New Product and Eagerly Wanted Product Adoption and Diffusion Processes: A Conceptual Model**

Masataka Yamada
Ryuji Furukawa
Hiroshi Kato*

Ver. 1.1.1
Revised July, 2001

*Masataka Yamada is Professor of Marketing, Faculty of Business Administration, Kyoto Sangyo University.
Address: Motoyama, Kamigamo, Kita-ku, Kyoto-shi, 603-8555, Japan
Phone: 81-75-705-1731; Fax: 81-75-705-1750; e-mail: myamada@cc.kyoto-su.ac.jp
Ryuji Furukawa is Manager, Evergreen Japan Corporation.
Address: Hakutsuru BLDG. No.12-5,Ginza 5-choume, Chuo-ku, Tokyo 104-0061 Japan
Phone: 81-3-3546-6610, Fax: 81-3-3546-6640 e-mail: r.furukawa@evergreen-japan.co.jp
Hiroshi Kato is Chief Researcher, Iihara Management Institute.
Address：Kawai Building 8F, 1-32-6 Higashi-Ikebukuro, Toshima-ku, Tokyo 170-0013 Japan
Phone: 81-3-5957-3378, Fax: 81-3-5957-3380 e-mail : JDX01156@nifty.ne.jp

This study was supported by special grants from Iihara Management Institute and NTT Musashino Research Laboratories and a regular research fund of Kyoto Sangyo University.

**Some of the preliminary results of this study were presented at Marketing Science Conference 2000, UCLA, FR-A4, 9:00-10:30.

NEW PRODUCT AND EAGERLY WANTED PRODUCT ADOPTION AND DIFFUSION PROCESSES: A CONCEPTUAL MODEL

ABSTRACT

In the past several years, researchers have started to notice successful products whose sales patterns show rapidly declining diffusion patterns. These products include certain movies, computer software, TV game software, music CDs, etc. (e.g., Windows95 (up grade version), Final Fantasy, Terminator 2; Sawhney and Eliashberg 1996, Yamada et al. 1997, Moe and Fader 1998). These declining diffusion patterns have been rather neglected in the field of marketing (Bass 1969) because they were regarded as being peculiar to unsuccessful products, even though before Bass (1969), Fourt and Woodlock (1960) predicted first purchases of grocery products by an exponential model and in theory Lekvall and Wahlbin (1973) raised the possibility of various diffusion patterns from a bell-shaped one (logistic model) to a rapidly declining one (modified exponential model) using a mixed model similar to the Bass diffusion model. Also after Bass (1969), Gatignon and Robertson (1985) discussed the same possibility with 29 propositions. Generally speaking, however, there were no such studies that include rapidly declining diffusion patterns until recently except for the above studies (e.g., Sawhney and Eliashberg 1996; Yamada et al. 1997; Moe and Fader 1998).

However, the relative importance of the entertainment industry or contents industry and IT-related industry has become greater due to the growth of the "networked" society. We believe that it is time to take a closer look at these products showing rapidly declining diffusion patterns from product classification and diffusion theory points of view. Establishing a conceptual model of adoption and diffusion process of a new product, we proposed the third "high involvement" adoption model. We call such a product as an eagerly wanted product and define it as anything that can be offered to a market to satisfy an *eager want or need*.

Then we establish operational hypotheses to test the conceptual hypothesis that an *eagerly wanted* product should take a rapidly declining diffusion pattern from the beginning. We tested the following operational hypotheses on sales patterns of 254 new popular music CDs including albums and singles sold in one of the national chains of convenience stores in Japan. Common practice of music CD consumers in Japan is that they first rent single CDs and then buy albums.

H1: A popular music album CD is an eagerly wanted product, that is, its diffusion pattern is rapidly declining.

H2: The fraction of rapidly declining diffusion patterns for album CDs is greater than that for single CDs.

H3: Sales pattern of a new singer's debut single CD does not take a rapidly declining diffusion

pattern.

H4: The sales pattern of a debut single of a new group or a singer produced through a well-designed process is a rapidly declining one.

We also tested sales patterns of new products of beer and low malt liquor as additional evidence to H2 and H3, because new beer products may be anticipated through promotional efforts but may not be awaited as eagerly as CD albums. We obtained favorable results on all four hypotheses.

As an implication of this study, a set of strategies for product development and introduction for an *eagerly wanted* product is proposed:

(1) One should let consumers be involved from the development stage (the outset); for example (a) the ASAYAN project of TV Tokyo (see Section 4.2); (b) the use of famous artists, movie stars, and directors; (c) creating a series etc.

(2) Before the introduction of a new product, its promotion and publicity should be done as intensively and widely as possible in the target market. Use media mix, etc.

(3) The initial price should be set at the most reasonable level possible or free if possible.

(4) To obtain a large potential market quickly, make as many business alliances as possible.

(Keywords: Innovation diffusion process, Product classification, Diffusion pattern classification, Popular music CDs)

1. INTRODUCTION

In the past several years, researchers have started to notice successful products whose sales patterns show rapidly declining diffusion patterns. These products include certain movies, computer software, TV game software, music CDs, etc. (e.g., Windows95 (up grade version), Final Fantasy, Terminator 2; Sawhney and Eliashberg 1996, Yamada et al. 1997, Moe and Fader 1998). These declining diffusion patterns have been rather neglected in the field of marketing after Bass (on pp. 218-219, 1969) because they were regarded as being peculiar to unsuccessful products, even though before Bass (1969), Fourt and Woodlock (1960) predicted first purchases of grocery products by an exponential model and in theory Lekvall and Wahlbin (1973) raised the possibility of various diffusion patterns from a bell-shaped one (logistic model) to a rapidly declining one (modified exponential model) using a mixed model similar to the Bass diffusion model. Also after Bass (1969), Gatignon and Robertson (1985) discussed the same possibility with 29 propositions. Generally speaking, however, there were no such studies that include rapidly declining diffusion patterns until recently except the above (Sawhney and Eliashberg 1996; Yamada et al. 1997; Moe and Fader 1998).

However, the relative importance of the entertainment industry or contents industry and IT-related industry has been becoming larger and larger as the "networked" society has grown. We believe that it is time to take a closer look at these products showing rapidly declining diffusion patterns from product classification and diffusion theory points of view. Establishing a conceptual model of adoption and diffusion process of a new product, we call such a product as an "eagerly wanted product" and define it as anything that can be offered to a market to satisfy an *eager want or need*.

We establish operational hypotheses to test the conceptual hypothesis that an *eagerly wanted* product should take a rapidly declining diffusion pattern from the beginning. We tested the following operational hypotheses on sales patterns of 254 new popular music CDs including albums and singles sold in one of the national chains of convenience stores in Japan. Common practice of music CD consumers in Japan is that they first rent single CDs and then buy albums.

H1: A popular music album CD is an eagerly wanted product, that is, its diffusion pattern is rapidly declining.

H2: The fraction of rapidly declining diffusion patterns for album CDs is greater than that for single CDs.

H3: Sales pattern of a new singer’s debut single CD does not take a rapidly

declining diffusion pattern.

H4: The sales pattern of a debut single of a new group or a singer produced through a well-designed process is a rapidly declining one.

We also tested sales patterns of new products of beer and low malt liquor as additional evidence to H2 and H3, because new beer products may be anticipated through promotional efforts but may not be awaited as eagerly as CD albums. We obtained favorable results on all four hypotheses.

As an implication of this study, a set of strategies for product development and introduction for an *eagerly wanted* product is proposed:

(1) One should let consumers be involved from the development stage; for example, (a) the ASAYAN project of TV Tokyo (see Section 4.2); (b) the use of famous artists, movie stars, and directors; (c) creating a series etc.

(2) Before the introduction of a new product, its promotion and publicity should be done as intensively and widely as possible in the target market. Use media mix, etc.

(3) The initial price should be set at the most reasonable level possible or free if possible.

(4) To get a large potential market quickly, make as many business alliances as possible.

The balance of this paper is organized as follows. In Section 2, we review the concept of a product to obtain a basic idea to establish a definition of an *eagerly wanted* product. We also review product classifications and find that each product type has an appropriate marketing-mix strategy and that it entails implications for marketing strategies. We then review diffusion studies that include rapidly declining diffusion patterns to develop a conceptual model for adoption and diffusion processes of new products in Section 3. We then consider products showing rapidly declining sales patterns and define an *eagerly wanted* product and we establish operational hypotheses to test the conceptual hypothesis. Data used is described in Section 5 and the test results are discussed in Section 6. Finally, we conclude with a summary and implications in Section 7.

2. PRODUCT CLASSIFICATIONS IN MARKETING

In this section, we investigate the reasons why we classify products in marketing to obtain a basic idea to establish a definition of an *eagerly wanted* product. The following

discussion leans heavily on Chapter 13, Philip Kotler (2000), *Marketing Management*, The millennium edition.

First, what is a product? It is defined as follows:

> **A *product* is anything that can be offered to a market to satisfy a want or need.**
>
> **Products that are marketed include physical goods, services, experiences, events, persons, places, properties, organizations, information and ideas.**

Then five levels of product are proposed to product planner for planning its market offering. Each level adds more customer value, and the five constitute a customer value hierarchy. The most fundamental level is the *core benefit*: the fundamental benefit or service that the customer is really buying. A hotel guest is buying "rest and sleep."
Then the product planner has to turn the *core benefit* into a *basic product*. Thus a hotel room includes a bed, bathroom, towels, desk, dresser, and closet.
At the third level, the marketer prepares an *expected product*, a set of attributes and conditions buyers normally expect when they purchase this product. Hotel guests expect a clean bed, fresh towels, working lamps, a relative degree of quiet.
At the forth level, the marketer prepares an *augmented product* that exceeds customer expectations. A hotel can include a remote-control television set, fresh flowers, rapid check-in, express checkout, and fine dining and room service.
At the fifth level stands the *potential product*, which encompasses all the possible augmentations and transformations the product might undergo in the future. The hotel guest finds candy on the pillow or a bowl of fruit or a video recorder with optional videotapes.

Each product is related to certain other products. Further, seven levels of product hierarchy are introduced for related products. The product hierarchy stretches from basic needs to particular items that satisfy those needs: *need family* (hope), *product family* (toiletries), *product class* (cosmetics), *product line* (lipstick), *product type* (frosted), *brand* (Revlon), and *item* (red).

Next, certain examples of product classifications include: nondurable goods, durable goods and services, based on *their durability or tangibility*. Consumer goods can be classified as convenience goods, shopping goods, specialty goods and unsought goods, on the basis of consumer *shopping habits*, in part, because they have implications for marketing strategy. Industrial goods can be classified as materials and parts, capital items, and supplies and business services, in terms of *how they enter the production*

process and their relative costliness.

Finally, what is the purpose of product classification? Marketers believe that each product type has an appropriate marketing-mix strategy--each implies marketing strategies.

There appears to be no product classification based on the *state of* purchaser's *want or need*. The *state of* purchaser's *want or need* is not included in Kotler's seven levels of product hierarchy. The *need family* discriminates only different needs such as hope, security etc. Hence, we propose a new product classification, an *eagerly wanted* product and a *non-eagerly wanted* product to help marketers select more appropriate marketing strategies (See Section 4).

3. A CONCEPTUAL MODEL FOR ADOPTION AND DIFFUSION PROCESSES OF NEW PRODUCTS

There exist various diffusion patterns including rapidly declining ones. Fourt and Woodlock (1960) successfully predicted first purchases of grocery products by an exponential model. Also Gatignon and Robertson (1985) discussed the same possibility with 29 propositions from past studies, especially in proposition 18[1], which states that the diffusion process tends to follow one of two ideal type patterns--sigmoid or exponential. Sawhney and Eliashberg (1996) proposed a parsimonious model for forecasting gross box-office revenues of motion pictures, which shows various patterns. Moe and Fader (1998) proposed a joint segmentation model of consumers and products and applied it to the sales of music albums, which show rapidly declining diffusion patterns. From these studies we must recognize that the diffusion pattern of new product, more precisely, the density function of adoption times, $f(t)$, can take any pattern from S-shaped one to J-shaped one in a continuous manner as shown in Figure 1.

As examples of this continuity, various diffusion patterns are tabulated in Table 1 from Sawhney and Eliashberg (1996) and in Table 2 from Bayus (1993)--which does not

[1] The diffusion process tends to follow one of two ideal type patterns—sigmoid or exponential. A sigmoid pattern is expedted under conditions of: • The operation of personal influence, • A learning hierarchy process of adoption, • High innovation costs or high switching costs, • Unimodal distribution of initial beliefs toward the innovation within the social system, • High uncertainty.
An exponential curve is expected under conditions of: • A relative lack of personal influence, • A low-involvement process of adoption, • Low innovation and switching

have J-shaped patterns.

Figure 1 A Continuous View of Diffusion Patterns

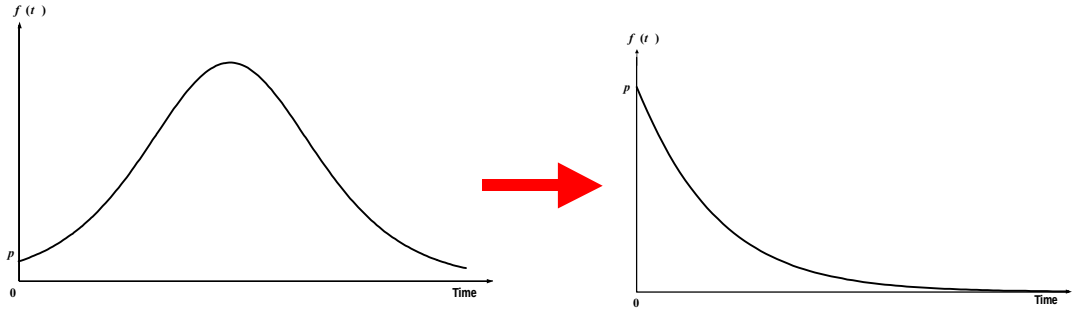


Table 1 Various Diffusion Patterns

Name of Movie	T_j (Wks)	*p*	*q*	*m*	*p* /*q*	Type of Pattern	Class
Terminator 2	24	0.553	0	142.532	#DIV/0!	Exponential	V
Robin Hood	20	0.319	0	141.780	#DIV/0!	Exponential	V
The Rocketeer	17	0.347	0.371	42.804	0.935	Gen. Gamma	III
Dying Young	10	0.56	0	32.218	#DIV/0!	Exponential	V
Naked Gun 2-1/2	19	0.557	0	73.703	#DIV/0!	Exponential	V
The Doctor	21	***	***	***	#VALUE!	***	***
V.I. Warshowski	10	0.553	0.858	9.607	0.645	Erlang-2	III
Mobsters	10	0.651	0.161	17.801	4.043	Gen. Gamma	V
Hot Shots!	16	0.279	0	73.562	#DIV/0!	Exponential	V
Doc Hollywood	19	0.193	0	65.883	#DIV/0!	Exponential	V
Die Hard 2	15	0.398	0.149	102.719	2.671	Gen. Gamma	IV
Days of Thunder	13	0.295	0.421	71.384	0.701	Gen. Gamma	III
Betsy's Wedding	10	0.199	0.724	18.949	0.275	Erlang-2	III
Exorcist III	6	0.288	1.353	22.062	0.213	Erlang-2	II
Arachnophobia	10	0.181	0.876	42.911	0.207	Erlang-2	II
Ghost	20	0.116	1.02	68.601	0.114	Erlang-2	II
Bird on a Wire	19	***	***	***	#VALUE!	***	***
Cadillac Man	12	***	***	***	#VALUE!	***	***
Wild at Heart	11	0.174	1.346	10.498	0.129	Erlang-2	II

(Based on Table 1 on p. 123, Sawhney and Eliashberg 1996)

costs, • A uniform pattern of initial beliefs within the social system.

Table 2 Correspondences between Bayus' Segments and the Classes

Product Group Characteristics	Segment	Comparative Details	Products	Basic Pattern*	Class
Housewares and Smaller Appliances	1	#1 has a lower avarage price than #2	Electric Toothbrush, Fire Extinguisher, Hair Setter, Slow Cooker, Styling Dryer, Trash Compactor, Turntable	(1)	III
	2		Can Opener, CassetteTape Deck, Curling Iron, Electricblancket, Heating Pad, Knife Sharpner, Lawn Mower, Waffle Iron	(3)	II
Major Appliances	3		B&W TV, Blender, Deep Fryer, Electric Dryer, Food Processor, Microwave Oven, Room A/C	(3)	I
	4	#4 is starting out much higher price point than #3	Color TV, Refrigerator, VCR	(2)	I
Products Large Production Efficiencies	5	large market potentials, and high learning and price trend coefficients	Calculator, Digital Watch	(3)	II

*** = Three basic patterns**
(1) fast initial growth with sales peaking quickly (segment # 1)
(2) a long introduction growth period (segment # 4)
(3) a moderate introduction and growth period, with differences primarily in the potential (segment # 2 , # 3 , and # 5)
(The original data are taken from Table 5 on p. 1329, Bayus 1993 and all in the US market)

There have been several statistical approaches for the diffusion pattern classification (Sultan, Farley and Lehman 1990; Helsen, Jedidi and DeSarbo 1993; Farley and Lehman 1994; Bayus 1993; Sawhney and Eliashberg 1996). Unfortunately, however, the number of classes and the boundaries among classes of each method varied with the diffusion data used (see Table 1 and Table 2). Yamada et al. (1997) and Yamada (1997) proposed a data independent classification method for diffusion patterns of new products using the Bass diffusion model framework. Those studies classified the patterns into five classes based on the value of p/q where p and q are coefficients of external influence and internal influence respectively. For a graphical explanation, they also used timings, T_{IN} defined as below, inflection points of Bass continuous time domain model, T_1, T_2 and peak time, T^*. T_{IN}, T_1, T_2 and T^* can be positive, zero, or negative along with the value of p/q. Although the details are not included in this paper, the class boundaries are posted in Table 3 and a typical diffusion pattern for each

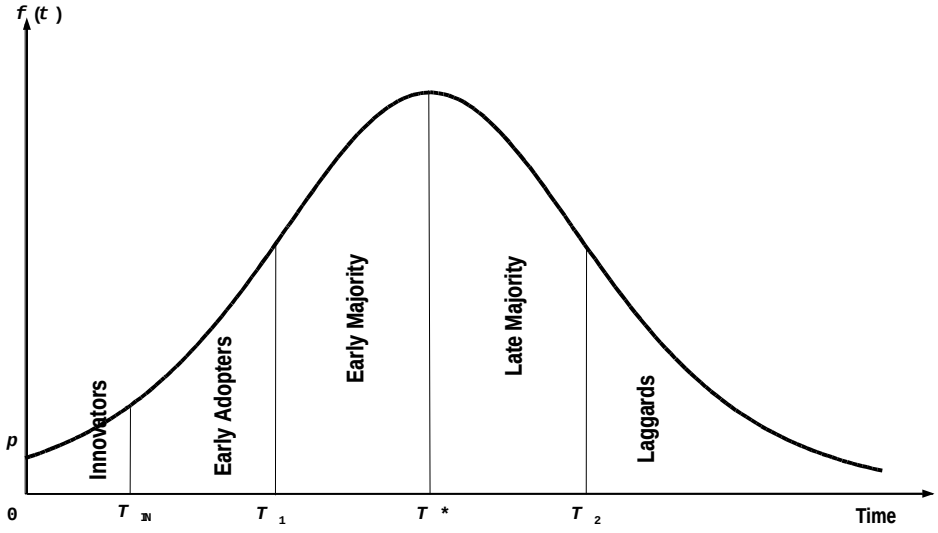
class is shown in Figures 2 to 6.

$$T_{IN} = T^* - 2(T^* - T_1) = 2T_1 - T^* = -\frac{1}{p+q} ln\left\{(7+4\sqrt{3})\frac{p}{q}\right\}$$

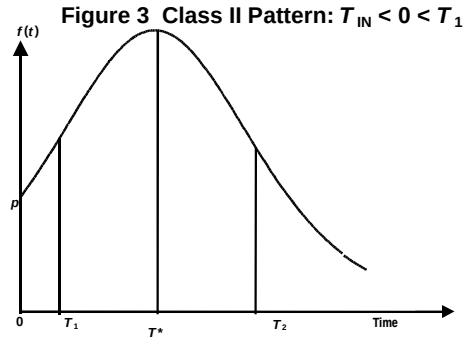
Table 3 Classification Criteria for Diffusion Patterns

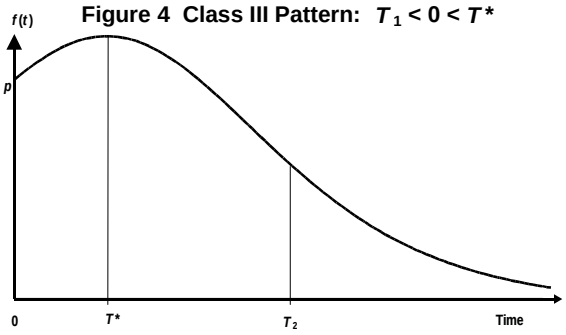
Class	Timing	Lower bound	*p/q*	Upper bound
I	$0 \le T_{IN}$	0	< *p/q* <	$7-4\sqrt{3} \cong 0.072$
II	$T_{IN} \le 0 < T_1$	$7-4\sqrt{3} \cong 0.072$	< *p/q* <	$2-\sqrt{3} \cong 0.268$
III	$T_1 \le 0 < T^*$	$2-\sqrt{3} \cong 0.268$	< *p/q* <	1.000
IV	$T^* \le 0 < T_2$	1.000	< *p/q* <	$2+\sqrt{3} \cong 3.732$
V	$T_2 \le 0$	$2+\sqrt{3} \cong 3.732$	< *p/q* <	∞

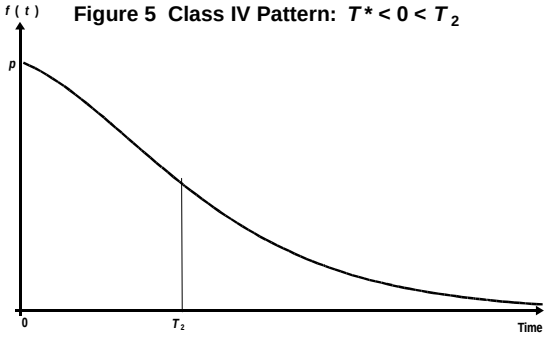
Figure 2 Class I Pattern: 0 < T_{IN}



(Note that although Yamada (1997) put the adopter categories into the graphs of Class II~Class V, these should be investigated empirically.)







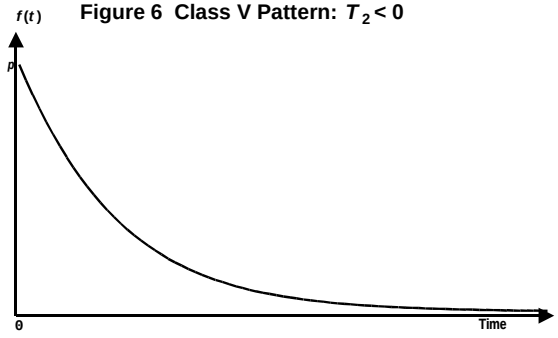
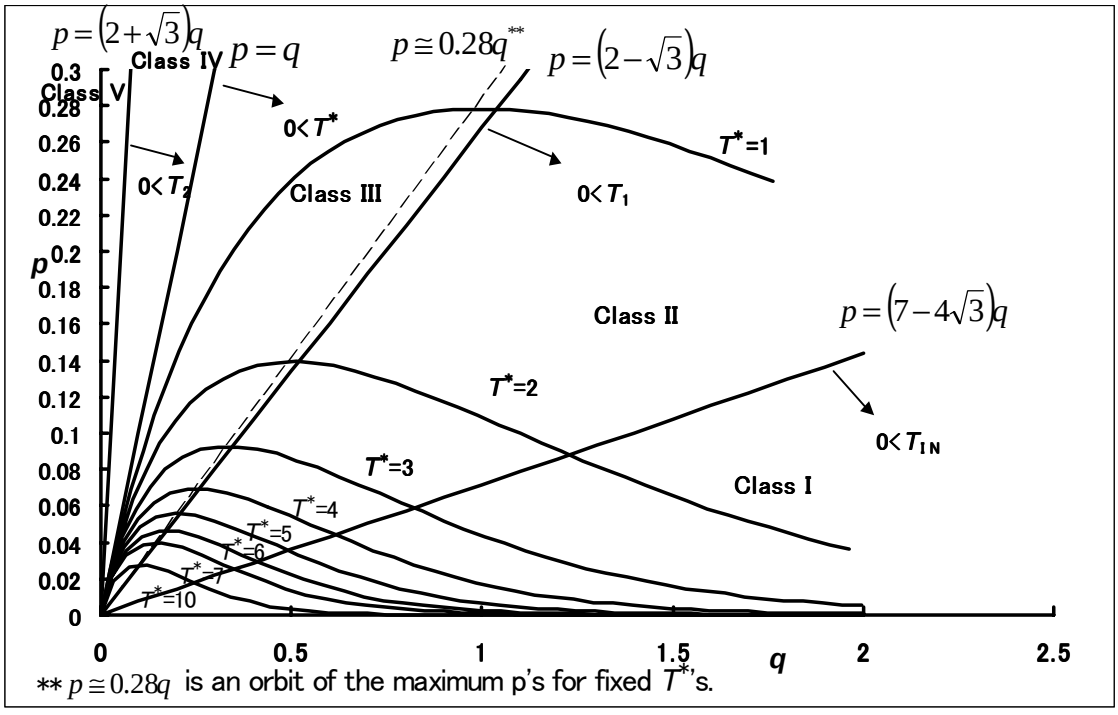


Figure 7 Class Map with Iso-peak Time Curves



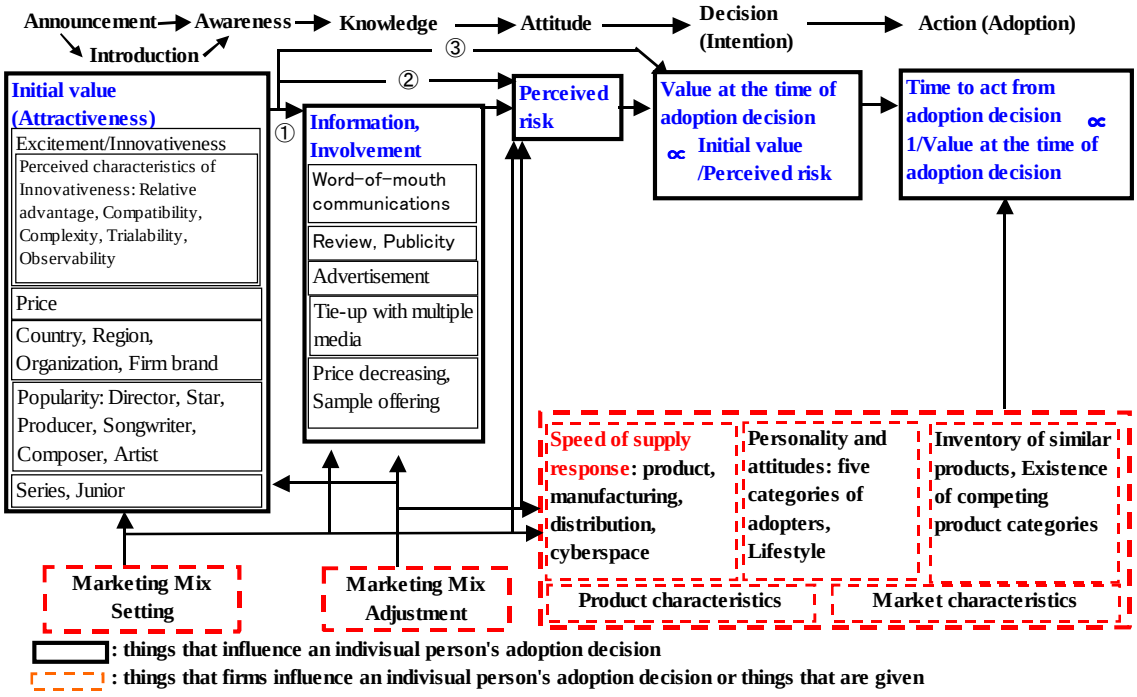
The identified class (Class I ~ Class V) for each diffusion pattern is specified at the right most columns in the previous Table 1 and Table 2. In addition, a class map is shown in Figure 7. This class map is a powerful tool to explain the nature of diffusion and to

present a multiple number of diffusion patterns at a time, because a point on the class map represents a diffusion curve.

Although a diffusion pattern can be classified by the value of *p/q* as we have seen so far, there will be a number of similar patterns for a value of *p/q* with different speeds. The speed of diffusion is best captured by the average speed from t_1 to t_2, namely, $\{F(t_2)-F(t_1)\}/(t_2-t_1)$. Therefore, it is important to note that diffusion patterns can be classified by *the value of p/q* and *the average speed*.

Finally, we propose a conceptual model for adoption and diffusion processes of new products in Figure 8.

Figure 8 Adoption and Diffusion Processes of New Products



Note that this conceptual model is made to answer the question of why different diffusion patterns from S-shaped curve to J-shaped curve exist.

Of course we have conceptual models such as those of Rogers (1983) and Gatignon and Robertson (1985); the above conceptual model, however, is made to answer the question of why different diffusion patterns and average speeds occur by closely looking at the value of the new product.

The upper level shows a general process of adoption of a new product, which is on the demand side. It starts with the stage of *announcement* of a new product. At the same

time or a little later, *introduction* of the new product to a target market follows and the *awareness* stage follows. Then potential adopters reach to the level of the *knowledge* stage. After this stage, an *attitude* is formed. *Decision* for adoption is made next. *Action* (*Adoption*) concludes the process.

Note the two types of boxes below the general process of adoption of a new product: (1) solid-lined boxes contain things that influence an individual person's adoption decision and action and (2) broken-lined boxes explicitly describe a firm's marketing efforts or things that are considered as given, which affect the items in the solid-lined boxes.

The product or offering will be successful if it delivers value and satisfaction to the target buyer. The buyer chooses between different offerings on the basis of which is perceived to deliver the most value. Kotler defines value as a ratio between what the customer *gets* and what he *gives*. The customer gets *benefits* and assumes *costs*. The benefits include functional benefits and emotional benefits. The costs include monetary costs, time costs, energy costs, and psychic costs. Thus he expresses value as follows (on p. 11, Kotler 2000):

$$Value = \frac{Benefits}{Costs} = \frac{Functional\ benefits + emotional\ benefits}{Monetary\ costs + time\ costs + energy\ costs + psychic\ costs}$$

The adopter selects the new product among the new product, the different new products and the existing products only if he perceives that the new product offers the most value. Following the above Kotler's notion, we define the initial value (attractiveness) of a new product as follows:

$$Initial\ value = \frac{Benefits}{Costs} = \frac{Functional\ benefits + emotional\ benefits}{Monetary\ costs + time\ costs + energy\ costs + psychic\ costs}$$

The higher the initial value (*attractiveness*) of a new product the more *awareness* increases. Here we assume that every innovation/product has its intrinsic value. *Initial value* (*attractiveness*) of a new product consists of (1) *excitement/innovativeness*, (2) *price*, (3) *country, region, organization* or *firm brand* to which the product belongs, (4) *popularity* that a director, a movie star, a producer, a songwriter, a composer, or an artist has, and (5) a *series* or a *second-generation celebrity*.

The perceived characteristics of *excitement/innovativeness* of the new product can be formed by its *relative advantage, compatibility, trialability, complexity,* and *observability* (Rogers 1983; with *perceived risk*, proposition 27[2], Gatignon and Robertson 1985). The more *excitement/innovativeness* is perceived, the more an adopter values the new product. The lower the *price* is perceived, the higher the initial value in general (Yamada 1999). Perfume made in France is usually perceived superior to that made in Japan. This country effect explains (3) above. *Popularity* instantly declares the value of the new product to the potential adopters based on previous achievements and performances. A *series* or a *second-generation celebrity* such as Terminator 2 or John F. Kennedy Junior can immediately communicate its value with the market. (4) and (5) are closely related to proposition 29[3] of Gatignon and Robertson (1985) but they were not discussed explicitly. These are with almost no risk and will be discussed later when we return to an *eagerly wanted* product in Section 4.

Information and *involvement* also positively affect *knowledge*. They consist of (1) *word-of-mouth communications*, (2) *review and publicity*, (3) *advertisement*, (4) *tie-up with multiple media*, and (5) *price decreasing* and *sample offering*.

Potential adopters can obtain knowledge about the new product through *word-of-mouth communications*. They also can acquire knowledge from *review articles* and *publicity*. In modern business every new product must be preceded by *advertisement.* Recently, more and more promotion of new products is taking a form of *tie-up with multiple media* so that the exposure of a new product becomes as wide and intensive as possible, with potential adopters more involved than before. *Price decreasing* and *sample offerings* which include even beta versions of computer software can also increase their level of involvement and eventually help to form *knowledge* and *attitude*. Through the above (1)-(5), information can be disseminated widely and intensively to the potential adopters and becomes adopters' knowledge. The more the knowledge the less the perceived risk.

---

[2] Proposition 27: Innovation characteristics affect speed of diffusion. Relative advantage, compatibility, trialability, and observability are positively related and complexity and perceived risk are negatively related.

[3] Proposition 29: Related knowledge and experience of an innovation are associated with a faster rate of adoption. • Alternatively, the greater the disparity between an innovation and the consumer's existing knowledge and experience base, the slower the

The less the *perceived risk*, the more favorable the *attitude* toward the new product is formed. *Perceived risk* consists of *financial risk*, *psychological risk*, *physical risk*, *functional risk* and *social risk* (Jacoby and Kaplan 1972).

The more information and involvement are obtained, the more the uncertainty is reduced and the less *risk* is *perceived* (pp. 586-587, Engel, Kollat and Blackwell 1973).

Therefore, v*alue* (*attractiveness*) *at the time of adoption decision* is proportional to *initial value* (*attractiveness*) and inversely proportional to *perceived risk*:

$$Value\ at\ the\ time\ of\ adoption\ decision \propto \frac{Initial\ value}{Perceived\ risk}$$

Time to action (*adoption*) *from adoption decision* is considered to be proportional to the inverse of v*alue* (*attractiveness*) *at the time of adoption decision*. The higher the value of new product at the stage of adoption decision, the faster the adoption takes place. This can be written as follows:

$$Time\ to\ action\ \ from\ adoption\ decision \propto \frac{1}{Value\ at\ the\ time\ of\ \ adoption\ decision}$$

$$= \frac{Perceived\ risk}{Initial\ value}$$

So far, according to Gatignon and Robertson (1985), this is equivalent to the hierarchy of effects model of the adoption process: awareness, knowledge, attitude formation, and adoption (shown as ① route in Figure 8). They also recognize that the possibility of another adoption process: awareness, trial, attitude formation, and adoption as the low involvement model. We, however, add another adoption process that with a strong value and a firm's strong marketing efforts mostly relying on adopter's previous experience, an adopter is extremely involved and wants a product eagerly and that the relative strength of perceived risk can become very low (route ② in Figure 8) or even zero

---

rate of adoption.

(route ③ in Figure 8) so that the adopter makes an adoption decision immediately. Although this appears to be a contradiction to propositions 1 and 4[4] (the low involvement model) of Gatignon and Robertson (1985), this kind of high involvement and their low involvement adoption processes arrive at the same conclusion: namely, low level of perceived risk. We will discuss this further in later.

We have concluded the demand side of this conceptual model. This model considers both demand and supply side within one framework. An observed diffusion curve can be considered as follows. First, a demand curve for a new product is assumed to take one of the five classes discussed above, depending upon the initial value and then (or at the same time) this demand curve is affected by a firm's marketing efforts and the given conditions such as *product characteristics* (e.g., the difference between TV and VCR diffusions: Yamada et al. 1997) and *market characteristics* (e.g., channel structure and adopters). More specifically, the demand curve is usually accelerated by *marketing mix setting* such as use of celebrated stars or setting the price at free that is considered as a change of the value of *p/q* and *marketing mix adjustment* such as a scheduled price reduction after the introduction within a given marketing mix setting. *Marketing mix adjustment* is a marketing mix change at a degree that does not change the value of *p*/*q*. Also it is decelerated by the *supply response* that is affected by the product class (e.g., intangible good or tangible good, information good or physical good, durable good or non-durable good etc.), by the manufacturing process, by the physical distribution system, and by the market place (such as a cyberspace market). The larger the *inventory of similar products* and *existence of competing product categories* the slower the diffusion speed. *Personality and attributes* of a potential adopter (propositions 23-26[5],

---

[4] Proposition 1: The two basic adoption models are the high cognitive processing "hierarchy of effects" model and the low cognitive processing "low involvement " model.
The hierarchy of effects adoption model is to be expected under conditions of:
• High consumer learning requirements
• High innovation costs or high switching costs
• High social imitation
• A multiperson adoption decision within the family or organization
The low involvement adoption model is to be expected under conditions of:
• Low consumer learning requirements
• Low innovation costs or low switching costs
• Low social imitation.
Proposition 4: The less the level of cognitive processing, the greater the impact of advertising and other impersonal marketing sources throughout the adoption process.

[5] Proposition 23: Variables most likely to characterize innovators are:
• Higher income; • Higher education; • Younger; • Greater social mobility; • Favorable

Gatignon and Robertson 1985) also affect the diffusion speed. In summary, the diffusion pattern (=*p/q*) can be expressed as the following relationship:

$$Diffusion\ \ pattern = \frac{p}{q} \propto \frac{Initial\ value}{Perceived\ risk} \times \frac{Marketing\ efforts}{Supply\ response} \times \frac{Personality}{Similar\ \ product} \times \frac{Attributes\ of\ \ adopter}{Competing\ product}$$

And since supply responses, similar product, competing product, personality, and attributes of adopter can be considered as fixed for a particular new product, the diffusion pattern can be expressed as follows:

$$Diffusion\ \ pattern = \frac{p}{q} = k\frac{Initial\ \ value \times Marketing\ \ mix\ setting}{Perceived\ \ \ risk},$$

where *k* is a constant.

Or, since perceived risk and initial value can be considered as functions of marketing mix setting such as use of gorgeous stars for a motion picture, the diffusion pattern can be expressed as follows:

$$Diffusion\ \ pattern = \frac{p}{q} = k\frac{Initial\ \ value\ (Marketing\ \ mix\ setting\ )}{Perceived\ \ \ risk\ (Marketing\ \ mix\ setting\ )},$$

where *k* is a constant.

Also, keeping *p/q* constant, the average speed of the diffusion of a new product can be expressed as a function of marketing mix adjustment such as price reduction:

$$Average\ speed = f(Marketing\ \ mix\ adjustment\ )$$

These can be clearly explained on the class map. To set a marketing mix is equivalent to choosing a straight line from the origin, and to adjust a marketing mix is expressed as a movement on that line. If the price is reduced, then the (*p*, *q*) point on the line moves away from the origin.

4. EAGERLY WANTED PRODUCT: DEFINITION AND HYPOTHESIS

The following two episodes describe well the phenomena for which a new product class based on the *state of* purchaser's *want or need* is necessary, namely what we call an eagerly wanted product. Episode 1 deals with a copy-able product (a music CD) and episode 2 deals with even a physical product, that is a home video-game console, or

---

attitude toward risk (venturesome); • Greater social participation; • Higher opinion leadership.

Proposition 24: New product innovators will be drawn from the heavy users of other products within the product category.

Proposition 25: Consumers with better-developed schemas need less cognitive effort for innovation comprehension and evaluation, and so are more likely to adopt early.

Proposition 26: The greater the individual propensity to use information from mass media or from sources external to the immediate social system (relative to interpersonal contacts within the social system), the earlier the adoption.

Sony's PlayStation2.

Episode 1: Tickets for the nationally known singer, Hikaru Utada's first whole-country concert tour are put on sale on April 22, 2000 and all 70,000 seats are sold out within 90 minutes. Also the sales of her new single "Wait and See ~Risk~" have already exceeded 1.3 million CDs within first three days after its introduction. Her popularity seems unlimited (translated by the authors, ZAX Entertainment News, JP.aol.com, 4/23/00).

Episode 2: PlayStation2 Clears Shelves On Debut

TOKYO (Nikkei)--Tokyo was hit by PlayStation2 fever Saturday morning when Sony Computer Entertainment Inc.'s latest home video-game console went on sale. Thousands of young people lined the streets of the capital in an effort to purchase the follow-up to Sony Computer's hit PlayStation terminal. One million units are expected to be sold in the first two days of release. The new game machine, priced at 39,800 yen, offers high quality visuals and can also play DVDs. The device can also be linked to the Internet. Sony Computer's Web site has already received a flood of orders and some 200,000 units are likely to be sold online. More than 2,000 consumers were queuing up for the device by 5 a.m. Saturday in front of four outlets of major computer retailer Sofmap Co. in Tokyo's electronics district of Akihabara. The stores had sold out of their 2,000 machines within three hours of opening. Streets in front of a Shinjuku outlet of Yodobashi Camera Co. were crowded with more than 1,600 game fans by 0:00 a.m. To control the heavy congestion, the store distributed numbered tickets and moved up its opening hours to 5 a.m. from the initially planned 7 a.m. (The Nihon Keizai Shimbun Saturday evening edition 3/4/00, Nikkei telecom21).

4.1. Definition

Following the notion obtained at the end of Section 4 that a new product classification should help marketers select more appropriate marketing strategies, we define an *eagerly wanted* product as follows:

An eagerly wanted product is anything that can be offered to a market to satisfy an eager want or need. Eagerness depends on the initial value of the new product to the adopter.

Examples are computer software (Windows95), TV game hardware (PlayStation2) and software (Final Fantasy), movies with celebrated stars/director (Terminator 2), and music CDs with famous artist/group (Hikaru Utada). We extracted the following properties for an eagerly wanted product through the investigations done in Section 3:

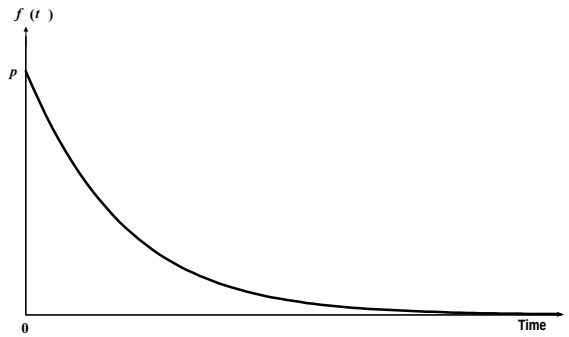
1. High value: Consumers want it eagerly and obtain it immediately when it becomes available because they like it very much. They may be fans, admirers, and the like.

2. Intensive information search: Consumers are willing to make great efforts and to spend time to search for information about its content, available time and date, etc., to travel to obtain it and so on. Often times, there are abundant supplies of information through firms' marketing efforts.
3. Low risk: Consumers basically like it because of their satisfaction with its previous versions. Therefore, they perceive very little risks. They anticipate the same or greater level of satisfaction with this subsequent product.
4. Reasonable price: It should be reasonably priced so that consumers will tolerate its unsatisfactory performance, as in the case of movies. Sometimes it is offered free while the firm is producing revenue elsewhere, e.g., a private broadcasting firm earns advertising revenues while offering free programs to consumers. Netscape was offering the web browser free while it was selling its server software. Also most of e-businesses were adopting this business model to collect as many memberships as possible and as fast as possible.
5. It may have "out of stock" or "sold out" risk. Certain products such as music content through the Internet may not have this risk at all, offering instantaneous supply responses to consumers.
6. An ordinary level of an initial value to the adopter can become an eagerly wanted level if the price is set at an extraordinarily low price or free.

4.2. Hypothesis

An eagerly wanted product whose properties are assumed to be as listed in the previous section should demonstrate a rapidly declining diffusion pattern (Class V). Therefore, we hypothesize that *an eagerly wanted product takes a rapidly declining diffusion pattern*.

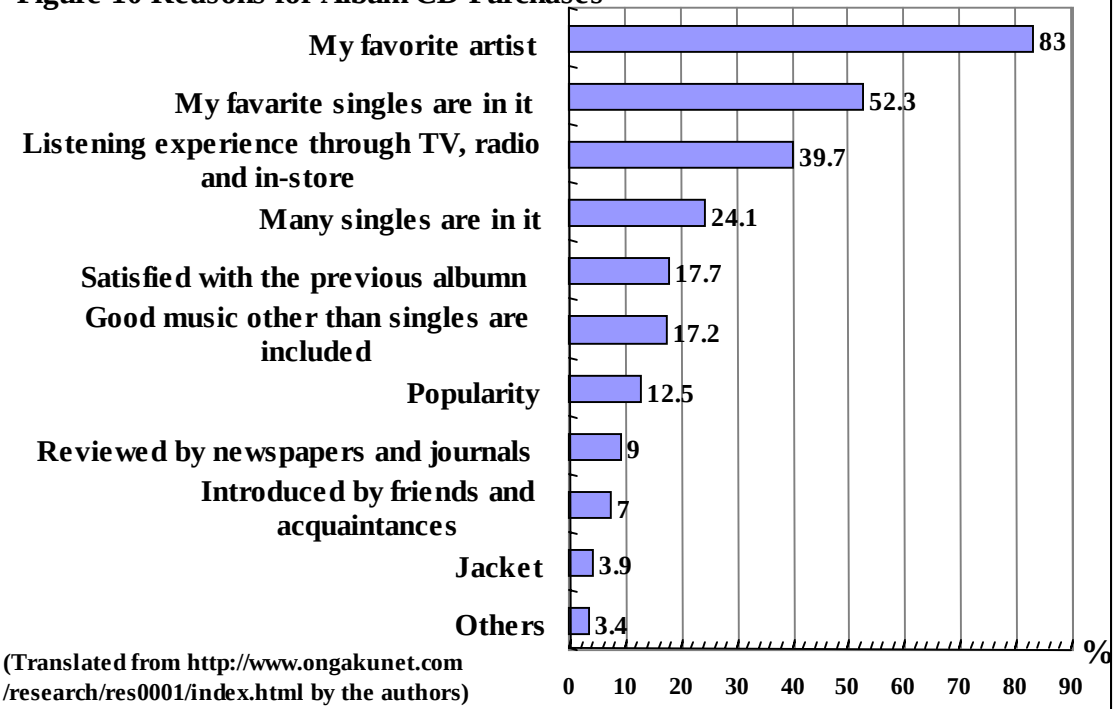
Figure 9 A Rapidly Declining Diffusion Pattern (Class V)



We selected a popular music CD album as one of the eagerly wanted products. As Figure 10 shows, the top reason for popular album CD purchases is "My favorite artist,"

the second reason is “My favorite singles are in it” and the third reason is “Listening experience through TV, radio and in-store.” These are the main reasons it was chosen as an eagerly wanted product.

Figure 10 Reasons for Album CD Purchases



(Translated from http://www.ongakunet.com /research/res0001/index.html by the authors)

4.3. Operational hypotheses

We tested the following operational hypotheses on sales patterns of 254 new music CDs including albums and singles sold in one of the national chains of convenience stores in Japan. Here, we mean that new music CDs are popular songs and accordingly are the candidates on the hit chart. Common practice of music CD consumers in Japan is that they first rent single CDs and then buy albums. Therefore, consumers want the new album eagerly because they know the contents very well. They are their favorite artist’s singles and have been promoted intensively by the firm’s marketing efforts. On the other hand, a new single is essentially new to consumers even if it is their favorite artist’s. Hence a new album will have higher possibility of becoming an eagerly wanted product than a new single. This is hypothesized as H1 and H2.

H1: A popular music album CD is an eagerly wanted product, that is, its diffusion pattern is rapidly declining.

H2: The fraction of rapidly declining diffusion patterns for album CDs is greater than that for single CDs.

Despite the firm's regular marketing efforts, a new singer's debut single CD has very little possibility to become an eagerly wanted product even if it has a very good initial value to consumers simply because the artist and the content are unknown before the release. Hence H3 is hypothesized as follows.

H3: Sales pattern of a new singer's debut single CD does not take a rapidly declining diffusion pattern.

On the other hand, a debut single of a new group or singer who is produced through a well-designed process such as "ASAYAN" contest program of TV Tokyo will have a high possibility to become an eagerly wanted product. The cases of the debut singles of Sun and Cisco-moon, Ami Suzuki and Morning Girls deserve mention. During the course of the "ASAYAN" contest program, auditions are usually held at big cities from Sapporo (northern part of Japan) to Fukuoka (southern part of Japan). A large number of youngsters come to the audition sites to watch the candidates. The entire sessions are broadcasted every week. Then the selected candidates are sent to Los Angeles, Chicago, or New York for training. Again, these training lessons are broadcasted, including the candidates' emotional struggles and joys. Some of the candidates may be dropped from the program depending upon their performance. Therefore, the audiences are very much involved with what is going on with their favorite candidates. Finally a group or an artist is announced on the TV program with a new song. Hence, by the time of the new single CD release date, the consumers have known the group or the artist and its content well and have become real fans. So, while this program is creating a new star and a song, it also creates its target market throughout the whole country. Hence the debut single should become an eagerly wanted product. H4 is hypothesized accordingly as follpws.

H4: The sales pattern of a debut single of a new group or a singer who is produced through a well-designed process is a rapidly declining one.

We also tested sales patterns of new products of beer and low malt liquor as additional evidence for H1 and H2, because new beer products may be anticipated through promotional efforts but may not be awaited as eagerly as popular CD albums.

5. DATA USED

Record shops contracted with record companies; record shops contracted with wholesalers; and mail order, door-to-door sales companies and selling agents for professional users are sharing the distribution channels of music CDs and records by

42%, 53%, and 5% respectively (Recording Industry Association of Japan 2000).

Our data include the sales data of music CDs sold at one of national chains of convenience stores obtained through Iihara Management Institute, a subsidiary of the top music record wholesaler, Seikodo in Japan (http//www.seikodo.co.jp/index.html).

Usually convenience stores start to sell new CDs from 3 p.m. on the day before the officially announced release date by record companies. They generally open stores for 24 hours. The original data are disguised using percentage ratios to the highest number of CDs sold/day within the data used for proprietary reasons and the day before the announced release date is treated as a one half-day duration for our analyses.

Period for data collection: 10/14/97-7/09/99

Number of CDs: 254

Number of data points: 56 days/CD

The sales penetration data of 14 new brands of beer and low malt liquor from QPR of Tokyu Agency Inc. is used. Bar code scanner collects the data on a number of households within a circle of 30-kilometer radius from the center of Tokyo.

Period for data collection: 4/20/95-4/24/96 ~ 5/15/97-5/20/98

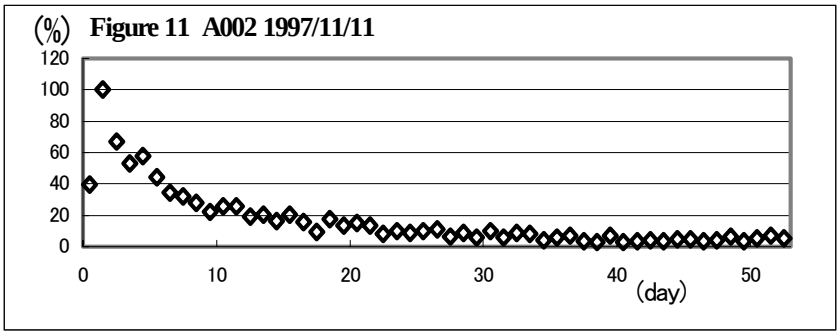
Number of brands: 14

Number of households: 1309~1407

Number of data points: 53 weeks/brand

6. RESULTS

A typical rapidly declining diffusion pattern is shown in Figure 11. The first data point is at 0.5 day followed by full day periods in the figure. It is important to note that the plotted curve appears similar to $f(t)$ only when data are plotted by equal time periods.



With regard to H1 (A popular music album CD is an eagerly wanted product, that is, its diffusion pattern is rapidly declining), the fraction of rapidly declining diffusion

patterns for album CDs is: P_1=119/121=0.983. Our statistical hypothesis as follows.

H_0: $P_1 < 0.95$, H_A: $P_1 > 0.95$

$$Z = \frac{P_1 - 0.95}{\sqrt{\frac{P_1(1 - P_1)}{121}}} = \frac{0.983 - 0.95}{\sqrt{\frac{0.983(1 - 0.983)}{121}}} = 2.808$$

Then H_0 is rejected at the significance level of $\alpha = 0.0025$. That is H_A is accepted.

With regard to H2 (The fraction of rapidly declining diffusion patterns for album CDs is greater than that for single CDs), while the fraction of rapidly declining diffusion patterns for album CDs is: P_1=119/121=0.983, the same fraction for single CDs is: P_2=135/153=0.882.

$$H_0 : P_1 - P_2 \le 0, \quad H_A : P_1 - P_2 > 0$$

$$Z = \frac{p_1 - p_2}{\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}} = \frac{0.983 - 0.882}{\sqrt{\frac{0.983(1-0.983)}{121} + \frac{0.882(1-0.882)}{153}}} = 3.5315$$

Since F(3.5315)=0.999793, H_0 is rejected at the significance level of $\alpha = 0.001$. The two non-declining patterns of album CD are A001 97/11/11, “Omnibus Western Music” and A009 97/12/11 as shown in Figures 12 and 13. We learned that albums can be regarded as eagerly wanted products by almost 100%. Because A001 is an omnibus CD which does not have any particular artist, and A009 seems to demonstrate basically a rapid penetration pattern. The high fraction of singles implies the high values of artists and contents and the effectiveness of firms’ marketing efforts.

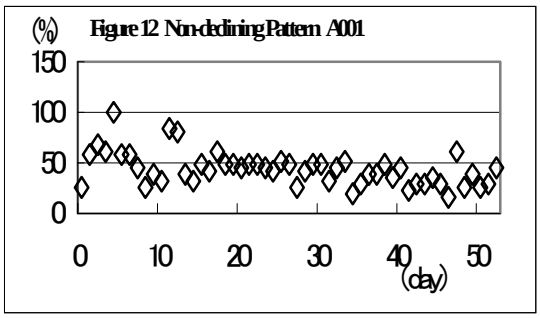


Figure 12 Non-declining Pattern A001

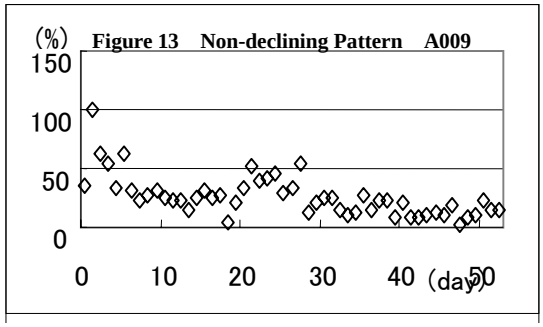
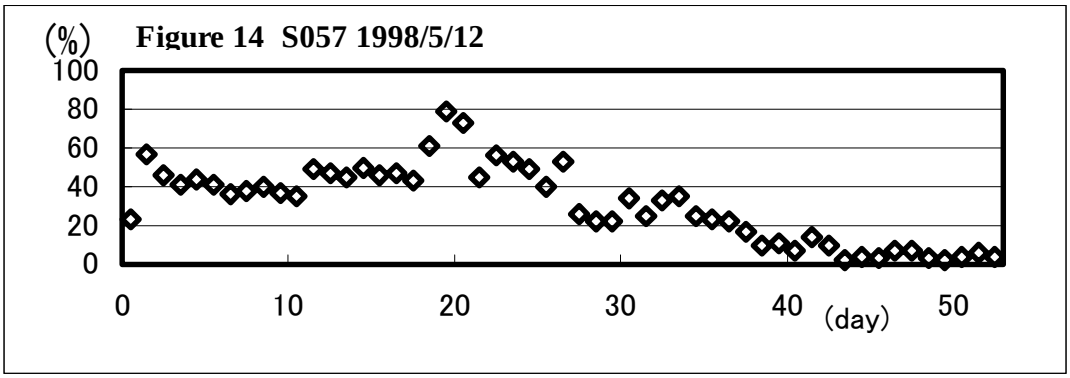
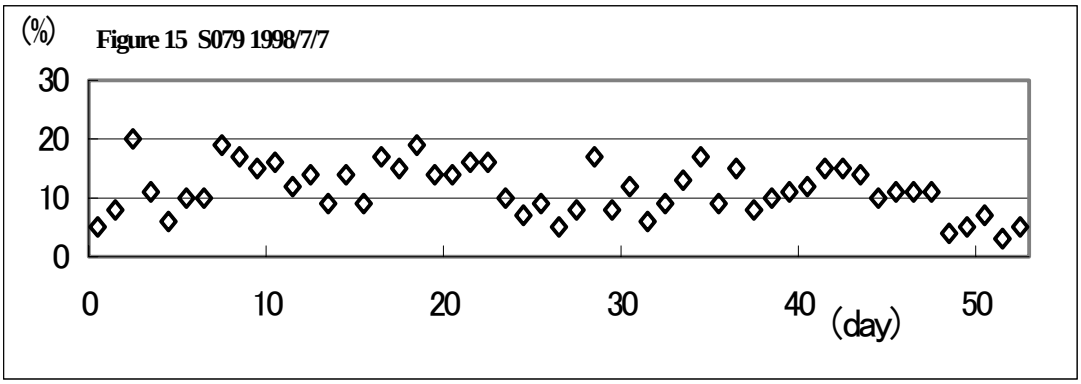


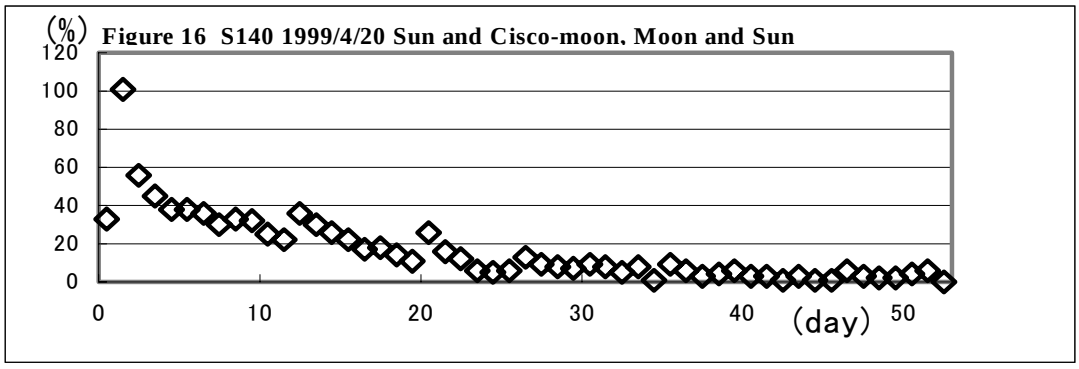
Figure 13 Non-declining Pattern A009

With regard to H3 (Sales pattern of a new singer’s debut single CD does not take a rapid penetration diffusion pattern), we have only two new singers’ debut single CDs in our data. They do not show clear declining patterns as shown Figures 14 and 15:





With regard to H4 (The sales patterns of a debut single of a new group or singer who is produced through a well designed campaign is rapidly declining), the cases of the debut singles of Sun and Cisco-moon, Ami Suzuki and Morning Girls are tested.



The diffusion pattern of Sun and Cisco-moon is clearly declining (shown in Figure 16). The patterns of Ami Suzuki and Morning Girls are also indicating clear down slopes (The data are obtained from ORICON (http://www.oricon.co.jp/) through Iihara Management Institute). Although we have only three cases, H4 is confirmed. It is interesting to note that the sales of the second single and the third single are becoming larger and larger than the sales of the debut single as their popularity grow. These facts

confirm our properties #1 and #3 of an eagerly wanted product in Section 4.1.

Figure 17 Ami Suzuki (from ORICON data)

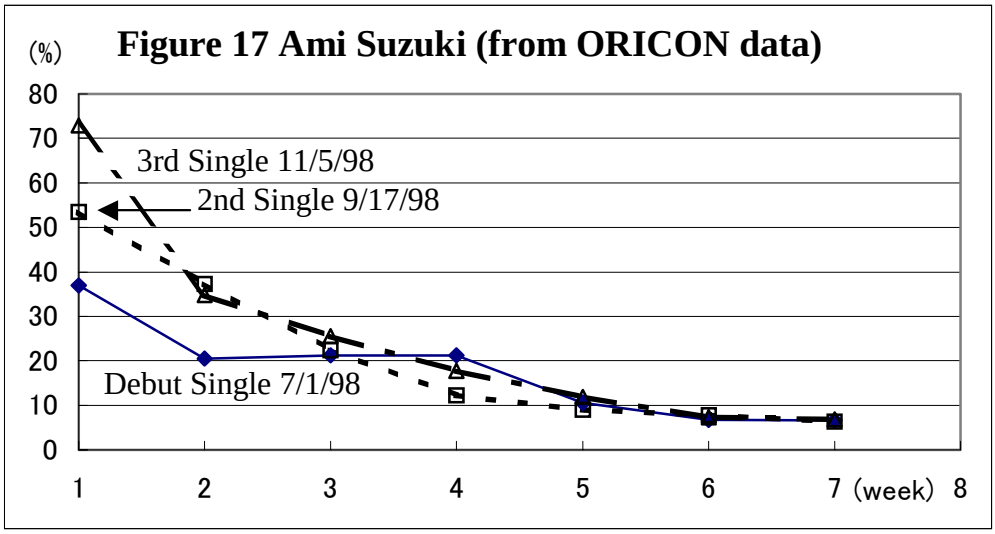
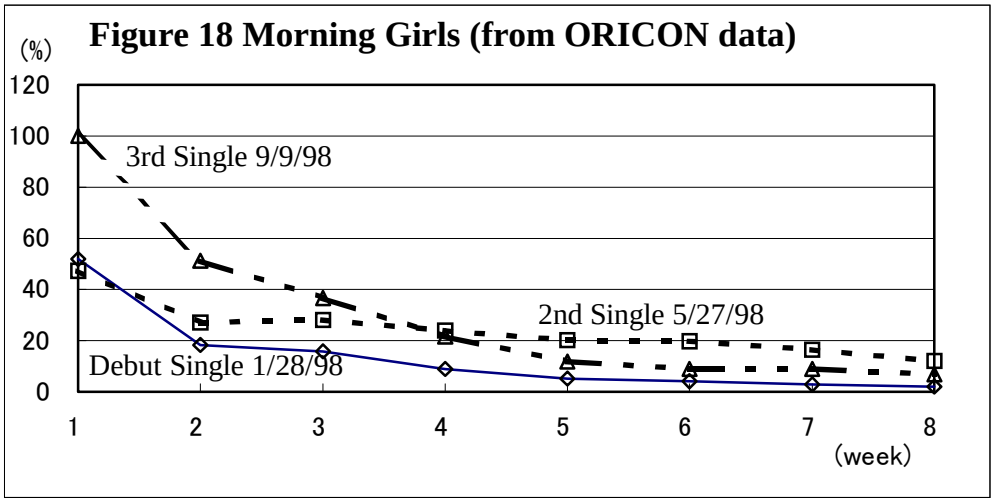


Figure 18 Morning Girls (from ORICON data)



Finally, as supporting evidence, we investigated the penetration data of 14 new brands of beer and low malt liquor. We found that four out of the fourteen brands show clear declining patterns from the first week; eight of the fourteen show clear declining patterns from the second week and the rest, show random patterns. This seems quite natural because the level of consumers' eagerness on new products of beer and low malt liquor is lower than that on new artists and contents.

7. Summary and Implications

In this paper, we have proposed *an eagerly wanted product* as a new product category. First, reviewing classification methods of products, we found that the purpose of product classification is to help marketers develop/adopt appropriate marketing strategies for the respective product category. Second, reviewing classification methods

of diffusion patterns, a conceptual model for adoption and diffusion processes of new products was proposed. Based on this conceptual model, we proposed the third adoption model with "high involvement" in addition to the high cognitive processing "hierarchy of effects" model and the low cognitive processing "low involvement" model. We found the state of consumer's want or need as a key to our product classification. We defined an eagerly wanted product as anything that can be offered to a market to satisfy an *eager want or need*. Then we hypothesized that an eagerly wanted product takes a rapidly declining diffusion pattern. We tested the operational hypotheses on the sales data of new popular music CDs in a convenience store environment and confirmed the theoretical hypothesis. Therefore, this product classification is based on the rapidly declining diffusion curve formed by individuals' adoption times whose adoption behaviors are governed by the third type of "high involvement" adoption model.

As far as the implications of this study are concerned, from the properties that we set in Section 4.1, we propose a set of strategies for product development and introduction of an *eagerly wanted* product:

(1) Let consumers be involved from the development stage on, for example
   (a) The ASAYAN project of TV Tokyo (see Section 4.2); (b) use famous artists, movie stars, and directors; (c) creating a series etc.

(2) Before the introduction of a new product, promotion and publicity should be as intensive and widely applied as possible in the target market. Use media mix, etc.

(3) The initial price should be set at the most reasonable level possible or free if possible.

(4) To get as large a potential market as possible and as fast as possible, make as many business alliances as possible. This is very important to products related to de-facto standards such as computers and TV game hardware and software.

Adopting this set of strategies, the value of p/q should increase, which means that the average speed of diffusion should increase with the increased level of eagerness even if an eagerly wanted product is not realized.

Finally, since we tested the hypotheses on only new popular music CDs with limited data, we need to investigate further with other products.

ACKNOWLEDGEMENT

We appreciate the comments of Frank Bass and the anonymous reviewer of *ROMS* on

an earlier version of this paper.

References

Bass, Frank M. (1969), "A New Product Growth Model for Consumer Durables," Management Science, Vol. 15 (January), 215-227.

Bayus, Barry L. (1993), "High-Definition Television: Assessing Demand Forecasts for a Next Generation Consumer Durable," Management Science, Vol. 39 (November), 1319-1333.

Engel, James F., David T. Kollat and Roger D. Blackwell (1973), *Consumer Behavior*, 2nd edition, Hinsdale, Illinois: Dryden Press.

Gatignon, Hubert and Thomas S. Robertson (1985), "A Propositional Inventory for New Diffusion Research," Journal of Consumer Research, 11(March), 849-867.

Iihara Business Research Institute and Nikkei Research Institute of Industry and Markets (2000), *The Structure of Music CD Hits ~Trend of Consumer Lifestyle and Music CD Consumption~* (translated by the authors), Tokyo: Iihara Business Research Institute (5/06/01, http://www.ongakunet.com/research/res0001/index.html).

Jacoby, J. and Kaplan, L. (1972), "The components of perceived risk," M. Venkatesan ed., *Proceedings, Third Annual Conference*. Chicago: Association for consumer research, 3, 382-393.

Kotler, Philip (2000), *Marketing Management*, The Millennium Edition, Upper Saddle River, New Jersey, Prentice Hall.

Moe, Wendy W. and Peter S. Fader (1998) "A Joint Segmentation Model of Consumers and Products Applied to the Sales of Music Albums," The Wharton School, University of Pennsylvania.

The Nihon Keizai Shimbun (2000), "PlayStation2 Clears Shelves On Debut," Saturday evening edition 3/4/00, Nikkei telecom21

Recording Industry Association of Japan (2000), "A brief description of the Japanese

recording industry 2000," *RIAJ YEARBOOK 2000*, (5/06/01, http://riaj.japan-music.or.jp/doc/yearbook/RYB2000E01.pdf).

Rogers, Everett M. (1983), *Diffusion of Innovations*. New York: The Free Press.

Sawhney, Mohanbir S. And Jehoshua Eliashberg (1996), "A Parsimonious Model for Forecasting Gross Box-Office Revenues of Motion Pictures," *Marketing Science*, Vol.15, No. 2, 113-131.

Yamada, Masataka, Ruji Furukawa and Mamoru Ishihara (1997) "A Classification Method of Diffusion Patterns with a Class Map," *ACTA HUMANISTICA ET SCIENTIFICA, UNIVERSITATIS SANGIO KYOTIENSIS*, Vol. 28, No. 2, Social Science Series, No. 14 (March), Kyoto Sangyo University, 59-82.

Yamada, Masataka (1997)" Identifying Diffusion Pattern of Toyota and Hyundai in the U.S. Market," *KSU ECONOMIC AND BUSINESS REVIEW*, No. 24, (May), The Society of Economics and Business Administration, Kyoto Sangyo University, 45-66.

Yamada, Masataka (1999) "Inter-class Price Setting in New Product Introductions," *'99 Marketing Science Conference* at Syracuse University, May 23, 8:30-10:00: SU-A8, 5/06/01, http://www.kyoto-su.ac.jp/~myamada/'99MktSc/sld001.htm.

ZAX Entertainment News, www.JP.aol.com, 4/23/00