 0.7 (Nunnally, 1978). For the content validity, the questionnaire design refers to the literature's review and opinions of coffee shop managers, specialists and scholars of this field. However, the questionnaire qualified for the content validity (Creswell, 2008).

4.3 Fuzzy c-means

The fuzzy c-means algorithm is adopted to be a clustering method in this research. The collected data are analyzing by the measurement function of the cluster validity, the S value (= 0.15386) is showed as the smallest value, while the data are partitioned into three clusters. Thus, observations are partitioned into three clusters and one fuzzy cluster. The size of the cluster A is 291(35%), the cluster B is 388(46%), the cluster C is 158(19%) and the fuzzy cluster F is 203(24.25%). Three clusters are tested by discrimination analysis and their Wilk's Lambda of first and second clusters are 0.415 and 0.380. Obviously, the effect of clustering is fine. Moreover, the markets' features are planned by mean of variables (Table 2).

Table 2. Markets of Industry of coffee shops in Taiwan

<i>Market (A): Environmental Consideration</i>	<i>Market (B): Cost Consideration</i>	<i>Market (C): Service Consideration</i>	<i>Fuzzy market (F): Image Consideration</i>
<i>*Fame and image</i>	*Free Parking	*Meal delivering on time	*Professional staffs
<i>*Meal outlook and name</i>	*Coupons	*Willing to help	*Security license
<i>*Quality facilities</i>	*Newspapers and	*Problem solving	*Reliability
<i>*Equipment decoration</i>	magazines provided	*Comfortable seat	*International brand
<i>*Light and music</i>	*Coffee mate and	*Quiet in store	*Uniform and manner
<i>*Professional labels clearly</i>	sugar offering	*Tasty and quality	*Fame and image
<i>*Healthy and green</i>	*Early open and late	*A variety of items	
<i>*Washroom cleaning</i>	close	*Special demand	
<i>*Nonsmoking</i>	*Bonus	*Uniform and manner	
<i>*International brand</i>	*Discount	*Professional staffs	
<i>*Security license</i>	*Price	*Internet access	
	*Reliability		

Data Source: This Research.

4.4 Supervised apriori algorithm

This study applies the supervised apriori algorithm (Chiang, 2008, apriori algorithm based) and fuzzy clustering to process the socioeconomic and transaction data (via questionnaires). The market of industry of the coffee shops is partitioned into three clusters and one fuzzy cluster by the fuzzy c-means algorithm. Thus, there are two association rules (rules 1 and 2) and two fuzzy association rules (rules 3 and 4) mined by the supervised apriori algorithm. However, the rules are illustrated in Table 3.

Table 3. Fuzzy and Crisp Association Rules of the coffee shop Chain in Taiwan

#	If	And	Then	Support	Confidence			
	Gender	Age	Income per month	Purchased Products	Market	Fuzzy market		
1	Male	21-30	US\$801-1300	Coffee/ Breads/ Snacks	A		23.1%	89.8%
2	Female	21-30	US\$801-1300	Teas (Chinese Teas)/Cakes	B		27.9%	93.2%
3	Female	31-40	US\$1301-1800	Cakes/ Cookies/ Milks	A	F	20.5%	79.9%
4	Female	31-40	US\$1801-2300	Teas (Chinese Teas)/ Cakes/ Breads	C	F	16.3%	80.1%

Data Source: This Research.

5. Conclusions, Suggestions and Managerial Implications

5.1 Conclusions

The results of this research found three crisp markets and one fuzzy market, the study also mining two association rules and two fuzzy association rules for retailers. The size of the cluster A is 291(35%), the cluster B is 388(46%), the cluster C is 158(19%)

and the fuzzy cluster F is 203(24.25%). However, the objective of this research is to propose a data mining approach for discovering customers marketing and purchasing rules, and also to integrate the fuzzy clustering and supervised-apriori-algorithm. Hence, the fuzzy association rules can be applied in e-business marketing systems to filter the valuable fuzzy target market and to understand shopping behaviors of the customers.

The scholar contribution of this study is to provide a data mining approach to integrate the fuzzy c-means and supervised apriori algorithm to generate the association rules in fuzzy mode. Via this case study, purchasing behaviors of the coffee shops' customers in Taiwan have been shown. The industry of the coffee shops of Taiwan can easily apply their marketing projects on the most two market shares (cost and environmental considerations) for increasing royalties of customers to retain existed consumers, as well as attracting new consumers. Furthermore, for enhancing the Market C: Service Consideration, Pynnönen et al. (2014) suggested that businesses should offer full integrated service solutions for customers. Thus, the coffee shops in Taiwan can provide more free services for attracting more young customers, such as free Internet service in stores and free information and ordering services via smart phone apps.

5.2 Suggestions

Some customers belong to two markets, but they still can be discovered via the fuzzy clustering analysis. In this empirical case, there is one fuzzy market is found in the market of industry of the coffee shops. There are two fuzzy rules discovered: the rules 3 and 4, which show customers who belong to two markets. The market F (fuzzy market) is taken 24.25% of the market shares. That is, 1/4 of the customers are the fuzzy customers, the industry of the coffee shops can provide the better marketing projects for

the fuzzy customers.

For the applications of the crisp (non-fuzzy) rule and fuzzy rule: the rule 1 (Table 3) is a crisp (non-fuzzy) rule which indicates that if a customer is male, aged between 21 and 30, income range between 800 and 1300, the customer might purchase as follows: Coffee, Breads and Snacks. Then, the customer belongs to the market-A. The market-A customers emphasize the environment of coffee stores, such as store outlook, facilities, equipments, neat & tidy, and no smoking. The industry of the coffee shops can improve its environment for attracting customers of the market-A.

The rule 3 (Table 3) is a fuzzy rule, which shows that if a customer is female, between the age of 31 and 40, income range between 1301 and 1800, the customer might usually purchase as follows: Cakes, Cookies and Miles. Then, the customer belongs to the market A and F (fuzzy market). The market F customers emphasize the store image, such as professional staffs, security license, manner and fame. The industry of the coffee shops can improve their environment and image for the customers of the market F.

However, for retail industries, rule generating algorithms are useful technology of data mining (Linoff et al., 2011). The useful technology can help retailers to discover customer shopping-behaviour knowledge (Bilgic et al., 2015). Hence, this research proposes a useful and practical approach for finding fuzzy markets and fuzzy association rules for retailers, the industry of coffee shops and other businesses can apply the approach on their implementations of online CRM, e-marketing or e-business systems for online CRM marketing strategy.

The research proposes a framework for discovering fuzzy market segmentations,

which can be applied on marketing systems or CRM / POS systems. The designed research framework can help coffee shops or other businesses for enhancing their marketing systems. Businesses can partition customers into some crisp markets and fuzzy markets. The procedures of this research can be a daily routine in marketing systems (Bilgic et al., 2015).

5.3 Managerial Implications

1. The research results can be applied on marketing systems or CRM systems for fuzzy market segmentations of businesses. Hence, the application of this research can be a machine-learning (daily loop) in marketing systems.

2. The logic of this research can create rules for target markets. That is, customer loyalty can be promoted by discovered rules and marketing plans rules.

3. Businesses can implement three different marketing plans for the discovered target markets.

4. The research framework can be applied on other retail industries for discovering marketing rules. They can accurately aim at their target markets for implementing marketing plans.

5. The cost for retaining an existing customer is about 1/5 of the cost of developing a new customer (Kotler & Keller, 2016). As a result, via the research, coffee shops can retain existing customers by improving their marketing or CRM systems.

References

- Agrawal, R., Imielinski, T., & Swami, A. N. (1993). Data mining: A performance perspective. *IEEE Transactions on Knowledge and Data Engineering*, 5(6), 914-925.
- Bezdek, J. C. (1974). Cluster Validity with Fuzzy Sets, *Journal of Cybernetics*. 3, 58-73.
- Bezdek, J. C. (1981). *Pattern Recognition with Fuzzy Objective Function Algorithms*. New York, NY: Plenum Press.
- Bilgic, E., Kantardzic, M., Cakir, O. (2015) Retail Store Segmentation for Target Marketing. *Advances in Data Mining: Applications and Theoretical Aspects*, Springer International Publishing : Switzerland, 32-44.
- Bryman, A., & Bell, E. (2007). *Business research method* (2nd ed). Oxford, UK: Oxford University Press.
- Chan, Y. T. (2004). *The Research on Leisure coffee shops' Consumer Behavior at Taichung City*. Master Thesis, Department of Leisure & Recreation Management, Dayeh University.
- Chiang, W. Y. (2008). A Market Perspective of E-Learning Behaviors. *Journal of Customer Satisfaction*, 4(1), 133-161.
- Chiang, W. Y. (2010). Applying Data Mining on Improving Customer Value Model: an Empirical Case of Coffee Chain Store. *Conference of Global and International Enterprises in 2010*, 173-182.
- Chiang, W. Y. (2011). Establishment and application of fuzzy decision rules: An Empirical case of the air passenger market in Taiwan, *International Journal of Tourism Research*, 13(5), 447-456.
- Creswell, J. W. (2008). *Research design: Qualitative, quantitative and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

- Dunn, J. C. (1974). A Fuzzy Relative of the ISODATA Process and Its Use in Detecting Compact Well-Separated Clusters, *Journal of Cybernetics*, 3, 32-57.
- Galloway, Lindsey. (2014). Living in: The world's top coffee cities. *BBC Travel*, <http://www.bbc.com/travel/story/20140421-living-in-the-worlds-top-coffee-cities>
- Huang C. F. (2005). *Applying Structural Equation Modeling to Study the Relationship among Service Quality, perceived value, Brand Equity, Customer Satisfaction and Customer Loyalty—An Empirical Study of chain leisure coffee shop in Taipei*. Master Thesis, Department of Business Administration, National Dong Hwa University.
- Kim, Y. & Chung, M. G. (2008). Personalised information services using a hybrid recommendation method based on usage frequency, *Program*, 42(4), 436-447.
- Kotler, P. T. & Keller, K. L. (2016). *Marketing Management*, 15th Edition, NY: Person Publishing.
- Kunz, W., Aksoy, L., Bart, Y., Heinonen, K., Kabadayi, S., Ordenes, F. V., Sigala, M., Diaz, D., & Theodoulidis, B. (2017). Customer engagement in a Big Data world, *Journal of Services Marketing*, 31(2). 161-171,
- Krishnapuram, R., & Keller, J. M.. (1993). A Possibilistic Approach to Clustering, *IEEE Fuzzy System*. 1(2), 98-110.
- Liao, S. H., Chang, H. K. (2016). A rough set-based association rule approach for a recommendation system for online consumers, *Information Processing & Management*, 52(6), 1142-1160.
- Lin, Y. C., Lin, H. C. & Lee, Y. C. (2007). The Study of the Relationship among Experiential Marketing, Customer Satisfaction and Customer Loyalty. *Journal of Customer Satisfaction*, 3(2), 57-94.
- Lin, Y. S. (2016) *The Effects of Perceived Values, Store Images, Customer Satisfaction on Repurchase Intentions with Study of S&D Coffee Shop Chain-Stores*. Master Thesis, Department of Leisure and Recreation Management, Da-Yeh University.

- Linoff, G. S., & Berry, M. J. A. (2011). *Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management, 3rd Edition*. New York, NY: John Wiley and Sons.
- Manski, C. (1990). The Use of Internation Data to Predict Behavior: A Best-Case Analysis, *Journal of the America Statistical Association*, 85(412), 934-940.
- Nunnally, J. C. (1978). *Psychometric Theory*. N.Y.: McGraw-Hill.
- Reinartz, W., Krafft, M., & Hoyer, W. D. (2004). The customer relationship management process: Its measurement and impact on performance. *Journal of Marketing Research*, 41(3), 293–305.
- Payne, A. and Frow, P. (2017) Relationship marketing: looking backwards towards the future, *Journal of Services Marketing*, Vol. 31, No. 1, pp. 11–15.
- Pynnönen, M., Hallikas, J. Ritala, P., Mikkonen, K. (2014). Analyzing systemic customer value in scalable business services. *The Service Industries Journal*. 34(14), 1154-1166.
- Ruspini, E. H. (1969). A New Approach to Clustering, *Information Control*, 15: 22-32.
- Russell, S. & Lodwick, W. (1999). Fuzzy Clustering in Data Mining for Telco Database Marketing Campaigns, *18th International Conference of the North American In Fuzzy Information Processing Society*, Fuzzy Information Processing Society, New York, NY., 720-726.
- Sarvari, P. A., Ustundag, A., Takci, H. (2016). Performance evaluation of different customer segmentation approaches based on RFM and demographics analysis, *Kybernetes*, 45(7), 1129 – 1157.
- Trade Search Service (2017), Coffee, not roasted, not decaffeinated, Bureau of Foreign Trade, Ministry of Finance, ROC, Taiwan, 2017.
- Wang, C. L. (2003). *The Study of the Relationship Between Store Image and Consumer Purchasing Behavior of Leisure coffee shops in Kaohsiung City*. Master Thesis, Institute of Communications Management, National Sun Yat-sen University.
- Wang, S. M. (2008). Prediction and Development Analysis of Soft Drink in 2008, *Food Industry Research and Development Institute*, Taiwan: The Ministry of Economic Affairs.

- Wang, S. Y. (2000). *A Study of Market Segmentation and Consumer Behavior in Coffee Chain Shops*. Master Thesis, Department of Business Administration, National Dong Hwa University.
- Wei, W., & Mendel, J. M. (1994). Optimality Test for Fuzzy c-means Algorithm. *Pattern Recognition*, 27(11), 1567-1573.
- Yang, T. C. & Lai, H. (2006). Comparison of product bundling strategies on different online shopping behaviors. *Electronic Commerce Research and Applications*. 5(4), 295-304.
- Xie, X. L. & Beni. G. (1991). A Validity Measure for Fuzzy Clustering. *IEEE Transactions of Pattern Analysis and Machine Intelligence*, 13, 841-847.
- Zadeh, L. A. (1965). Fuzzy Sets, *Information and Control*, 8, 338-353.
- Zalaghi, Z & Varzi, Y. (2014). Measuring customer loyalty using an extended RFM and clustering technique. *Management Science Letters* , 4(5), 905-912.