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REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESIS (ES)

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

LIMITATIONS

SCOPE FOR FURTHER RESEARCH

REFERENCES

APPENDIX/ANNEXURE

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CONTRIBUTIONS TO BOOKS

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CUSTOMER'S VALUE PERCEPTION ON A DRUGSTORE

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ABSTRACT

Drugstore business in Taiwan encountered huge threats from both giant rivalries of conglomerates and ever-demanding consumers. Literature generally accepted that customer's value is core to retain customer loyalty; this paper proposes an innovative approach by using fuzzy logic to precisely identified patient's value directions, from which the drugstore management may adopt to foster customer satisfaction and loyalty, and the drugstore's core competences. Other than previous research, we adopt fuzzy logic in identifying the most expected value attributes in the mind of the customers. This research successfully distinguished some subtle differences in value-based customer satisfaction among three types of drugstore. Results are mostly consistent with previous research; however, this research shed more lights on the customer value perception toward drugstore. We suggest the drugstore management maintain a close monitoring on the changes of value levels the customer perceived, and accordingly timely respond to such changes.

KEYWORDS
fuzzy logic, perceived value, drugstore (pharmacy), loyalty, competitiveness.

JEL CODES
D12, D91, I12.

1. INTRODUCTION

Drugstores in Taiwan encounter multiple challenges that threaten survival. The utmost power is the threats from fast expansion of chained drugstores with affluent financial backup from the parent firms of conglomerate. The customers in the market are more knowledgeable and more demanding than ever because of handy information that accessible in the internet. Other sources of threats have also found have significant impacts on the drugstore's survival in terms of variety of customer demands and behavior. Consequently, hundreds of drugstores and clinics have reported loss, or been merged by others. In response to such challenges, some traditional drugstores conducted certain kinds of revolutions, such as store remodeling, service lines expansion, procurement allied, and intensive sales promotion among others.

Needs uncertainty plays a major source of uncertainty drugstore encountered. Changes of customer needs may not significantly deviate from organization's core competence (Christensen & Bower, 1996), as long as the firm's core competence was built and maintained based on customer value (Woodruff, 1997). Unfortunately, it is common to find that firms adopted novel approaches in response to the bandwagon effects (Leibenstein, 1950), and not to the customer's favors (Jarworski & Kohli, 1993). To gain competitive advantage, drugstores shall first identify what are the values that perceived by the target customers (Petrison & Wang, 2003), and such value perception will in turn result in customer satisfaction and loyalty (Dubrovski, 2001; Revilla-Camacho, Vega-Vázquez & Cossío-Silva, 2017).

There is a need in knowing what the customers need and want, yet conventional approach such as market survey seems fail to provide this valuable information. The impalpable nature of human mind is the key reason for the failure of this kind. It is almost impossible for drugstore to know exactly what customers want with drugstore visiting, partly because of the customers are typically unable to express what indeed they need for health. This paper addresses the importance of the customer value perception in the drugstore, and proposes a method that adopts the fuzzy logic in the process of understanding the customer's value perception toward a drugstore.

To our best knowledge, this research is the first study on the value perception of drugstore, and the first successfully applied fuzzy logic in Taiwan drugstore industry. The empirical study proved that fuzzy logic is able to identify effectively the subtle differences in value perception and consequently the satisfaction levels of competing drugstores.

2. PERCEIVED VALUE AND FUZZY LOGIC

2.1 Perceived value and customer satisfaction

Relationship marketing studies identified strong relationship exists between customer's satisfaction and repurchase behavior (e.g. Edvardson, Johnson, Gustafsson & Strandvik, 2000; Caruana, 2002). However, customer satisfaction alone may not result in customer loyalty (e.g. Ganesh, Arnold & Reynolds, 2000; Mittal, Ross & Baldasare. 1998; Oliver, 1999).

Customer loyalty or patronage to a store is something beyond satisfaction, that is the perceived value (Neal, 1999), which consists of functional, social, emotional, and even epistemic value components (Sheth, Newman & Gross, 1991). In other words, perceived value is the essential base for loyalty. The higher the perceived values, the stronger the customer's patronage to the businesses will be (Bowen & Chen, 2001). Recently, instead of paying attention to traditional customer satisfaction, researchers have already switched their interests to the value perception (e.g. Eggert & Ulaga, 2002). Value can be described as the proportion of the

benefits customers received and the sacrifices borne by customers (e.g. MacStravic, 1997). In healthcare services, perceived value is vital to the success of healthcare marketing in creating and retaining loyal customers (Peltier *et al.*, 2002).

2.3 Applying fuzzy logic to measure perceived value

Plenty of studies had applied fuzzy logic in exploring the consumer's behaviors. For example, Bitner *et al*. (1990) use critical incident technique to explore the reasons behind satisfaction and dissatisfaction. Not surprisingly judgment-based classification methods have been found in many services and marketing research. Fuzzy logic is superior to these classification techniques in making correct judgments in response to the fuzzy nature of real world. Dillon & Mulani (1984) classified items into categories that have higher probability estimations; Viswanathan & Childers (1999) adopted fuzzy set in categorizing products and innovatively propose the existence of hybrid-category products that having the membership across various categories. Fuzzy set application in the marketing increased our understanding on the reasons behind customer's buying behaviors.

Plenty research has applied fuzzy logic and found that such technique performs better in detecting the minor differences between alternatives. For example, evaluating airline service quality (Tsaur, Chang & Yen, 2002; Chang & Yeh, 2002), evaluating teacher performance (Kuo & Chen, 2002), predicting election results (Royes & Bastos, 2001), and grading service quality level (Chen, 2001). Although research generally accepted fuzzy logic to be appropriate in evaluating perceived quality level in response to the need of reflecting the ambiguous nature of human perception, few if any of the studies have attempted to adopt fuzzy logic in obtaining precise knowledge on customer perceived value, especially in drugstore business.

3. MEASURING PERCEIVED VALUES

3.1 Attributes of value

This research includes attributes and items of three different scales as a base in developing a measuring instrument. We put together fifty-eight items derived from these scales of Sweeny & Soutar (2001), Petrick (2002), and Shemwell & Yavas (1999) in one for further validation process. A questionnaire contains 20 items are used to examine the values of five dimensions: quality, emotion, price, reputation, and search, as proposed by MacStravic (1997).

TABLE 1: ATTRIBUTES AND SUB-ATTRIBUTES OF HEALTHCARE SERVICE EVALUATION

Attributes		Sub-attributes (criteria)
Quality	1	Acceptable service quality
	2	Service offered with consistent quality
	3	Services are reliable
	4	Services are dependable
	5	Speediness and correctness of drug dispensing
	6	Pharmacists competence
Emotion	7	Attractive for use
	8	Easy to use facilities
	9	Comfortable place
	10	Pleasant place
	11	Respect personal privacy
	12	High degree of personal care
Price	13	Value for money
	14	Flexible payment methods
Reputation	15	Drugstore has good reputation
	16	Drugstore is widely respected
Search	17	NHI[a] accredited
	18	Complete service (product) lines
	19	Sufficient personnel
	20	Modern facility

'a. NHI, national health insurance is a compulsory insurance policy issued by Taiwan government. NHI covers the majority of healthcare services for Taiwan nationals and some residents as the law regulated.

4. ASSESSING LINGUISTIC EXPRESSIONS WITH FUZZY LOGIC

By recognizing a value perception is a function of multiple value components (Sheth *et al*. 1991) that shall be weighted individually (Neal, 1999), this research request the respondents to rate the importance and experienced performance they experienced with individual value components.

Beyond traditional measurements that grading respondent's psychological property by crisp values, linguistic assessment is ideal in targeting a real reflection of human language and feeling (Chen, 2001; Zadeh, 1965). This research applies fuzzy logic to represent linguistic variables. Questionnaire used to collect data in such survey is specifically designed from which can be easily converted into fuzzy numbers (Zimmermann, 1991).

4.1 Data collection

Fuzzy numbers in expressing linguistic variables is presented in the first part, followed by proposing a linguistic decision-making method to produce overall fuzzy ratings as well as the perceived service value level for each drugstore. A fuzzy number is a fuzzy subset in the universe of disclosure X that is convex and normal,**.**

The value of $\mu_{\tilde{A}}(x)$ is then termed as the degree of composition of particular membership of x in $\tilde{A}$ (Zadeh, 1965), formulae are shown in appendix.

There are 130 responses in total, 32 for the conventional drugstore (A_1), 35 and 63 for the modern drugstore (A_2) and chained drugstores (A_3) respectively. Distribution of respondents is roughly in line with the market share of respective drugstores in terms of number of customers.

Instead of asking respondents to grade 1 to 5 as typical Likert-scale, respondents choose appropriate expressions that most reflecting their opinion of each item. Linguistic expressions are from 'extremely low' to 'extremely high' in terms of importance of a criterion, and from 'extremely disagree' to 'extremely agree' for the second part questions regarding those service values that they actually experienced and perceived.

5. RESULTS AND ANALYSIS

5.1 Customers expected Values

We convert the linguistics expressions on the importance weight of respective criteria into fuzzy trapezoidal numbers, as shown in table 2**.**

TABLE 2: CONVERSION OF VERBAL EXPRESSION INTO FUZZY TRAPEZOIDAL NUMBERS

Importance of linguistic assessment		Agreement of ratings	
Extremely low	(0, 0, 0, 0)	Extremely disagree	(0, 0, 0, 0)
Very low	(0, 0.1, 0.2, 0.3)	Highly disagree	(0, 1, 2, 3)
Lower than average	(0.2, 0.3, 0.4, 0.5)	Disagree	(2, 3, 4, 5)
Average	(0.4, 0.5, 0.5, 0.6)	No comments	(4, 5, 5, 6)
Higher than average	(0.5, 0.6, 0.7, 0.8,)	Agree	(5, 6, 7, 8,)
Very high	(0.7, 0.8, 0.9, 1.0,)	Highly agree	(7, 8, 9, 10)
Extremely high	(1.0, 1.0, 1.0, 1.0)	Extremely agree	(10, 10, 10, 10)

Based on a method that is widely used to calculate an expected average for PERT (Program Evaluation and Review Technique) (Davis, Aquilano & Chase, 2002), we obtained the average weights of criteria of each attribute with the formula AW= (A + 4B + C) / 6. B is the most possible value for that item, A and C are pessimistic and optimistic values respectively.

In the expected values, speediness and accurate drug dispensing, and the pharmacist' competence received the most concern in quality dimension. Privacy is the most important component for emotional value; an accreditation from the National Health Insurance Bureau (NHIB) is the most important in the search value; whereas value for money to the price dimension, and good reputation to the reputation value respectively. Quality value remains the most important attribute followed by the values of emotion, search, price, and reputation, as shown in table 3. It is noteworthy that the reputation dimension receives the lowest grade.

TABLE 3: VALUE PERCEIVED BY CUSTOMERS IN TERMS OF RESPECTIVE ATTRIBUTES

Attributes	Quality	Emotion	Price	Reputation	Search
Importance in value	0.89	0.85	0.81	0.80	0.83

5.2 Customers perceived values

We use again the linguistic expression method to inquire the respondent's experiences with the values of each criterion. The conversion processes as has done earlier for weights of importance. The results of comparisons indicated that customers perceived better values of quality and price attributes for drugstore A_3 , emotional values for drugstore A_2 , reputation, and search values for drugstore A_1 , shown as table 4.

TABLE 4: ATTRIBUTE VALUE OF RESPECTIVE DRUGSTORES PERCEIVED BY CUSTOMERS

	Quality	Emotion	Price	Reputation	Search
A_1	0.73	0.60	0.62	**0.68**	**0.49**
A_2	0.69	**0.69**	0.58	0.56	0.47
A_3	**0.78**	0.66	**0.68**	0.66	0.48

Quality attribute is the common denominator of all these drugstores with an exception of A_2 that the quality value and emotion value are perceived equal. The search attribute that covers complete service and product lines, sufficient personnel, modern facilities, and NHI accredited receives low value from the respondents.

By taking the attribute values of each drugstore and mapping their respective membership of value levels, shown as table 5, we can reveal the relative strength each drugstore by each individual attribute, shown as table 6. For example, respondents generally perceive drugstore A_3 as the one that offers higher level of value at V₆, but some part of its customers downgraded it to a lower level of V₅. Aa a result, we may conclude that as far as the quality concern, *A₃* is the best, and followed by *A₁* and *A₂*.

TABLE 5: VERBAL EXPRESSIONS USED FOR THE LEVELS OF VALUE (L)

L_1	Extremely low	(0, 0, 0, 0)
L_2	Very low	(0, 0.1, 0.2, 0.3)
L_3	Lower than average	(0.2, 0.3, 0.4, 0.5)
L_4	Average	(0.4, 0.5, 0.5, 0.6)
L_5	Higher than average	(0.5, 0.6, 0.7, 0.8,)
L_6	Very high	(0.7, 0.8, 0.9, 1.0,)
L_7	Extremely high value (the ideal level)	(1.0, 1.0, 1.0, 1.0)

TABLE 6: GRADING EXPERIENCE MEMBERSHIPS OF ATTRIBUTES

Drugstore attributes		V_1	V_2	V_3	V_4	V_5	V_6	V_7
Quality	A_1					0.3	0.7	
	A_2					0.7	0.3	
	A_3					0.1	0.9	
Emotion	A_1					1.0		
	A_2					1.0		
	A_3					1.0		
Price	A_1				0.2	0.8		
	A_2				1.0			
	A_3				0.4	0.6		
Reputation	A_1					1.0		
	A_2				0.7	0.3		
	A_3					1.0		
Search	A_1			0.1	0.9			
	A_2			0.3	0.7			
	A_3			0.2	0.8			

The overall perceived value of each drugstore are then calculated as closeness index (CI) to see how the overall value of each drugstore far away from the perfect level. The overall closeness index can be as reliable index in revealing the comparative strengths of these drugstores. The closeness indices for each drugstore are

$CI_1 = 0.67$ for drugstore A_1, $CI_2 = 0.67$ for drugstore A_2, and $CI_3 = 0.71$ for drugstore A_3, shown as table 7. All types of drugstores are offering roughly similar level of value to customers. However, by examining the membership of each store, as shown in table 7, *CI* has 10 percent of membership in a higher level of V₆ for drugstore A_3. This means A_3 is slightly better than its rivalries in terms of perceived value.

TABLE 7: GRADES OF MEMBERSHIP OF CI_i in V_j

	V_1	V_2	V_3	V_4	V_5	V_6	V_7
CI_1					1.0		
CI_2					1.0		
CI_3					0.9	0.1	

6. IMPLICATIONS AND CONCLUSION

6.1 Discussion and Managerial implication

This research applies fuzzy logic as a reliable approach to enquire the customer's subtle perception on the importance and experience of relevant service values of s drugstore. Quality is not surprisingly remains the most significant attribute of customer's perceived values.

Accurate dispensing service and pharmacist competence are the most significant single quality criteria pursued by customers. Similar to service business in other industries, providing service accurately and timely is typically a baseline for every business in service sector, and that apparently includes drugstore business. This research provide evidence that a fuzzy approach can reveal effectively the true values perceived by targeted customers, and thus can be a superior tool for drugstore to include the customer's value perception into its daily and strategic operations.

Today, customers to the pharmacy are far more demanding than ever for drugstore. It is not surprising that the unsung environment will further exacerbate customer's value perception toward drugstore. Value perception toward individual drugstore varies from one to another. Bear in mind that most powerful segmentation that result direct return is the one base on customer perceived benefits (values).

6.2 Conclusion

Blindly relied on intensive promotion, as a major marketing tool to compete for those consumers who need medication is not cost-effective, and may sometimes hurts positioning due to price wars. Although obtaining customer loyalty is not easy, fostering customer's value perception is nevertheless essential and thus the prime goal drugstores shall achieve. Methods that applied fuzzy logic in identifying the core attributes of customer's perceived value toward drugstore services would be highly target-oriented and cost-effective.

This research suggests that drugstores should focus their efforts in identifying those cases that require accurate and timely dispensing, and accordingly respond to what they need. Proof what the drugstore promised for the customer's health. Fuzzy logic has also helped this research in revealing important information for drugstore management.

Customer value is the core to survival. Again and to the last, a successful drugstore operation stems from precise responding to the customer values. The research result suggests applying the fuzzy approach to capture precisely the customers inside their minds.

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APPENDIX

SUMMARY ON THE FUZZY LOGIC AND FORMULAE

Definition for the α-cut of fuzzy number $\tilde{n}$ **is as**

$$\tilde{n}^{\alpha} = \{x_i : \mu_{\tilde{n}}(x_i) \geq \alpha, x_i \in X\} \tag{1}$$

PTFN

Positive trapezoidal fuzzy number (PTFN) can be defined as composition of (n_1, n_2, n_3, n_4) and the membership function can be formulated as

$$\mu_{\tilde{n}}(x) = \begin{cases} 0, & x < n_1 \\ \dfrac{x-n_1}{n_2-n_1}, & n_1 \leq x \leq n_2 \\ 1, & n_2 \leq x \leq n_3 \\ \dfrac{x-n_4}{n_3-n_4}, & n_3 \leq x \leq n_4 \\ 0, & x > n_4 \end{cases} \tag{2}$$

Calculations of fuzzy numbers

$$\tilde{m} \oplus \tilde{n} = [m_1 + n_1, m_2 + n_2, m_3 + n_3, m_4 + n_4] \tag{3}$$

$$\tilde{m} \cdot \tilde{n} = [m_1 - n_4, m_2 - n_3, m_3 - n_2, m_4 - n_1] \tag{4}$$

$$\tilde{m} \otimes r = [m_1 \cdot r, m_2 \cdot r, m_3 \cdot r, m_4 \cdot r] \tag{5}$$

$$\tilde{m} \otimes \tilde{n} = [m_1 \cdot n_1, m_2 \cdot n_2, m_3 \cdot n_3, m_4 \cdot n_4] \tag{6}$$

$$d(\tilde{m}, \tilde{n}) = \sqrt{\frac{1}{4}\left[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2 + (m_4 - n_4)^2\right]}$$

(7)

(i) A set of K customers is called E = $\{D_1, D_2, \cdots, D_K\}$

(ii) A set of m alternatives for selection is called A= $\{A_1, A_2, \cdots, A_m\}$

(iii) A set of n criteria that used to evaluate alternatives performance is called C= $\{C_1, C_2, \cdots, C_n\}$

(iv) A set of performance ratings of alternative $A_i(i = 1,2,3\ldots, m)$ in terms of criteria $C_j(j = 1,2,3,\ldots,n)$ is shown as
$$X = \{x_{ij}, i = 1,2,\ldots,m \, j = 1,2,\ldots,n\}$$

Weights

$$x_{ij} = \frac{1}{K} \otimes \left[\tilde{x}_{ij}^1 \oplus \tilde{x}_{ij}^2 \oplus \cdots \oplus \tilde{x}_{ij}^k\right]$$

(8)

$$\tilde{w}_j = \frac{1}{K} \otimes \left[\tilde{w}_j^1 \oplus \tilde{w}_j^2 \oplus \cdots \oplus w_j^k\right]$$

(9)

A matrix format is adopted to express the GMCDM for service value perception problem as:

$$\tilde{D} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \cdots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \cdots & \cdots & \tilde{x}_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{x}_{m1} & \tilde{x}_{m2} & \cdots & \tilde{x}_{mn} \end{bmatrix}$$

$$\tilde{W} = [\tilde{w}_1, \tilde{w}_2, \cdots, \tilde{w}_n]$$

where $\tilde{x}_{ij}$ and $\tilde{w}_{ij}$ are approximated by positive trapezoidal fuzzy numbers as

$$\tilde{x}_{ij} \equiv (a_{ij} + b_{ij} + c_{ij} + d_{ij})$$
$$\tilde{w} \equiv (w_{j1}, w_{j2}, w_{j3}, w_{j4})_{i=1, 2, m, j =1, 2, n}$$

Normalization

Normalized figures on the fuzzy ratings are expressed as follow:

$$r_{ij} = \left(\frac{a_{ij}}{d_j^*}, \frac{b_{ij}}{d_j^*}, \frac{c_{ij}}{d_j^*}, \frac{d_{ij}}{d_j^*}\right), C \in B$$

(10)

$$\tilde{r}_{ij} = \left(\frac{a_j^-}{d_{ij}}, \frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}}\right), C_j \in C$$

(11)

Maximum and Minimum

$$d_j^* = \max_i \; d_{ij}, \; _{if} \; C_{ij} \in B$$

(12)

$$a_j^- = \min_i \; a_{ij}, \; _{if} \; C_{ij} \in C$$

(13)

where B is benefit criteria and C is cost criteria respectively

Overall value

Thus, overall value perception toward certain alternative can be expressed as

$$\tilde{V}_i = \frac{1}{n} \otimes \{(\tilde{r}_{i1} \otimes \tilde{w}_1) \oplus (\tilde{r}_{i2} \otimes \tilde{w}_2) \oplus \cdots \oplus (\tilde{r}_{in} \otimes \tilde{w}_n)\}$$

(14)

Using normalizes trapezoidal fuzzy numbers in equation (14); the estimated overall fuzzy rating of all alternatives is approximately as

$$\tilde{V}_i \cong (v_{i1}, v_{i2}, v_{i3}, v_{i4}), i = 1,2, \cdots, m$$

The ideal level of value customers perceived and received is defined as L$_7$ = (1.0, 1.0, 1.0, 1.0) that is produced by the average weights of each item.

Closeness index

A closeness index of respective $A_i(i = 1,2,\cdots, m)$ to the ideal level is then defined as

$$CI = 1 - d(\tilde{V}_i, L_7)_{, i=1, 2, m}$$

(15)

where $CI \, (0 \le CI_i \le 1)$ is the closeness index of $A_i \, (i = 1, 2, \cdots, m)$ to the ideal level, L_7. And $d(\widetilde{V}_i, L_7)$ is the distance between $\widetilde{V}_i$ and the ideal value level of L_7. When $d(\widetilde{V}_i, L_7) = 0$, value perceived and received by the customers is exactly the same as ideal value, $CI = 1$; when $d(\widetilde{V}_i, L_7) = 1$, value perceived and received by the customers is zero, $CI = 0$. The higher the CI_i, the higher the customers perceived and received value with the alternative drugstore A_i.

Value level as membership

To illustrate value level of each drugstore in question and the relative status among them, a linguistic expression of value levels is assigned to compute the maximum grade of membership of CI_i in V_j.

$$G(CI_i, V_j) = \max_j \mu_{S_j}(CI_i), \, j = 1, 2, \ldots, 7$$

(16)

where $G(CI_i, V_j)$ is the maximum grade of membership of CI_i in V_j.

Overall value actually received from drugstores in question by the customers then can be expressed by using the jth label of V_j. For those value levels fall into the same category, a comparison of closeness index of respective drugstores would be useful in clarifying the equivocal circumstances.

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