IMPACT OF TIME-SHIFTING AND AD-SKIPPING VIEWINGS ON ADVERTISING EFFECTIVENESS

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Abstracts - As the way of life changes, the way people watch TV is changing. Recently, it has been said that the audience rating has declined. The widespread use of hard disk recorders (HDR) is considered as a major factor behind the decline in audience ratings. Video Research Ltd., which measures the audience rating criteria that determine commercial advertising fees, has released time-shifted audience ratings and total audience ratings, which are new indicators since 2016. However, since HDR has a function to skip commercials, the total audience rating cannot be left as it is. In this study, we analyzed the prediction of time-shifted audiences and the effect of time-shifted viewing on advertising effectiveness using a single-source data include TV viewing data, as well as changes in purchase intentions. As a result, it was suggested that time-shift viewing has a negative effect on the commercial effect.

Keywords - Time-shifted viewing, advertising effectiveness, Hard disk recorders, intension to buy, actual purchases

I. INTRODUCTION

Advertisements in mass media are diminishing their presence with the rapid growth of Internet media. According to Dentsu Inc. [11], one of the largest Japanese international advertising and public relations companies, Japan's advertising expenditures for calendar 2018 totaled 6,530.0 billion yen, an increase of 2.2% compared with the previous year's figure. As Table 1 shows that overall spending in the traditional media posted a decline of 3.3% while Internet advertising expenditures (up 16.5%) achieved robust growth centering on performance-based advertising [11].

TV commercials, particularly, used to be the most popular media in advertising; however, their effects on consumers have been questioned over time. Recently, in Japan, the forms of viewing broadcast programs have diversified, and with the spread of internet connected devices and app/web smartphones and tablet terminals, video distribution services such as missed broadcasts by television stations have become widespread.

This is not phenomena only happened in Japan. Nielsen in the U.S. reported how much time people are spending daily with TV-connected devices, defined as DVD/Blu-Ray Devices, Game Consoles, and Internet-Connected Devices (including streaming media players and smart TVs), and compare those with TV-connected devices to the time spent watching traditional TV (hh:mm) for each age group from 18 to 65 year-old and over. This data is averaged among the entire population by different age segments [24] (see figure 1). Older audiences are spending more time with traditional TV, while younger groups are watching more connected TV. It is expected that the number of people watching TV will decrease soon.

Recorders equipped with Hard Disk Recorders (HDR), such as Digital Video Recorders (DVRs) and Blu-ray Disc Recorders (BDRs), as well as such on-demand services for television stations, are widely used with television sets. With an HDR, it is easier for viewers to skip ads, and it is common for viewers to use "time-shifted viewing" to watch recorded programming at any time the viewer prefers after broadcasting.

Time-shifted reach on TV include "Recorded TV Programs, VOD services, Packaged TV, and TV programs on Video Site [19]. Although Video Research has added time-shifted viewing measure, as well as gross rating point (GRP) since October 2013[18], it may not be able to cover some viewers with hard disk recorders with ad-skipping features. Video Research defines time-shifted viewing as "playing programs within 7 days."

The purpose of this research is to measure impact of time-shifting and ad-skipping viewings on advertising effectiveness, by using single-source data provided by Nomura Research Institute, Ltd, one of the largest consulting firms in Japan.

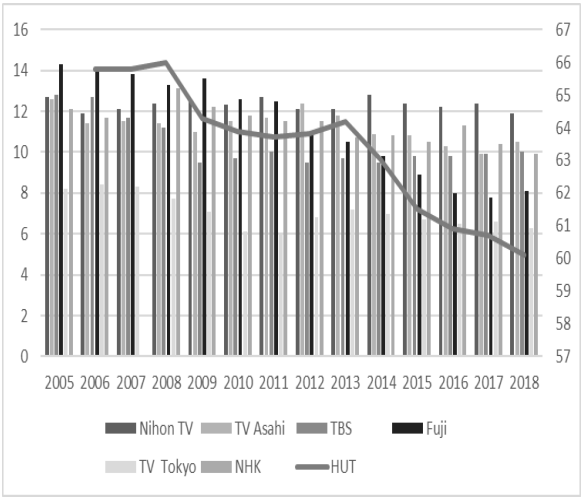


Fig. 1. Households Using Television (HUT) rates for major TV station in Japan 2005-2018

	Advertisement Cost (in billion yen)				
Advertising Medium	2018	2017	2016	2015	2014
Total Advertising Expenses	6,530.0	6,390.7	6,288.0	6,171.0	6,152.2
Newspapers	478.4	514.7	543.1	567.9	605.7
Magazine	184.1	202.3	222.3	244.3	250.0
Radio	127.8	129.0	128.5	125.4	1,247.2
TV media	1,912.3	1,947.8	1,965.7	1,932.3	1,956.4
Terrestrial broadcasting	1,784.8	1,817.8	1,837.4	1,808.8	1,834.7
Satellite broadcasting	127.5	130.0	128.3	123.5	121.7
Promotional Media Advertising	2,068.5	2,087.5	2,118.4	2,141.7	2,161.0
Internet media	1,758.9	1,509.4	1,310.0	1,159.4	1,051.9
Internet advertising media costs	1,448.0	1,220.6	1,037.8	9,419.4	824.5
Internet advertising production costs	310.9	288.8	272.2	240.0	227.4

Table 1. Advertisement Expenditures in Japan, 2014-2018.
(The author created the table based on data from Dentsu Inc. News release, 2015-2019)

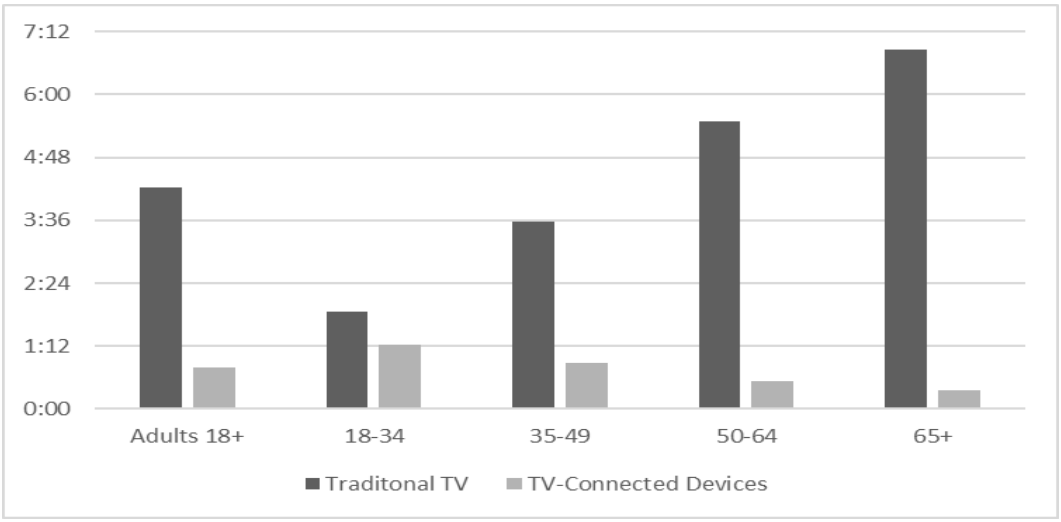


Fig. 2. Traditional TV vs. TV-Connected Device Usage in Q3 2018 (Daily hh:mm, total population) (Souce: The Nielsen Company as of April 2019)

II. LITERATURE REVIEW

TV and other media bundle their content with advertising messages. Some literature has talked about the way advertising works is changing [5], where traditional advertising has been losing their ground to newer marketing technologies, such as Internet. Not only changes in how advertising is presented but recently new ad-avoidance technologies have allowed consumers to avoid ads. If all ads are avoided, no revenue will be generated for TV networks, and content cannot be funded [4]. Good advertisings are regarded as a "complementary good, that consumers' enjoyment of the product might be boosted" [21]. Ad viewing and product purchases are related in complex ways. Advertising may increase the chances of consumers choosing the advertised option over others [6]. Targeting on consumers who are less likely to skip an ad is more profitable than the blanket approach which tries to cover everything [25]. There a few studies about the DVR's impact on advertising. As for ad-skipping, some explores the DVR as tool to avoid advertisements bundled within a program [4] [20]. By exploring ad-skipping and time-shifting in which the network delivers content to viewers with decreasing, constant or increasing marginal nuisance costs (MNCs) of advertising, Shah [20] examined the impact of the two main aspects of the DVR, ad-skipping and time-shifting, on the television industry and their effects. In a monopoly model, Shah [20] found that the DVR can increase network profit depending on the percentage of ads it filters out, otherwise, it reduces network welfare. As for the constant MNC model to a duopoly setting in which two identical networks face each other, the DVR helps each network, both through the decreased sensitivity the most ad-averse consumers feel towards ads when using a DVR and through the element of price discrimination it affords [20].

Recently, some firms have allowed consumers to pay to remove advertisement. Tåg [23] set up a framework for the option to pay to remove advertisement in a

monopoly media firm entirely financed by advertisements and predicted that the observed advertising quantity should be higher if the option to pay to remove advertisements is available. Advertisements should be more annoying and intrusive if the option to pay to remove advertisements is present. Single-source data track the same individuals or households for both their purchases and opportunity to see advertising.

Individual-level analysis of single source data suggest that the total sales effect of advertising very much depends on the initial effect, and advertising exposure typically has a half-life of three to four weeks [15],[16]. According to Theory of Planned Behavior (TPB), human action is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (behavioral beliefs), beliefs about the normative expectations of others and motivation to comply with these expectations (normative beliefs), and beliefs about the presence of factors that may facilitate or impede performance of the behavior and the perceived power of these factors (control beliefs) [12].

TPB addresses individual motivational factors within unique contexts to explain the overall execution of a specific behavior. TPB predicts an individual's intention to engage in a behavior at a specific time and place. It posits that individual behavior is driven by behavior intentions, where behavior intentions are a function of three determinants: an individual's attitude toward behavior, subjective norms, and perceived behavioral control [1],[2]. Since the first model introduced in the 1960s, the frameworks for Consumer Decision-Making (CDM) have evolved through various forms. Howard and Sheth [13] introduced theory of buyer behavior which explains the buyer behavior of individuals over a period; more specifically, the brand choice behavior of the buyer.

The authors identify the elements of consumer decision process (a set of motives; several alternative courses of action, and decision mediators by which the motives are matched with the alternatives), observed the changes that occur in them over time as a result of repetitive natures and showed how a combination of decision elements affects search processes and the incorporation of information from the buyer's commercial and social environment. CDM model suggests three levels of consumer decision-making: extensive problem-solving limited problem solving, and habitual response behavior.
Presented CDM model shows an enhanced level of specificity in terms of the relations between variables, not only that attitude influences purchase, but also that intention is a moderating variable [14]. The model is also notable for including a wide range of inputs into the process in terms of marketing variables and social influences.
The model depicted a flow of information that moved through four main components: (a) inputs such as marketing and social stimuli, (b) perceptual constructs such as attention and information search (c) learning constructs such as motives, choice criteria, brand comprehension, leading to an attitude, confidence, intention and satisfaction and (d) outputs such as purchase, intention, attitude, brand comprehension and attention [13].A fifth element, exogenous variables (importance of the purchase; the consumer background, reference groups, personality traits; time available; and financial status), was included as an influence on the perceptual and learning constructs rather than being part of the information flow itself [13].

We propose a new model, Consumer Planned Behavior and Decision-Making (CPBDM) model, to measure impacts of consumers' time-shifting and ad-skipping viewings on advertising effectiveness, consumers' intention to buy and actual purchases activities by combining TPB model and CDM model. Figure 3 depicts the proposed framework.
Then, the authors had formed the following three hypotheses;
H1: There is a significant, positive relationship between information awareness and change in consumers' intention to purchase and actual purchase
H2: There is a significant, positive relationship between purchasing experience and change in consumers' intention to purchase and actual purchase
H3: There is a significant, negative relationship between time-shift viewing and change in consumers' intention to purchase and actual purchase

III. DATA

We use Nomura Research Institute, Ltd.'s single-source data, which is based on data collected from 2,848 consumers, during the period from January 28 to April 1, 2017. A sample of descriptive statistics for respondents are shown in table 2. There are 1,806 respondents who own either DVD or Blu-ray player. Based on the survey conducted by Video Research Japan in the first quarter of 2017, "Tokyo Tarareba Girls", "A Life" and "War of Lie" are listed as the top three dramas with the higher time-shifted audience rate (household) [26]. "Kirin Chuhai 'Hyoketsu'", "Oronamin C drink", and "i-phone" are some of commercials which sponsored those dramas. Thus, we would like to investigate the relationships between respondents' intention to buy and actual purchases activities of those products, Hyoketsu, Oronamin C and i-phone, for those consumers with HDRs.

IV. RESULTS

A. Logistic Regression

The single-source data contains survey questionnaire asking about "Consumer values." We make three

groups from questionnaire based on the similarities. The first group consists willingness to pay money. The second group contains quality and safety. The third factor contains brand, and the fourth group constitutes inexpensiveness and private brand. From these observations, they are named as 1) Expensive and Good, 2) Quality and Safety, 3) Brand, and 4) Price Sensitive. Next, we conduct logistic regression analysis to see which variables are related to the person who owns HDR. Logistic regression analysis is the multivariate technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables. The response, y_i , is equal to 0 if default occurs (with probability P_i) and to 1 if default does not occur (with probability 1 – P_i). In regression models, the probability P_i that the default will occur by specifying the following model

Gender	Male = 1,499, Female=1,349
Age	20s= 518, 30s=746, 40s= 886, 50s=698
Marital Status	Single=1,089, Married=1,601, Divocee= 158
Having any children	yes =1,604, no=1,244
Household status	Single=548, Husband & wife=397, Husband & wife & unmarried children = 1,432 A single parent & unmarried children, Husband & wife and married children =211 Family of marriedcouple and married children=25, Three generations = 152, others =83
Income Status	no income=43; Less than 1million yen=107; 1million yen～2million yen=129 2million yen～3million yen=217; 3million yen～4million yen=310 4million yen～5million yen=384; 5million yen～6million yen=381 6million yen～7million yen=314; 7million yen～10million yen=599 10million yen～15million yen=273; 15million yen～20million yen=59 More than 20million yen=32
DVD recoder ownership	yes=911, no=1,937
Blu-ray recorder ownership	yes=1,358, no=1,490
HDR Ownership	yes=1,806, no=1,042

Table 2.Descriptive Statistics of Respondents

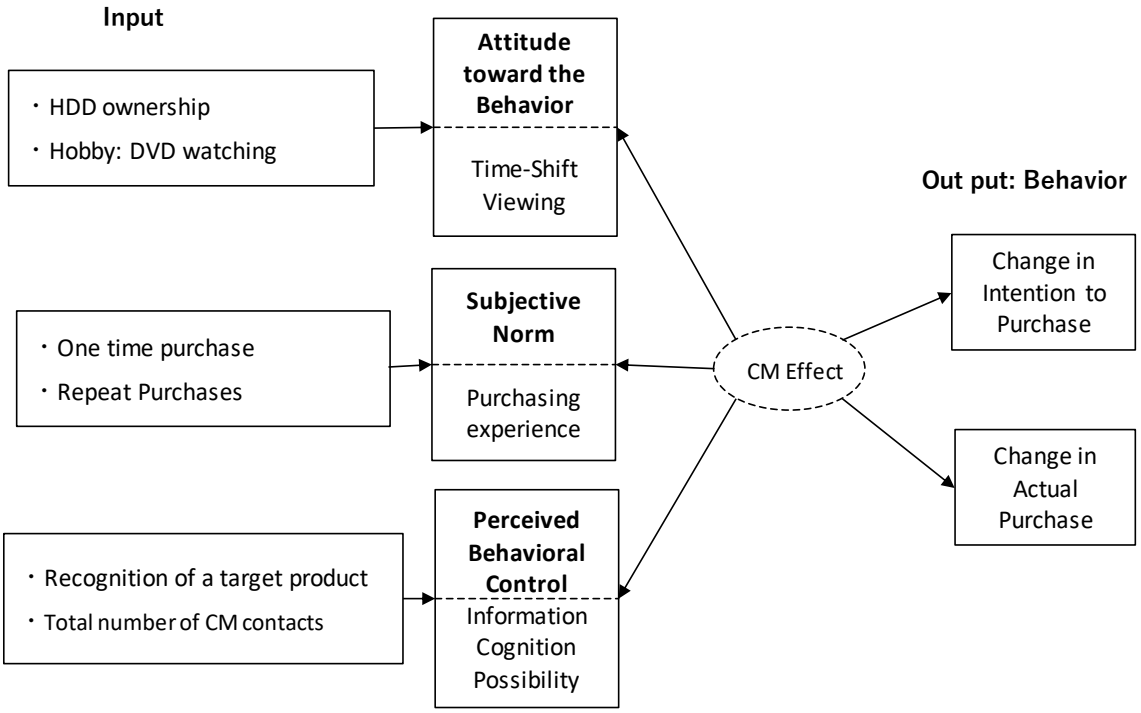


Fig. 3. Consumer Planned Behavior and Decision-Making (CPBDM) Model.

	Hyoketsu	Oronamin C	i-phone
	Estimated Vaule	Estimated Vaule	Estimated Vaule
SEX CD	-0.088	-0.086	-0.093
age 20	-0.883***	-0.815***	-0.966***
age 30	-0.472***	-0.435***	-0.527***
age 40	-0.122	-0.015	-0.140
Marriage status	-0.058	-0.025	-0.075
Having child or not	0.221	0.179	0.222
Family type	0.074**	0.083**	0.082**
BS viewing availabilities	0.471***	0.514***	0.484***
Household owned financial assets	0.025	0.026	0.024
Household income	0.091***	0.079***	0.084***
Expensive and Good	0.236***	0.259***	0.253
Quality and Safety	0.208***	0.219***	0.234***
Brand	0.181**	0.193**	0.185**
Price Sensitive	0.300***	0.304***	0.338***
March 7 intention to buy	-0.192**	0.053	0.120
March 7 actual purchase	0.218***	0.071	-0.063
March 22 intention to buy	0.048	-0.041	-0.037
March 22 actual purchase	-0.049	-0.124	-0.034
Constant	-0.315	-0.236	-0.248

Table 3. The Result of Logistic Regression Analysis (Dependent variable: HDR holders)
(* significant at 0.001)**

$$P_i = f(\alpha + \beta' x_i) \quad (1)$$

where x_i is a financial indicator and α, β are estimated parameters. In logit model, the logistic transformation is used:

$$P_i = \frac{\exp(\alpha+\beta' x_i)}{1+\exp(\alpha+\beta' x_i)} = \frac{1}{1+\exp(-\alpha-\beta' x_i)} \quad (2)$$

Due to nonlinear features of this model, it is necessary to use maximum likelihood method for parameters estimation. Given P_i and assuming that defaults are independent, the logarithm of likelihood function is formed as follows:

$$\ln L = \sum_{i=1}^{n} y_i \ln P_i + \sum_{i=1}^{n} (1-y_i) \ln(1-P_i) \quad (3)$$

As shown in Table 3, most of the results are the same for three products, Hyoketsu, Oronamin C, and i-phone. Coefficients for age 20, age 30 are negative and significant, which suggest that those age groups are not likely having HDRs.

Those of larger families, with BS viewing availabilities and higher household income are more likely having HDRs. Those like expensive, good, quality, safety, brand and price sensitive are more likely having HDRs. As for intention to buy, or actual purchase, Hyoketsu have negative and significant for March 7th intention to buy, and positive and significant for March 7th actual purchase. Thus, we will continue our analysis further using Hyoketsu consumers' data.

B. Consumer Planned Behavior and Decision-Making (CPBDM) Model for Hyoketsu

Testing the efficacy of the CPBDM model was conducted by AMOS 24, and the major results of analysis are shown in Fig. 4. The path diagram highlights the structural relationships. In this diagram, the measured variables are enclosed in boxes, latent variables, such as Information Awareness, Time Shifting viewing, Purchase Experience, and Change in purchasing, are circled, and arrows connecting two variables represent relations, and open arrows represent errors. A better goodness of fit is required for this analysis [10]; the better the fit, the closer the model matrix and the sample matrix. By means of various goodness-of-fit indexes, including the comparative fit index (CFI) [8], the incremental fit index (IFI) [7], and the root mean squared error of approximation (RMSEA)[9], the estimated matrix can be evaluated against the observed sample covariance matrix to determine whether the hypothesized model is an acceptable representation of the data.

In general, incremental fit indexes (i.e., CFI, IFI) above 0.90 signify good model fit. An RMSEA in the range of 0.05 to 0.10 was considered an indication of fair fit and values above 0.10 indicated poor fit [17]. The CPBDM model is shown in Fig. 6; CFI=0.981, IFI=0.981, RMSEA= 0.040 (see Table 4). The Path Coefficient for the CPBDM model suggested that the regression coefficient for all constructs show significance. Since all indexes satisfy the cut-off values, these results are regarded as acceptable.

The Followings are results of hypotheses;

FIT indices	Recommended level	CPBDM model
CMIN/DF	2.0 (Tabachnick and Fidell [24])~5.0 (Wheaton et al.[27])	4.846
CFI	>0.90 (Bentler [7])	0.981
IFI	>0.90 (Bollen [8])	0.981
AIC	Smaller values suggest a good fitting (Akaike [3])	111.845
p-value	>0.05	0.000

Table 4. Reliability Test

H1: There is a significant, positive relationship between information awareness and change in consumers' intention to purchase and actual purchase
H2: There is a significant, negative relationship between purchasing experience and change in consumers' intention to purchase and actual purchase
H3: There is a significant, negative relationship between time-shift viewing and change in consumers' intention to purchase and actual purchase.

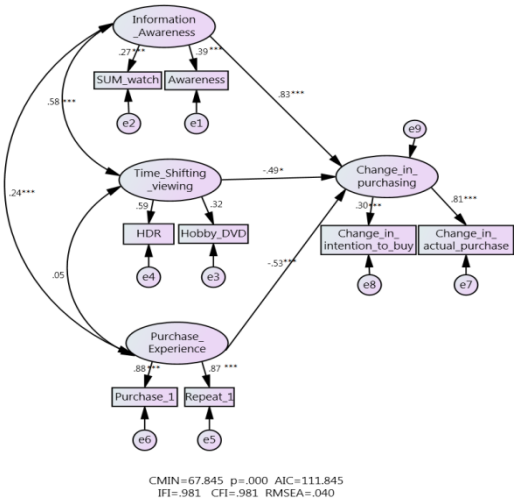


Fig. 4. Consumer Planned Behavior and Decision-Making (CPBDM) Model

V. CONCLUSION

We found that the ownership rate of HDR owners increased in proportion to the age groups. It was also suggested that each consumer has a sense of value and tends to value reputation.
From the results of CPBDM model, it shows that the ability to recognize information has a positive effect on the commercial effect. However, time shifting viewing has a negative effect on the commercial effect as shown in Fig. 4. It implies that viewers who are selecting time shifting viewing may skip or avoid the commercials. In this study, it suggests that the advertising effect of TV commercials could not be expected by time shifting viewing when the target of commercials was set to 40s and 50s. Now that HDR has become widespread, it is necessary to think about new forms of TV commercials such as infomercials. Furthermore, an analysis combined with more detailed information such as commercial audience ratings and questionnaire surveys on how to view TV may be necessary to understand a relationship between an impact of time-shifting and ad-skipping viewings and advertising effectiveness.

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