
Attribute-consequence-value linkages: A new technique for understanding customers' product knowledge

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Abstract A new technique based on the means-end chain (MEC) framework is proposed to assess consumers' product knowledge and cognitive structures. Applying linear regression and factor analyses to explore the relationship between product knowledge (product attributes) and self-concept (personal values) components on services of the convenience store chains (CVS), this study provides a new analysis to help identify decisive attributes for satisfying customers' value demands. The new technique not only addresses the limitations of the traditional MEC methodology but also provides marketers with a new insight for developing effective marketing strategies.

INTRODUCTION

A new technique is proposed for enhancing the traditional means-end chain (MEC) methodology of understanding customers' product knowledge. Traditional MEC analysis relies on survey data to uncover the means-end hierarchies defined by the relationship among attributes, consequences and values. Such an analysis leads to a tree diagram, termed a hierarchical value map (HVM), which is by nature structural and represents these relationships. These rich and deep descriptions of product knowledge reveal differences in product knowledge between experienced and novice consumers. Marketers can thus use HVM to decide which attributes are most

effective in achieving their desired consumer values.

The traditional MEC methodology, however, has four main limitations.

- selecting and grouping *A*, *C*, *V* variables is a subjective process that may lead to the elimination of relevant marketing variables resulting in inappropriate product strategies
- researchers must predefine the cutoff value for an HVM
- the necessary process of simplifying *A/C/V* variables restricts the scope and depth of interviewee response to predetermined variables, which may not accurately reflect consumers' true desires
- identifying which variable is the

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attribute, consequence, or value is difficult, especially when the MEC methodology is applied to developing intangible product strategies.

A new technique that integrates MECs and statistical methods such as factor analysis and linear regression analysis can solve these limitations of the traditional MEC methodology. Such a method allows the marketer to identify the relative importance of different product attributes in achieving the values associated with consumer satisfaction. This expanded MEC methodology provides marketers with the relevant product information on a straightforward *A-C-V* line for developing effective marketing strategies. The purpose of this paper is twofold: to provide new insights into the *A-C-V* linkages and to propose a new methodology for developing and understanding related product strategies.

LITERATURE REVIEW

Attribute, consequence and value

Among marketing literatures, the predominant approach to analysing product–consumer relevance is MEC analysis.^{1–7} MECs are based on the taxonomy of consumer product knowledge involving three key concepts: product attributes (*A*), consequences (*C*) and values (*V*). The underlying idea is that product attributes are means for consumers to obtain desired ends, namely values through the consequences of those attributes.^{8,9} In MEC theory, the key concepts are linked hierarchically in cognitive structures; that is, a product's attributes yield particular consequences upon product consumption.

Attribute (A): product attributes can be regarded as varying along a continuum from the concrete to the abstract.

Concrete attributes, such as product model or price, can be viewed as relatively tangible product characteristics.^{10–12} Abstract attributes, such as product brand or style, can be considered as non-pictorial distinguishing features. Abstractness, in this context, is defined as the inverse of how directly an attribute denotes particular objects or events, and is equated with the specificity–generality of terms and the subordination–superordination of category labels.^{13,14} Similarly, more abstract or superordinate category distinctions encompass larger, more general product groupings.

Consequence (C): many articles emphasised only product attributes^{15,16} or personal values;^{17,18} only a few mention consequence variables. Consequence is what a consumer feels after consumption. The feeling can be positive or negative. That is, whether the post-consumption feeling can satisfy the consumers' desires that will affect consumer's willingness to repurchase the same product. Several researchers have used quality as a replacement of consequence,^{19,20} because quality can be thought of as a measure of a product upon consumption. In other words, quality can function as a consumption consequence.^{21,22}

Value (V): several customer-oriented researches indicated that the process by which consumers satisfy their value expectations could be used to build consumers' consumption and experience models. Marketers can use these models to clarify what consumers' recognition will be, where their product position can be, and how they can develop competitive product strategies.^{23,24} In fact, consumers' cognitive structure uncover consumers' values.^{25–27}

Personal value or characteristic classification in LOV, VALS2 and RVS are often used to develop effective marketing strategies. The following are

the detailed descriptions of the three models.

Researchers²⁸ used a scale developed by Kahle and Kennedy²⁹ called 'List of Values' (LOV) to discuss marketers' norms. Results from canonical correlation analysis generally indicated that marketers' norms could be partly explained by personal values. An integrated methodology to identify segments in international markets based on consumer means–end chains was developed by Hofstede *et al.*³⁰ The methodology also utilised LOV to analyse consumers' value systems. The values used in the association pattern technique (APT) are those from the LOV inventory,³¹ that is, several researchers think nine 'value' items in LOV are suitable as variables of *A-C-V* linkages.

Several research firms have developed lifestyle classification systems. The most widely used is SRI Consulting's Values and Lifestyles (VALS2) typology.^{32,33} VALS2 is a psychographic system that links demographics and purchase patterns with psychological attitudes. SRI, a consulting company in USA, uses VALS2 technique to differentiate eight types of American consumers, each representing a specific market segment with a distinctive behaviour and emotional make-up.

Marketers need to identify segmentation variables based on demographics, lifestyles and values. Personal values can be an important basis for segmentation, differing according to age, income, education, gender and social class. A popular methodology, Rokeach Value Survey (RVS) consists of 18 instrumental values and 18 terminal values. Instrumental values are the cognitive representations of 'preferred modes of conduct or behavior', such as independence or courage. Terminal values, on the other hand, represent

'preferred end states of being', such as happiness or freedom.³⁴ Prakash³⁵ further discussed women's segmentation by the value structure based mainly on the researches of Bartos,^{36,37} Rokeach³⁸ and Coleman.³⁹

Improvements in MEC analysis

New techniques for improving traditional MEC analysis and developing useful marketing strategies are presented as follows:

- APT technique: association pattern technique (APT) is a data collection procedure for compelling means–end chain segmentation approach.^{39,40} This method is built on a structured data collection approach derived from AB (attribute–benefit) and BV (benefit–value) matrices
- LVQ technique: learning vector quantisation (LVQ)⁴¹ is a predictive clustering technique that can be applied to whole means–end chains, as opposed to other specific characteristics
- CDA technique: cognitive differentiation analysis (CDA)⁴² can be used to identify the relationship of the pairwise preference or perception judgments to the attributes, consequences and values
- graph theory and correspondence analysis: graph theory and correspondence analysis proposed by Valette–Florence and Rapacchi⁴³ allow marketers to comprehend how consumers translate the attributes of products into meaningful associations with respect to self-defining attitudes and values
- HVCM technique: an integrated methodology based on cluster analysis and means–end chain method can be used to derive the hierarchical value cluster map (HVCM), which can

handle and develop strategies for pricing, product differentiation, advertising and market segmentation⁴⁴ — other techniques: researchers⁴⁵ used the concepts of statistical graphics, graphical perception theory and graphics semiology to improve the design of HVM so the original data are presented more clearly. Moreover, Lin and Fu⁴⁶ utilised the mathematical model on deductive technique and flow chart to demonstrate how MEC's logic construction can be applied to computer programs for developing useful marketing strategies.

METHODOLOGY

Data collection

In this study, data were collected by two approaches: first by conducting open one-on-one consumer interviews and secondly interviewing respondents using a structured questionnaire. The researcher investigated the top five convenience store (CVS) chains in Taiwan that offered various patterns of service and identified 39 service items. Based on those 39 service items, the researcher collected 100 valid samples of data by in-depth open interviews. The sample data are based on five questions designed to determine the following:

- what CVS services did you prefer during your purchase
- why did you prefer these services
- what are the consequences for you after experiencing these services
- what personal values did you satisfy after experiencing these services or consequences
- did you agree the relationship between attributes, consequences and values?

The researcher analysed the collected

data to understand all *A*, *C* and *V* variables of CVS. The survey results were summarised into 48 service items (attribute variables A_i ; $i = 1 \dots 48$), 36 consequence variables (C_j ; $j = 1 \dots 36$) and 22 value variables (V_k ; $k = 1 \dots 22$). Using the total 106 *A-C-V* variables as the base for the structural questionnaire with a Likert scale (scale: 1–7), 300 valid samples of data were gathered. The ratio of interviews was based on the ratio of stores of the top five CVS, located in the city, town and countryside. The top five CVS were 7-Eleven (2,248 stores), Family Mart (796 stores), Hi-Life (610 stores), OK (465 stores) and SJ Express (310 stores), which account for 80 per cent of total Taiwan CVS stores.

Factor analysis

Factor analysis in this research was conducted using the Varimax Method. Forty-eight attribute variables were classified into eight attribute factors (AF_m ; $m = 1 \dots 8$) shown in Appendix 1, where the cutoff value of eigenvalue was greater than 1. The cumulative percentage of variance for attribute factor analysis was 68.7 per cent. The individual contributions of each factor are indicated in Appendix 1.

Linear relations of A-C-Vs

Multiple regression analysis is a general statistical technique used to analyse the relationship between a single dependent variable and several independent variables.⁴⁷ In this study, each consequence variable was a dependent variable and the attribute variables were regarded as independent variables. Multiple regression analysis was applied to analyse the consequence–attribute relations. The same process was used to identify the value–consequence relations. The linear relation was considered

significant when the P -value (using T test) of beta coefficients (regression coefficients) of the C_j-A_i/V_k-C_j linear regression functions was less than 0.05. All significant linear relations were positive (the negative linear relations were eliminated) because marketers tend to focus on the positive consequences or value of buying and using products.⁴⁸ Tables 1 and 2 show the significant linear relations between C_j-A_i and between V_k-C_j , respectively.

RESULTS

Analysis of A-C, C-V, A-V linkages

The number of $A-C-V$ linkages (Tables 1 and 2) was used to measure the importance of a product's attributes. The more links each attribute could form with consequence variables and each consequence variable could form with value variables, the more important the product attributes or consequence were upon product consumption. The total number of $A-V$ linkages was determined from each $A-C$ and $C-V$ linear relationship.

In Table 1, the figures in the “*” column represent the total number of A_i-C_j linkages. The figures in the “***” column are the total number of C_j-V_k linkages, when A_i-C_j linkages exist. Simultaneously, the figures in the “****” column represent the total number of A_i-V_k linkages, when A , C and V variables are linked hierarchically. The figures in the “***” and “****” columns in Table 1 are summarised from Tables 1 and 2.

‘Xerox-copy’(A01), for example, has a significant linear relationship with ‘money-saving’(C01) (see Table 1). The figure ‘4’ in row A01 and column C01 means that four value variables have significant linear relations with C01 variable (see Table 2). The figure ‘10’ in

row A01 and column “*” means that ten consequence variables have significant linear relations with variable A01. These ten consequence variables have significant linear relations with 22 value variables (summing the figures in row A01) shown in row A01 and column “***” of Table 1. The figures in column “****” and row A01 indicate the number of significant linear relationships between the ten consequence variables and their linking value variables, but do not compute repeatedly those value variables. In other words, 15 rather than 22 value variables have significant linear relations with variable A01.

The number of times a single product attribute can link consequences and values is positively related to the strength or weakness of consumers' value satisfaction upon consumption. For example, linked with 11 consequence variables ‘photo booth’ (A15) is an important product attribute, which can attain a consumer's positive cognition (see Table 1, column “*”). ‘Fun’ (C32), which linked with 17 value variables, can be regarded as a significant means to achieving consumers' desired ends. What marketers really care about, however, is how to design a product that satisfies consumers' value demands. Of particular importance is identifying product attributes that can yield particular consequences upon consumption, which contributes an analysis to the value of consumer satisfaction. In this research, ‘mail-order service’ (A09) and ‘photo booth’ (A15), which both linked 19 value variables hierarchically (see Table 1, column “****”), are most important product attributes to satisfy consumer wants. Therefore, marketers can use the information provided in Tables 1 and 2 to identify the attributes that will help them achieve the desired consumer values and develop the appropriate product strategies.

Table 1: Profile of each A_i-C_j linkage

No.	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	*	**	***
A01	4												0		1	0				2				4	1	1				3	6					10	22	15	
A02																																				0	0	0	
A03													0		6				7																	3	13	10	
A04																																				0	0	0	
A05																				2														5	5	3	12	11	
A06																																				0	0	0	
A07																																				0	0	0	
A08				0																	4	0														3	4	4	
A09	4	0	0		2																			4					3		17					7	30	19	
A10																							4											5		2	9	8	
A11				0				0														1						3								4	4	3	
A12																												1								1	1	1	
A13					2																															1	2	2	
A14								0																												1	0	0	
A15		0	0				0						0	0	6	1	0							4	1						17					11	29	19	
A16																																				0	0	0	
A17	4								2		0																						9		5	5	20	14	
A18							0			1								1									1	3								5	6	6	
A19																																				0	0	0	
A20																																				0	0	0	
A21					2																				1												2	3	3
A22				0																																1	0	0	
A23																		1			4															2	5	5	
A24				0	2					1		9			6																					5	18	12	

Table 2: Profile of each C_j - V_k linkage

No.	V01	V02	V03	V04	V05	V06	V07	V08	V09	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	Total
C1														*	*	*	*						4
C2																							0
C3																							0
C4																							0
C5						*	*																2
C6													*	*	*	*		*					5
C7																							0
C8																							0
C9				*														*					2
C10															*								1
C11																							0
C12	*		*				*	*	*		*					*					*	*	9
C13																							0
C14																							0
C15		*					*		*	*						*		*					6
C16																*							1
C17																							0
C18																*							1
C19										*	*	*	*					*	*	*			7
C20														*	*								2
C21											*								*	*	*		4
C22																							0
C23												*											1
C24						*	*	*					*										4
C25	*																						1
C26														*									1
C27											*												1
C28				*								*						*					3
C29																							0
C30						*			*	*													3
C31			*	*		*	*					*								*			6
C32			*	*	*	*	*	*	*	*	*		*		*	*	*	*	*	*	*	*	17
C33						*													*			*	3
C34			*	*	*	*				*	*						*		*			*	9
C35			*	*		*			*						*								5
C36	*				*											*	*	*					5
Total	3	1	5	5	4	8	6	3	5	4	6	5	4	4	5	8	5	6	5	4	3	4	103

Note: * represents that the row consequence variable has a significant linear relationship with the column value variable.

Table 3: Profile of each AF_M-C-V linkage

Attribute factor (number of attribute variables)	AF-C (average linkages)	AF-C-V (average linkages)	AF-Cf-Vi	AF-Cp-Vi	AF-Cf-Vt	AF-Cp-Vt
AF1(8)	17(2.1)	39(4.9)	8	7	20	4
AF2(11)	21(1.9)	46(4.2)	5	18	10	13
AF3(11)	30(2.7)	65(5.9)	2	43	0	20
AF4(5)	13(2.6)	15(3.0)	2	8	0	5
AF5(5)	10(2.0)	31(6.2)	9	7	8	7
AF6(2)	10(5.0)	22(11.0)	0	13	4	5
AF7(3)	12(4.0)	36(12.0)	2	20	5	9
AF8(3)	6(2.0)	17(5.7)	0	9	0	8

Notes: Cf: Functional Consequence; Cp: Psychosocial/Social Consequence; Vi: Instrumental Value; Vt: Terminal Value

Table 4: Profile of C-V linkages based on level categories

Consequence levels	Value levels Instrumental value	Terminal value
Functional consequence	10	13
Psychological consequence	49	31

Analysis of AF-C-V linkages

The purpose of factor analysis is to group similar characteristics of attribute variables. The factor analysis through the Varimax Method classified 48 attribute variables into the eight attribute factors (AFs) listed in Appendix 1. In the marketing literature, two broad levels of product consequences after product use were distinguished as functional and psychosocial.⁴⁹ Functional consequences are tangible outcomes resulting from product use and more directly experienced by consumers. In contrast, psychological consequences of product use are less tangible and more individualised outcomes, such as how the product makes the consumer feel. Based on functional and psychological classifications, 36 consequence variables were divided into the two levels shown in Appendix 2. Following the Rokeach⁵⁰ classifications, this study classified 22 value variables into instrumental values

and terminal values as shown in Appendix 2. Table 3 is a profile of each AF-C-V linkage derived from the information provided in Tables 1 and 2 and the level classifications of Appendix 2.

In this research, Table 3 shows the linkages of each attribute factor with different levels of consequence and value variables. AF3, for example, is the most important attribute factor, involving 30 AF-C linkages. Considering the number of variables included in each attribute factor, AF6 has the highest average AF-C linkages.

Comparing the different levels of C-V linkages in Table 4, 'psychological consequence' and 'instrumental value' have the highest linkage frequency. This means to satisfy the consumers' value demands, the marketer must satisfy their psychological consequence desires. Consequently, understanding which product attributes (service items) can

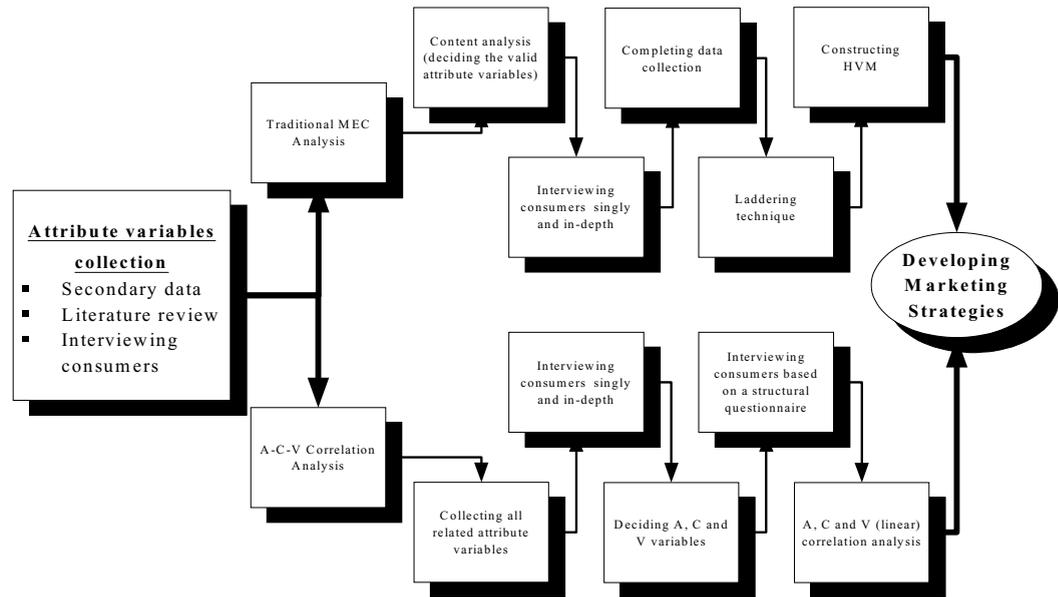


Figure 1 The comparison of traditional MEC analysis and A-C-V linear regression analysis

achieve consumer's psychological consequence desire is important. The researcher further analysed the linkages of *AF* with different levels of *C* and *V* variables in Table 3. The results show that *AF3*—psychological consequence—instrumental value has the highest linkage frequency. Thus, upon consumption, the product's attribute factors yield to psychological level of consequences, contributing to the instrumental value of consumer satisfaction.

Comparison of traditional MEC analysis and the new integrated methodology

In this study, a new integrated methodology, based on MEC analysis and the linear regression analysis, was proposed to enhance traditional MEC methodology and give marketers a better understanding regarding the relative importance of product attributes. Figure 1 illustrates the frameworks of the

traditional MEC methodology and the new integrated methodology proposed in this study. These two methodologies begin by collecting a particular product attribute and end by formulating marketing strategies. The major difference between these two methodologies is the way data are collected. The traditional MEC methodology uses in-depth interviewing to collect data. In this study, the purpose of in-depth interviewing was to identify the differences between the attribute variables of secondary data and the attribute preference of consumers in order to determine the base variables for designing a structural questionnaire. The traditional MEC analysis is a qualitative analysis; the new integrated analysis is a quantitative analysis. Quantitative analysis can avoid the possible response bias created by unknown variables during interviewer and interviewee interaction. Furthermore, quantitative analysis can be used in various analyses, contributing to the understanding of consumers' product knowledge.

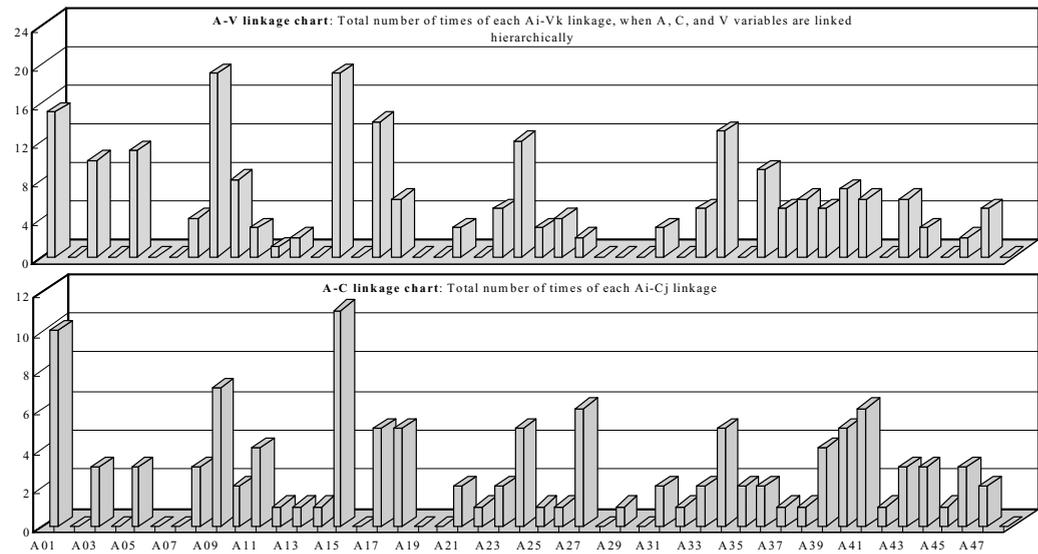


Figure 2 The A-C and A-V linkage charts

Based on the information provided in Table 3, marketers can formulate product-attribute (service items) mix of the CVS service items and identify the different levels of consumers' value demands upon consumption to attain consumers' satisfaction and further strengthen the CVS competitive advantages.

IMPLICATIONS

Marketing strategy for CVS

Product differentiation strategy

Figure 2 is derived from the data provided in Table 1, which includes A-C and A-V linkage charts. In the A-C linkage chart, A15 has the highest A-C linkage frequency. Providing a 'photo booth' (A15) machine is positively associated with 'fun' (C32) (see A15-C32 linkage in Table 1). This means that 'photo booth' yields 'fun' consequence upon consumption, contributing to 17 values of consumer satisfaction (see C32-Vi linkage in Table

2). That is, the CVS must adhere to the 'photo booth' product differentiation strategy. Again, in the A-V linkage chart, A15 also has the highest A-V linkage frequency, meaning CVS can achieve consumers' value demands through the 'photo booth' product differentiation strategy.

Product-mix strategies

In Table 3, *AF3-Cp-Vi* linkage has the highest frequency (43 times). Thus, if the targeted consumers prefer psychological consequences and instrumental values, the product-mix strategy in CVS must focus on the service items in *AF3*.

Other marketing strategy

CVS member club is a principal approach to increasing consumer brand loyalty. CVS can offer club members price discounts or free services. In Figure 2, for example, CVS can provide club members half price for using 'Xerox-copy' (A01) or 'photo booth' (A15) and no extra charge for 'mail-order service' (A09) to achieve consumers' value satisfaction and increase brand loyalty.

Applications of A-C-V linkage

The methodologies based on traditional MEC methodology such as APT, LVQ and CDA all exhibit a certain degree of researcher or interviewer subjectivity. Adopting a structural questionnaire for consumer responses and applying statistic analysis can eliminate the issue of response bias. The researcher used linear regression to test the linear relations of *A/C/V* variables, utilised *A-C-V* linkages to develop effective marketing strategies and give marketers a useful tool for understanding their consumers' product knowledge.

A-C-V linkages indicate the consumers' product perceptions. Applying the perception analysis to CVS service items and using factor analysis to group those service items was effective in developing an appropriate product-mix. The method can help the service industry develop intangible product-mix strategies. Besides understanding why intangible product-mix can satisfy consumer's value demands, marketers can utilise the analysis of *A-C-V* linkages to investigate the characteristics of target markets such as demographic and geographic variables.⁵¹ With this information marketers can analyse individual consumer's value demand to develop or improve CVS service items and strengthen competitive advantage.

Each product attribute or product attribute factor can satisfy different consumer consequence or value. Table 1 shows that each product attribute yields positive consequences upon product consumption though the linkage frequencies are different. Simultaneously, consequence variables and value variables were divided into two levels in Table 3. Through grouping, the number of times that the attribute factor linked with that of consequences and values was different. In other words, considering the characteristics of target customers for the

CVS or service industry, marketers can simply follow the technique proposed in this paper so that their service items attain the highest positive *A-C-V* linkage times and achieve consumers' value satisfaction.

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Appendix 1: Profile of each attribute factor

Attribute factors	Percent of variance %	Attributes
AF1	19.8	(A26) Tuition remittance service, (A28) Repairs, (A29) Delivery, (A32) Valet parking, (A34) Helping customers make hospital reservations, (A35) Certificate, (A36) Ads aid, (A40) Deposited goods
AF2	11.7	(A17) Forward registered mail to post office, (A19) Remittance for various fine payments, (A20) Train ticket sales agent, (A21) Remittance for phone bill payment, (A22) Paid road ticket agent, (A27) Health insurance certificate replacement, (A30) Remittance for public utility payment, (A31) Remittance for various taxes, (A37) Remittance for sundry payments, (A38) Forward registered mail to client, (A43) Uniform invoice prize money exchange
AF3	9.0	(A05) Microwave, (A07) Locker area, (A10) Wrappings, (A11) Providing vending machine, (A12) Movie ticket sales agent, (A13) Music concert ticket agent, (A14) TV wall, (A15) Photo booth, (A39) Entertainment equipment, (A44) Flower delivery, (A48) Film processing
AF4	6.9	(A41) Handicapped friendly facility, (A42) Parking place, (A45) Rest area, (A46) Baby-sitting service, (A47) Waterworks
AF5	6.6	(A06) On-sale, (A23) Recycle, (A24) Transportation information, (A25) Motorcycle insurance, (A33) Money-exchange
AF6	6.4	(A01) Xerox-copy, (A02) Fax
AF7	5.0	(A09) Mail-order service, (A16) Missing-elder-line, (A18) Internet information
AF8	3.3	(A03) Restroom facility, (A04) Reading area, (A08) ATM

Appendix 2: Profile of each consequence/value variable based on level categories

Consequence variables	Functional	(C01) Money-saving, (C02) Easy to acquire information, (C03) Convenient store chains, (C04) Use before payment, (C05) Environmental protection, (C06) Without going out, (C07) Short distance, (C08) Air-conditioning, (C09) Bulk shopping discount, (C10) Handicapped shopping aisle, (C11) Providing life-show activity, (C12) Information available
	Psychosocial/social	(C13) Handiness, (C14) Time-saving, (C15) Effectiveness, (C16) Cleanliness, (C17) Comfort, (C18) Decoration, (C19) Energy-saving, (C20) Killing-time, (C21) Feeling-good, (C22) No troubles in shopping, (C23) Amusement, (C24) Usefulness, (C25) Effortlessness, (C26) Incidental visit, (C27) Easy to get a product or service, (C28) Pleasant, (C29) Knowledge, (C30) Warmth, (C31) Nice environment, (C32) Fun, (C33) Knowledge available, (C34) Anxiety-free experience, (C35) Trade opportunity, (C36) Privacy
Value variables	Instrumental	(V01) Safety, (V02) Relaxation, (V03) Energy, (V04) Feeling-great, (V05) Elegance, (V06) Activity, (V07) Helpfulness, (V08) Creativeness, (V09) Trustworthiness, (V10) Ease, (V11) High spirit, (V12) Excitements of life, (V13) Healthy
	Terminal	(V14) Happiness, (V15) Satisfaction, (V16) Insurance, (V17) Human longevity, (V18) Easygoing life, (V19) Wonder, (V20) Achievement, (V21) Healthiness, (V22) Enriched life