The Survival of Paid Broadcasting Channels in Korea, 1993-2010

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Abstract

This study investigates the decisive factors affecting the survival or collapse of cable networks in the Korean paid broadcasting market from 1993 to 2010. The effects of performance variables discussed in previous studies were verified through survival analyses. According to the results, the most influential factors in the survival of cable networks were horizontal integration (MPP), channel genre, the scheduling of HDTV content, and the proportion of access program scheduling. These findings imply that the differentiation strategy of content suppliers is the most decisive factor among all business performance-related factors. Specifically, the content supply power and strategy of the program provider (PP) have the greatest influence on cable network viability. The present study is meaningful as the first attempt to establish the performance of PPs in Korean pay broadcasting markets through the viewpoint of organizational mortality. Accordingly, the present study can supplement the results of cross-sectional studies conducted with smaller samples.

Keywords: Cable Networks, Program Provider, Survival Analysis, Stratified Hazard Model

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1. Introduction

Today, the broadcasting industry is characterized by multiple media and channels as the industry undergoes rapid changes with the emergence of new media and platforms. As well as using TV sets, users access broadcasting content via computers, smartphones, and Digital Multimedia Broadcasting (DMB)s. As a result, such content appears in a variety of modes including real-time video, downloaded content, and Video on Demand (VoD). Most people watch TV delivered by paid broadcasters using cable TV, satellite TV, IPTV, or Internet broadcasting rather than terrestrial modes. As of the end of December 2011, the number of subscribers to pay television stood at 24.29 million, meaning that most households are watching television via pay television services [1]. Given that the paid broadcasting market generates revenue from its subscriber base, the fierce competition for subscribers among platform service providers boils down to ensuring a stable supply of entertainment content preferred by consumers. Given the primacy of content, the most important factors for securing subscribers are the supply power of the Program Provider (PP) channels and the terrestrial broadcast content. Here, a PP refers to a service provider that operates a channel in the paid broadcasting market.

The self-viability of a PP as a major content supply source is the most important condition for securing the competitiveness of paid broadcasting. The content of terrestrial broadcasters and outsourcing production companies is insufficient to supply the paid broadcasting market, and so the existence of various PPs providing quality content in a stable manner is essential to foster the market and enhance viewersh the emergence of new policies affecting the paid broadcasting market, however, have tended to be introduced without a sufficiently detailed review of PPs. When policies were introduced regarding the entry of a terrestrial broadcasting company into the market, the alleviation of restrictions on ownership and co-ownership in the market, or the introduction of a general service PP, there was a lack of specific analysis with regard to how these factors would affect competition among PPs and their operating environment. Before the establishment of these policies, their results should have been forecast based on empirical analyses of the actors in the market [2]; instead, the regulations were adopted as a result of political and social compromises [3].

Identifying the factors that affect the survival of PPs should be an important step when crafting PP promotion policies. Some have argued that systems should guarantee a mandatory share (20%) for small and medium individual PPs and that, in terms of the program service commission, they should be offered license fees of 25% or more, excluding VoD service fees, to give them at least the minimum conditions for survival [4]. This would be a measure to protect individual PPs whose survival is threatened by the entry of new general service PPs and those specializing in news reports. However, some criticize the idea of a protective policy without improvement to the PP entry and exit structure, arguing that it would only extend the life of insolvent PPs that depend on Service Operator (SO) sales with no internal production [5]. This criticism originates from the market situation, in which even uncompetitive PPs have managed to survive in spite of increasingly fierce competition. This implies that an in-depth analysis of new PPs'echances of survival is required when designing a policy to protect individual PPs. Nonetheless, empirical analysis on the competition among and survival of PPs has been inadequate when setting up policies for the paid broadcasting market. The main limitation of previous studies is a lack of data on and systematic analysis of the growth and

demise of individual PPs, as unsuccessful PPs that entered but disappeared from the market did not draw public attention [6].

The above problem is the starting point for this research, which will examine the overall growth and demise of PPs through an analysis of their survival, an approach very few domestic studies on PPs have taken. The specific aims of this research are as follows. First, this research will examine the overall processes of PP creation, survival, and demise from 1993, when they first appeared in the domestic media market, until the end of December 2010, when the analysis for this research was conducted. In this way, this study will analyze how long it took for PPs that fell behind others to close their business, as well as identify trends in the survival ratio. Second, this research will investigate factors that affected changes in PPss survival and risk ratios, focusing on factors identified through an examination of existing PPs'existing . First, previous studies and theoretical discussions were reviewed and summarized to clearly identify the purpose and topic of this research. After that, relevant materials were collected to conduct empirical research, and conclusions were drawn through a statistical analysis of survival. This paper is organized as follows. The first chapter discusses the background and purpose, while the second chapter briefly summarizes relevant earlier studies. The third chapter describes the design of research models necessary for empirical research and issues related to the research methods and collection of materials. The third chapter also introduces the major analysis method in this paper, the analysis of survival. The fourth and fifth chapters present the results of the analysis and subsequent investigation. The sixth chapter summarizes the results and discusses implications, limitations, and future research directions.

2. Literature Review

2.1 Competition and The Survival Base of PPs

It was only 20 to 30 years ago that the concept of competition and achievement in the media market, including the paid broadcasting market, became important and relevant research began [7]. In particular, major studies examined whether a company merger could create value not merely at the company level but also in terms of social welfare due to the nature of information goods and the economic characteristics of the broadcasting industry, as well as whether competition could be encouraged in the market [8]. It was recognized that mergers of companies in the paid broadcasting market could significantly affect the fair competition structure and industrial achievements throughout the market, and so discussions went beyond the simple issue of whether mergers could enhance economic efficiency at the company level.

When using a merger as a strategy for competitive advantage, a broadcasting company generally has low marginal costs due to the characteristics of public goods and information goods. In addition, a salient economic feature of the broadcasting industry is that profits increase when the size of a company and the number of its subscribers increase, based on economies of scale and scope [9][10]. That is, instead of the production company, program scheduling company, broadcasting company, and service company handling broadcasting content separately, one company operating the entire process—from production to distribution—can achieve economic rationality based on economies of scale, reducing information costs or transaction costs incurred by external transactions and using internal surplus resources [10]. In addition, as the recent media industry clearly shows, media service companies provide their services by securing several windows via the convergence of media. Therefore, economies of scope can also be obtained by maximizing additional value creation, even though there is little difference in the investment cost [11].

Media companies began applying business consolidation strategies in order to be more competitive in the media market, which is characterized by information goods. The most typical of these strategies is the vertical/horizontal diversification strategy, which is based on the cost leadership strategy [7][12]. This strategy involves vertical and horizontal integration. Vertical integration refers to consolidation between the upper-side company, which plans and produces the product in the pay broadcasting market, and the lower-side company, which supplies the product to consumers. Horizontal integration refers to consolidation between upper-side companies or between lower-side companies [13]. In fact, vertical integration has appeared in the form of Multiple System Program operator (MSP), i.e., consolidation between PPs and SOs in the Pay-TV market, whereas horizontal integration has appeared in the form of Mutiple Program Provider (MPP, consolidation among PPs) or Multiple System Operator (MSO, consolidation among SOs).

Some have argued that company consolidation strategies could be competitive in the pay broadcasting market, generating economic revenue at the company level and eventually improving social welfare from the consumer's standpoint, such as by reducing costs and improving program quality and network quality [14][15]. However, others have noted certain shortcomings from companies' standpoint, such as the spin-off of businesses due to the increased administration costs and reduced efficiency that are generally associated with an increase in company size. In addition, it has been argued that company consolidation could increase inefficiency and damage consumer welfare from the perspective of the entire market, as having a company occupy a dominant position in the market decreases competition [16]. Using the consolidation strategy, companies that provide their programs competitively have made the market non-competitive or caused disadvantageous results for their counterparts in transactions by doubling the market blockade effect against competitors, using monopolistic and oligopolistic pricing and encouraging collusion [17]. In particular, company consolidation in the Pay-TV market frequently causes non-competition between SOs and PPs, or among PPs, because of exclusive transactions, refusal of cooperation, and price discrimination [7]. Although these market characteristics can provide an opportunity for some competitive PPs such as MPPs or MSPs, they have at times fatally influenced the business results of small-sized PPs or non-competitive service providers, thereby threatening their existence in the market [10].

Since the early 2000s, studies have investigated the competition among and achievements of PPs, which were in a relatively weaker competitive position compared to SOs, and environmental changes in the paid broadcasting market. In particular, studies have looked into which factors have the largest influence on a PP's management results [8], the factors that determine the market power of a PP [18], and the results of monopoly and competition in the paid broadcasting market, including cable SOs and PPs [19][20]. However, studies of the existing paid broadcasting market have targeted upper-level channels or service providers with high ratings and excellent financial results. In addition, service providers' achievements were utilized rather than the channels' achievements, and the emphasis has been placed on the analysis of PPs' achievement factors based on a relatively short period of time. Conversely, no attempt has been made to systematically analyze how competition in the pay broadcasting market and PPs' strategy alternatives affected their survival, including the reasons a specific PP collapsed in the market, the characteristics shared by collapsed PPs, and the factors leading to business closure.

2.2 IO Economics and Business Performance of PPs

Most studies of strategy management paradigms that have attempted to establish performance variables for the pay broadcasting market are basically rooted in the viewpoint of the Industrial Organization (hereafter, IO) theory, which tried to establish the relationship between external environments and businesses. The IO theory provides a framework for analyzing the external environments surrounding businesses (i.e., market environments) to enable exploration of the nature of diverse competitions and sources of profitability in industries [21][22]. In particular, Porter [23] replaced an individual business-oriented discussion of business administration in favor of the IO theory when he developed his "five forces model". This is an analysis tool incorporating industry competition, profitability, and the characteristics of market structures in interpreting the actions and efforts of individual businesses. Some argued that Porter [12] emphasized only the analysis of external environments and thus insufficiently examined the strengths and weaknesses of unique environments inside businesses [24][25][26]. Others raised the criticism that the five forces model focused on static analyses and thus could not reflect the competitive situations of dynamic markets [27][28]. Nonetheless, industry structure analysis provides a somewhat objective starting point for empirical analyses of individual businesses—a starting point not provided by resource-based or knowledge-based viewpoints focused on environments inside businesses—as well as provides a basis for analyses of competitive dynamics. Therefore, industry structure analysis has continued to provide an important axis in discussions of strategy management and is utilized even now as an effective framework for theoretical analyses. In addition, the cost-leadership strategy, differentiation strategy, and focused strategy—the three most generic business strategies described by Porter [23]—have been actively utilized as strategic variables for the establishment of related businesses performance in studies of pay broadcasting markets, including PPs. Until the present, however, there continue to be varying opinions on what each strategy should entail exactly.

Meanwhile, the survival of PPs has not been studied either at home or abroad. Only indirect attempts have been made, primarily by analyzing variables that affect the management results of PPs. Such analyses mainly tried to identify actors that affect measurement variables of achievement. Such studies considered the dependent variables of PP management results to be financial achievements—including sales revenue and operating income/losses—as well as viewer ratings and the broadcasting penetration rate of SOs, the dominant platform in the paid broadcasting market. Of these, 'viewer ratings' have been treated as the most direct financial performance indicator [29][30], as they affect both advertising revenue and broadcasting revenue.

The fundamental competitive advantage of a PP lies in the excellence of the content it provides. Therefore, it has been argued that the production of quality broadcasting content and the implementation of a product differentiation strategy—by which means quality content is applied to channel scheduling—are the most critical strategic variables [18]. Prior research found that channel performance and brand image were improved when many programs were produced internally with significant investment [29], when the program schedule contained more main programs [31], and when more digital format broadcasting content was provided. Furthermore, it was shown that PP management results (e.g., viewer ratings) have a causal relationship with a specific genre based on a study of channel genres [8].

It was found that quick market entry has a significant effect on the management results of a PP. A service provider that establishes itself early as part of an early market occupation strategy (first-runner advantage) can, by quick trial and error experience, benefit by securing a base from which to provide stable service to customers. Such a PP can also gain a competitive

advantage over recently entered rivals through securing a customer base and improving brand awareness [32].

Some studies have indicated that changes in relevant government policies and systems affect a PP's management results rather than its individual strategic variables [33]. In Korea, there have been advantages and disadvantages for PP service providers with changes in the market entry policy. In particular, an analysis indicated that competition intensified (e.g., accelerated service provider consolidation, genre diversification, etc.) after the implementation of a registration system [34]. In addition, one empirical study attempted to identify the relationship between mandatory program scheduling channel and management results with regard to government policies [6][35].

Studies that have attempted an empirical analysis of PP management results have paid attention to the results of consolidation among service providers as part of a diversification strategy. As much research indicates, horizontal integration (MPP) has been utilized as a means of increasing market dominance and improving efficiency [9][10]. It has been shown that horizontal integration is used as a strategy for reducing the fixed costs of the PP in question and for increasing the negotiating power of advertising sales and platform service providers in the competitive paid broadcasting market [34]. Furthermore, vertical integration (MSP) has been found to bring many advantages in program scheduling and platform broadcasting for the PP in question [36]. However, empirical analysis results regarding the influence of consolidation on management results appear to be somewhat contradictory; therefore, a review of the empirical analysis results is warranted.

Platform broadcasting in the paid broadcasting market has been considered an important factor in the study of PP performance. Above all, the cable SO broadcasting rate was treated as a key driver and result variable of PP management. Therefore, the stable supply of programs to the cable market, which has secured about 80% of paying subscribers, was used by Kim [37] as the most fundamental variable in PP management. Also, some studies have proposed based on empirical analysis that the foreigners' share affects management results and financial performance [29]. Other analysis results suggest that the channel provisioning price and PP's scale can affect the management results of individual PPs [8].

In sum, the existing mainstream empirical studies have been focused on factors that affect a PP's management results, such as the differentiation strategy for PP channels (genre, channel scheduling, content competitiveness, brand, and price); first-runner advantages such as early market entry; the cost superiority strategy, which reduces fixed costs in the competitive situation (consolidation strategy such as MPP and MSP); a concentrated strategy for realizing economies of scope (securing the broadcasting platform); and policy intervention by government to secure pubic interests (mandatory program scheduling).

3. Research Methodology

3.1 Method and Analysis Procedures

'Survival analysis' refers to a method of analyzing data statistically if the data are given by the time a certain event occurs in which the researcher is interested [38]. As a statistical technique, one differentiating feature of survival analysis is that censored data are included in survival analysis of the occurrence of a specific event.

In this study, the PP channel's survival curve was drawn, and the survival probability trend and business risk were observed using the life table method and Kaplan-Meier method

(hereafter "K-M"). This is a non-parametric method of survival analysis that does not assume a specific distribution. Then, the significance of individual predicting variables was verified using the K-M survival function to determine whether the PP management performance variables identified in the literature review actually affected the survival function of the PP channel. In addition, the interrelation of continuous variables was evaluated to avoid the risk of multi-collinearity from the survival function. When estimating the regression coefficient, the impact of the coefficient was tested using partial likelihood estimation applied with backward elimination.

Then, the impact of the covariates was tested using the Cox proportional hazard model (hereafter "Cox regression"), which is a method of semi-parametric survival analysis. Residual analysis and impact diagnosis were performed to verify the appropriateness of the estimated regression model. Lastly, a proportionality test was performed to check for the existence of time-dependent covariates, and the stratified hazard model (hereafter "S-H model") was analyzed because time-dependent covariates were identified. For reference, SAS version 9.2 was used as the statistics program for analysis.

3.2 Research Model

For the life table method, the most frequently used among all non-parametric estimation methods, the dependent variable is *h(t)*, and the estimation is determined by multiplying the conditional risk probability *(number of failures/number of observations)* for each section cumulatively each time the survival distribution function *S(t)* is assumed.

For the K-M, if we assume that the ith survival time is *t(i)*, the probability of surviving longer than *t(i)–S(t(i))* is calculated. *S(t(i))* can be estimated by multiplying the conditional survival probability of each station p continuously until *t(i)*. At this time, the conditional survival probability *p(i)* can be expressed as $p(i)=1-(d_i/n_1)t_i$, if we assume that *n1* represents the survival numbers before *t(i)*, and d_i is the number of dead in *t(i)*.

Next, for the Cox regression, the survival rate can be calculated based on the logistic regression model by identifying the complex relations among various factors that affect the survival period, using multivariate analysis to check the influence of several variables simultaneously if there are many prediction variables. The model can be estimated as follows [39]:

$$h_i(t) = h_0(t)\exp(\alpha+\beta_1 x_{i1}+ \beta_2 x_{i2}+\ldots\ldots+ \beta_k x_{ki}) \quad (1)$$

Here, $h_i(t)$ on the left-hand side of the model is a dependent variable, which indicates the rate of risk *(h(t)/h'(t))* that the individual *PP(i)* will fall behind at time *t* instantaneously, whereas $h_o(t)$ on the right-hand side is a baseline hazard function at time *t*. In addition, the final prediction variables found to affect the survival of the channel and management performance are described in the parentheses on the right. The influence of the variables in parentheses on survival is the relative hazard ratio, and the relative hazard ratio of each variable can be calculated by the $exp(\beta_i)$ value. In other words, risk increases as the value of the variable in question increases, given that the hazard function value increases when the regression coefficient has a positive sign. Therefore, the channels will attempt to increase the survival rate by maximizing the performance of each variable, and the channel will survive when the management performance at the time of analysis becomes greater than the risk ratio. As we can see from the study model, the null hypothesis H_0 is equal to $\beta i=0$ (i.e., the variable in question does not affect the changes in the risk ratio of the PP channel's falling behind at time

i). The alternative hypothesis *Ha* has the relationship of $\beta i \neq 0$ (i.e., the variable in question affects the changes in the risk ratio of the PP channel′s falling behind at time *i*).

Lastly, the S-H model used for posterior tests is an application model that is used when the specific covariable used for Cox regression violates the assumption that the baseline hazard is proportional regardless of the time flow. The S-H model is used when it contains a time-dependent variable. If we assume that *z* is the time-dependent covariable having *k* strata among several covariates and the remaining covariates are proportional, the S-H model can be assumed as follows [39]:

$$h_{ig}(t) = h_{0g}(t)e^{\sum \beta_\alpha x_\alpha} \quad (2)$$

Here, $h_{ig}(t)$ indicates the hazard function of i^{th} cases in *g* strata, and $h_{io}(t)$ indicates the baseline hazard. x^a indicates the value that the a^{th} proportional covariable *z* takes at the i^{th} case.

3.3 Variables

Competition behavior and management performance were selected as the predicted variables based on previous studies on PP performance. Other predicted variables that affect PP performance, such as changes in government policy, were considered. Among variables that have directly affected PP management performance in the paid broadcasting market or that have been used as proxy variables for measuring management performance, the predicted variables used in this study are listed and described in **Table 1**.

The predicted variables used in this study encompass the major variables that existing empirical studies suggest are relevant to PPs. However, we did not use all of the analytical variables that might affect the survival of PP channels due to limitations in data collection. Rather than using a limited number of predicted variables confined to a specific theory, this study attempts to test the general proposition that various predicted variables shown by previous studies to predict PPs' achievements can explain their survival, as well.

As explained before, the dependent variable is the risk ratio at which a particular channel falls behind at time *t*. For this purpose, the date on which each channel enters the market, the analysis base date (December 31, 2010), and the survival status at the analysis base date were used as dummy variables.

3.4 Data

As the target of analysis, we selected television PP channels that were or are presently operating in Korea. To improve the reliability of the analysis, idle PP channels were excluded. To check the market entry and exit information, the service provider information and basic data published by the KCC were collected. Based on those data, we identified the entry/exit status of 428 television PP channels, all of which had been registered (or approved or permitted) as broadcasting channel use SOs with the KCC (previously, the Korean Broadcasting Commission, Bureau of Public Information) between 1993 and December 31, 2010 (**Table 2**). Then, five home shopping channels with heterogeneous characteristics and revenue sources were excluded. To identify idle PP channels, TV PP channels that had no viewer ratings record for seven years (2004-2010) were checked. Channels for which the PPs' financial information had not been reported in the Broadcasting Industry Status Research Report (2001-2010) published by the government were also checked. Based on these data, 222 channels were identified as PPs that did not provide a broadcasting service or that existed on

Table 1. Definition and Measurement of Predicted Variables

Variable	Definition	Data	Coding Information
Entry Type	Market entry type (licensing policy type when entering the market)	1993-2010	1 Registration 0 Permitted/Approved
Must Carry Channel	Compulsory scheduling channel status	1993-2010	1 Must carry channel 0 Not applicable
Horizontal Integration	Multiple Program Provider (MPP) channel status	2002-2010	1 Belong to MPP 0 Independent channel
Vertical Integration	Multiple System Operator (MSP) channel status	2007-2010	1 Belong to MSP 0 Independent channel
Channel Genre	Channel's major contents supply area	1993-2010	1 Movie 2 Drama 3 Sports 4 Remainders
Original Program Scheduling	Main program scheduling ratio	2005-2010	1~100%
In-house Program Scheduling	Internally produced program ratio	2005-2010	1~100%
HDTV Scheduling	HDTV program scheduling ratio	2007-2010	1~100%
Foreign Investment	Foreign capital invited channel status	2006-2010	1 Attract foreign invest 0 Not applicable
Cable TV Carry	Number of CATV broadcasting	2003-2010	0~233
Satellite TV Carry	Satellite broadcasting status	2004-2010	1 Carry, 0 Don't carry
IPTV Carry	IPTV broadcasting status	2008-2010	1 Carry, 0 Don't carry
DMB Carry	DMB broadcasting status	2006-2010	1 Carry, 0 Don't carry

paper only without shutout reports. Therefore, only 201 channels were available for analysis; however, the business closing date of a channel called "Study On" on Sky Education TV could not be identified. Accordingly, 200 channels were finally selected for the analysis. Information on the predicted variables was collected from the Broadcasting Industry Status Research Report published by the KCC, as well as from the PP registration/business closing status data posted on the "Download" section of the KCC homepage. However, ratings research on PP channels cannot be taken as data that represent the entirety of the channels, considering that viewer ratings were implemented in 2004 and measured by region; this differs from the terrestrial broadcasting program's rating method. As the ratings data were given to advertisers, however, they could serve as reliable criteria for identifying idle PPs that did not provide broadcasting services as well as channels that disappeared through consolidation. The viewer ratings data provide information on channels with high ratings as well as zero ratings (around 40 every year).

4. Analysis and Results

4.1 Survival Characteristics of PP Channel

First, this study identified the risk and survival rate of PP channels by drawing the survival distribution curve for a total of 201 channels using the life table method and K-M. As shown in

Fig. 1., the *x-axis* of the survival distribution curve represents the observation period, calculated as the days after each channel enters the market. The *y-axis* shows the survival probability (1=100% survival, 0=0% survival). Two curves show the trend whereby the survival rate drops towards the bottom right after entering the market. While the cumulative survival ratio of PPs estimated during the period of analysis stood at 76.24%, the survival rate of the channels drops abruptly after less than 1,000 days, and drops even more 3,500 days after market entry.

Table 2. shows that seven channels disappeared from the market after entering the market through the permission/licensing system. In fact, all of these channels changed their genre or continued to operate by changing their channel operators. In other words, it is difficult to conclude that a channel with this entry type has actually disappeared. Therefore, this study separated the analysis targets into two groups and performed another survival analysis to study the channels' survival environment in more detail. One group includes 34 channels that entered the market under the permission/licensing system, and the other includes 167 channels that entered the market after the adoption of the registration system (hereafter the "registered group"). **Fig. 2.** shows the results of the survival analysis using the life table at intervals of 90 days from the market entry date of the individual channels until December 31, 2010 (analysis base date).

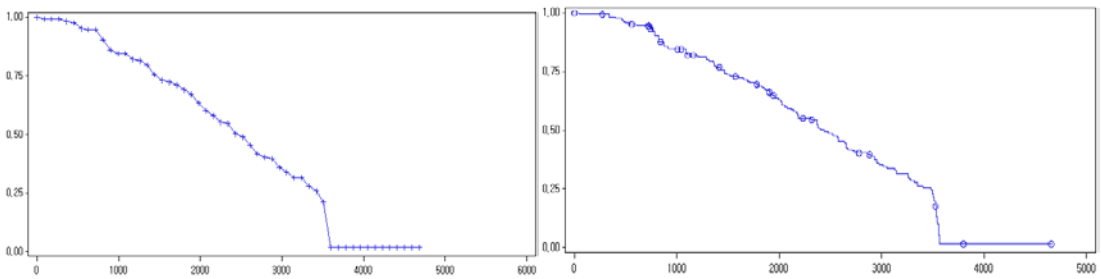
As shown in **Fig. 2.**, the survival curve and hazard curve of the two groups are quite different. The survival curve and hazard curve of the channels that entered the market under the registration system are similar to those shown in **Fig. 1.**, whereas the channels that entered the market under the permission/licensing system have a survival rate of 1 and zero risk of disappearing from the market. These results clearly confirm that there was a first-runner advantage and that certain advantages and disadvantages depend on the market entry system. The group that entered the market by the permission/licensing system was not considered in the life table analysis because it seemed irrelevant to this study.

Table 2. Entry/ Exit Status of the TV Channels of PPs

Entry Type	Year	Birth	Die	Cancel	Survival
Permission	1993-1995	29	3	0	26
Admission	2000	14	4	0	10
Registration	2001-2010	385	165	12	208
Total		428	172	12	244

*Source: Broadcasting Industry Status Research Report (2000-2011) of the KCC

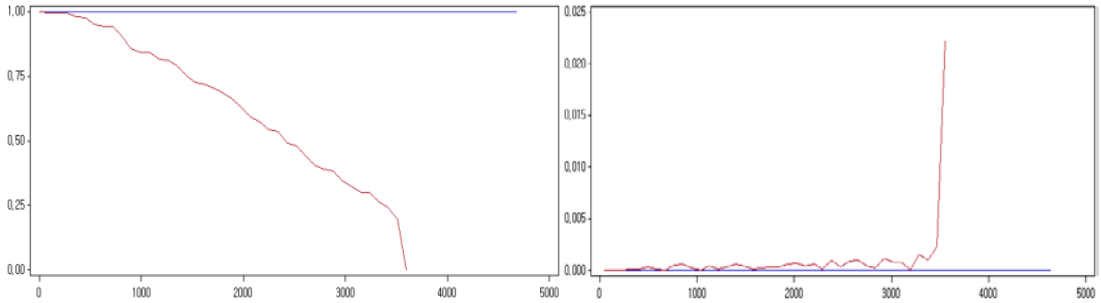
Fig. 1. Survival Distribution Curve [a,b]



[a] N=200. Left: Life table estimate curve, Right: Kaplan-Meier Product-limit estimate curve

[b] *Y-axis*: Survival rate, *X-axis*: Length(days), ─ Estimate survival function, ∘∘ Censored observation

Fig. 2. Life Table Survival(Left) and Hazard Smooth Curve(Right) over the Entry Type [a,b]



[a] N=200. Left: Life table survival curve(*Y-axis*: survival rate, *X-axis*: day), Right: Life table hazard curve(*Y-axis*: hazard rate, *X-axis*: day), [b] Blue strata (permission/admission channel), Red strata (registered channel)

4.2 Channel Evaluation of The Predicted Variables

This study reviewed the correlations of continuous variables among the predicted variables in order to find significant final variables that affected the survival of PPs while attempting to minimize the possibility of multi-collinearity among the variables. The results on the correlation (**Table 3.**) show that there is no collinearity among the predicted continuous variables.

Table 4. shows descriptive statistics on the predicted variables prior to identifying the factors that affect the survival of PP channels.

Next, bivariate analysis was used to test whether the categorical variables among the predicted variables showed a significant influential relationship between the groups that survived and disappeared in the K-M survival function. The log-rank test was selected as the determination criterion, which is appropriate when the hazard functions of the comparison group show a specific difference in several sections (generally, data whose survival period is more than 5 years), in order to determine the significance of the chi-square result values among the two groups [39]. In addition, the significance level was loosened to alpha level 0.20 for bivariate analysis as is normal practice [40][41]. **Table 5.** summarizes the analysis results.

The results (**Table 5.**) indicate that predicted variables such as entry type, horizontal integration, genre, satellite TV carry, and DMB carry significantly affect the survival function ($p<.20$). Conversely, the addition of must carry, vertical integration, foreign investment, and IPTV carry was not significant according to the homogeneity test results. The homogeneity test based on bivariate analysis only tested whether an individual variable independently affected the survival function of the K-M method. The test does not provide a basis for judgment regarding how strongly a variable affects the survival function compared to other variables.

Table 3. Bivariate Correlations Matrix

Predict Variable	1	2	3	4
1. Original Contents Programming (%)	1			
2. In-house Production Programming (%)	0.39	1		
3. HDTV Contents Programming (%)	0.13	0.07	1	
4. Cable TV Carry (No.)	0.16	0.08	0.15	1

Table 4. Descriptive Statistics

Predict Variable	N		Mean(S.D.)		Max.		Min.		Skew		Kurtosis	
	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2
Entry Type	201		0.82(0.39)		2		1		-1.64		0.71	
Must Carry	201	167	0.17 (0.38)	0.16 (0.36)	1	1	0	0	1.73	1.91	1.01	1.69
Horizontal Integration	201	167	0.41 (0.36)	0.37 (0.48)	1	1	0	0	0.36	0.56	-1.89	-1.70
Vertical Integration	201	167	0.24 (0.43)	0.21 (0.41)	1	1	0	0	1.20	1.44	-0.56	0.07
Genre	201	167	4.15 (1.51)	4.11 (1.55)	5	5	1	1	-1.33	-1.26	-0.05	-0.25
Original Contents Program(%)	161	128	28.26 (16.54)	27.01 (15.82)	84.18	74	2	2	0.98	0.71	0.89	0.07
In-house Production Program(%)	161	128	35.15 (34.75)	31.64 (33.52)	100	100	0	0	0.57	0.73	-1.11	-0.84
HDTV Contents Program(%)	90	69	24.57 (26.98)	27.04 (29.38)	100	100	0.02	0.02	1.53	1.32	1.66	0.81
Foreign Investment	201	167	0.13 (0.34)	0.13 (0.34)	1	1	0	0	2.22	2.20	2.98	2.86
Cable TV Carry(No.)	183	149	72.95 (53.23)	62.07 (51.63)	223	223	0	0	0.12	0.48	-1.15	-0.71
Satellite TV Carry	201	167	0.46 (0.50)	0.40 (0.49)	1	1	0	0	0.15	0.43	-2.00	-1.83
IPTV Carry	201	167	0.35 (0.48)	0.34 (0.47)	1	1	0	0	0.62	0.70	-1.63	-1.52
DMB Carry	201	167	0.09 (0.29)	0.07 (0.25)	1	1	0	0	2.79	3.53	5.85	9.60

Note: G1=all 200 entire channels, G2=167 registered channels.

In conclusion, eight variables (entry type, horizontal integration, genre, original content programming, in-house production programming, HDTV content programming, cable TV carry, satellite TV carry, and DMB carry) were selected as the final variables that affected the survival of a PP channel. In addition, this study assesses the influence of these predicted variables through Cox regression.

4.3 Identifying The Factors that Affect The Survival of PPs

This study tested the influential relations of covariates in each model by analyzing a total 201 channels. Then, it examined the 167 channels that entered the market after the registration system was implemented in order to control the influence of the approval system/licensing system channels, which showed heterogeneous aspects in the estimation of the entire survival function.

When applying Cox regression, this study also applied a multi-phase variable sampling method as in existing regression analyses. In this way, significant variables were extracted in a phased procedure to select a variable that affected the hazard function (i.e., the variable that affects survival significantly when there are several covariates). A significance test and a correlation test were also performed on the predicted variables. Among the various variable extraction methods available, the backward elimination method was applied; this excluded variables that did not produce significant results sequentially after applying several variables at the same time based on the assumption that there would be a suppressor variable among the

Table 5. Testing Homogeneity of Survival Curves (K-M) for Length over Strata

Predicted Variables	Stratum (Group)	Censored Case (%)	Mean (S.E.)	Equality Test (Log-Rank)		
				χ2	DF	Pr>χ2
Entry Type	Permission/Admission(37) Registration(163)	3(8.11) 21(12.88)	5489.72(169.76) 2357.00(82.11)	109.66	1	<.0001
Must Carry	Not applicable(165) Must carry channel(35)	23(13.94) 1(2.86)	2926.60(127.64) 3140.71(347.78)	0.6858	1	0.4076
Horizontal Integration	Independent Channel (117) Belong to MPP(83)	23(19.66) 1(1.20)	2813.50(154.84) 3151.52(194.80)	2.3618	1	0.1243
Vertical Integration	Independent Channel(151) Belong to MSP(49)	24(15.89) 0(0.00)	2950.66(140.82) 3026.47(251.46)	0.5947	1	0.4406
Genre	Movie(26) Drama(18) Sports(6) The remainders(150)	3(11.54) 1(5.56) 0(0.00) 20(13.33)	3167.78(328.90) 2618.30(316.28) 4299.50(664.95) 2927.31(145.23)	5.0150	3	0.1707
Foreign Investment	Not applicable(174) Attract foreign investment (26)	22(12.64) 2(7.69)	3009.37(129.85) 2739.53(371.88)	0.3762	1	0.5396
Satellite TV Carry	Don't Carry(107) Carry(93)	24(22.43) 0(0.00)	2618.18(161.67) 3313.04(177.67)	8.0831	1	0.0045
IPTV Carry	Don't carry(129) Carry(71)	24(18.60) 0(0.00)	2989.11(149.20) 2926.25(212.94)	0.0452	1	0.8317
DMB Carry	Don't carry(181) Carry(19)	24(13.26) 0(0.00)	2893.18(126.33) 3651.95(433.67)	4.8426	1	0.0278

Table 6. Results of Cox Regression Analysis (Backward Elimination)

Variables	Model 1(N=200)		Model 2(N=167)	
	Exp.(β)	Hazard Ratio	Exp.(β)	Hazard Ratio
Horizontal Integration	-0.19 (0.27)	0.823	-0.77* (0.36)	0.463
Genre	0.16* (0.08)	1.178	0.24* (0.10)	1.266
Original Contents Programming	-0.01 (0.01)	0.989	-0.01 (0.01)	0.986
In-house Production Programming	-0.01 (0.00)	0.994	-0.01† (0.00)	0.992
HDTV Contents Programming	0.01* (0.00)	1.012	0.01* (0.01)	1.014
Cable TV carry	-0.01** (0.00)	0.992	-0.01 (0.00)	0.999
Satellite TV Carry	0.08 (0.28)	1.087	0.03 (0.32)	1.035
DMB carry	0.12 (0.35)	1.128	0.21 (0.44)	1.236
Likelihood Ratio		30.4333***		22.5401**
Wald χ2		32.7376***		21.8976**
df		8		8

Note: Model 1 and 2 are Cox hazard proportional hazard regression analyses. Hazard ratios can be obtained by exponentiating the coefficients reported for each variables. Numbers in brackets are standard errors corrected for heteroskedasticity and non-independence of Wald within target channels. $^{\dagger}p<.10$, $^{*}p<.05$, $^{**}p<.01$(using the Wald test statistic, two-tailed test)

final variables inserted into the regression model. The alpha level was set at 0.10 (two-tailed test) considering the partial likelihood estimation, so that the Cox regression coefficient

estimation method considers only the likelihood of event occurrence and does not consider censored cases.

Table 6. shows the results of Cox regression performed on 200 channels and 167 channels. The two models presented first were found to be good enough to interpret the influence of the regression coefficient because both the likelihood ratio and the Wald χ^2 value were statistically appropriate. It is noteworthy that the factor significance of the covariates in Model 1 and 2 differs. In Model 1, which analyzed the entire sample, the genre (*exp.β=0.16**), HDTV content programming (*exp.β=0.01**), and cable TV carry (*exp.β=-0.01***) variables were found to significantly affect the survival of a PP channel, whereas in Model 2—analyzing the 167 channels that entered the market after the registration system was adopted—the genre (*exp.β=0.24**), horizontal integration (*exp.β=-0.77**), and in-house production programming (*exp.β=-0.01*[†]) variables were found to affect the survival of a PP channel significantly. Cable TV carry was not significant at all, although it was a significant variable in Model 1.

In sum, the genre of PP channels, scheduling of high-quality (e.g., HDTV) digital content, and cable TV broadcasting (which applies to about 80% of the paid broadcasting market) affected the survival of the PP channels when all were taken into account. For broadcasting channels that appeared after 2001, it is thought that most were affected by channel genre, scheduling of high-quality digital content, participation in the MPP, and the number of internally produced programs.

5. Post-hoc Analysis

Further analysis is required to secure the validity of the Cox regression results. Above all, Cox regression is based on the assumption of proportionality—i.e., that the effect of covariates does not change over time. If a specific covariable has a time-dependent characteristic, the analysis is not valid. As with the general regression analysis, residual analysis should be performed as a post-hoc test of the Cox regression analysis results.

In addition, the proportionality of the covariates should be checked to determine whether any covariable is time-dependent [39]. This study also tested the validity of the results using post-hoc tests. First, a residual analysis was performed to determine whether the deviance residual was symmetrical at around 0. It was found that the residual drops as time goes on, and the MPP variable's proportionality was found to be problematic in the test of co-variables' influence based on score residual analysis. Then, the proportionality of the co-variables was evaluated using the graph method. Because the graph deviated from the parallel line, it was found that the MPP was a time-dependent variable that affected hazard abnormally. As a result, this study designed a stratified hazard model and compared the results with the existing analysis results. This stratified hazard model included variables with the time-dependent effect to test the model's appropriateness depending on the insertion of the MPP variable and influential relations among the variables.

Table 7. shows the analysis results of all targeted channels and of 167 channels. Model 1 is the Cox regression that removed the time-dependent covariable, Model 2 is the Cox regression that included the time-dependent covariable, and Model 3 presents the analysis of the stratified strata model. As the model fitness demonstrates, the model with the smallest AIC value is Model 3, which stratified the time-dependent variables as shown in **Table 7**.

The analysis results are as follows. First, the hazard ratio of all PP channels changed as time went on depending on the MPP status. However, the genre (*exp.β=0.24**), HDTV content programming (*exp.β=-0.01**), and in-house production programming (*exp.β=0.01**) variables

Table 7. Robustness of the Results concerning the Survival of the Registered Channels

Variables	Cox, Model 1	Cox, Model 2	S-H, Model 3
	Exp.(β)	Exp.(β)	Exp.(β)
Horizontal Integration	-	-0.77* (0.36)	-
Genre	0.22* (0.10)	0.24* (0.10)	0.24* (0.10)
Original Contents Programming	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)
In-house Production Programming	-0.01 (0.00)	-0.01† (0.00)	-0.01* (0.00)
HDTV Contents Programming	0.01* (0.01)	0.01* (0.01)	0.01* (0.01)
Cable TV Carry	-0.02 (0.00)	-0.01 (0.00)	-0.00 (0.00)
Satellite TV Carry	-0.15 (0.31)	0.03 (0.32)	0.11 (0.33)
DMB Carry	0.12 (0.42)	0.21 (0.44)	0.23 (0.43)
-2LL(AIC)	423.616(437.616)	417.883(433.883)	333.818(347.818)
Likelihood Ratio	16.8074*	22.5401**	18.3815**
Wald χ^2	17.6330*	21.8976**	19.2049**
df	7	8	7

Note: Model 1 and 2 are Cox hazard proportional hazard regression analyses, and 3 is a time -dependent stratified hazard regression analysis. Hazard ratios can be obtained by exponentiating the coefficients reported for each variables. Numbers in brackets are standard errors corrected for heteroskedasticity and non-independence of Wald within target channels. $^{\dagger}p<.10$, $^{*}p<.05$, $^{**}p<.01$ (using the Wald test statistic, two-tailed test)

were also found to affect the survival of a PP channel all of the time, regardless of the MPP status. The cable TV carry variable, significant in the model targeting all channels, was found to be insignificant in the analysis of channels that began service after the registration system was implemented.

In sum, genre, scheduling of high-quality digital content, and the proportion of internally produced programs affected the survival of a PP channel, and the influence of cable TV broadcasting differed depending on the entry type.

6. Conclusion and Implications

If performance is an important factor from the management perspective, survival is an important factor to consider when the government makes policy affecting the market and industry. When crafting policy, it is important to understand the average survival period of a PP and the factors that increase the risk of business closure. Most previous studies, however, targeted factors that influence the performance of PPs, and factors affecting the survival or shutdown of PPs have rarely been addressed.

This study reviewed trends in the business closure risk ratio after market entry to determine the factors that contribute to the survival of domestic PPs. Furthermore, it was tested whether those factors identified as affecting the performance of PPs actually have a significant effect on their survival rate as determined by the ratio of business closure risk. We also investigated performance because we believe it is the most important factor in determining whether a business will be maintained or terminated in the market. We summarize the research results below.

First, this study estimated that actual viewer ratings and financial performance have been reported for only about 200 TV channels out of approximately 400 PP channels registered with the relevant agency. This estimation implies that new PPs entered the market indiscriminately

after the implementation of the PP registration system despite lacking sufficient production capability, and that many PPs closed even before starting business or stopped their business without closure registration. These findings support the claim that many PPs purchase cheap programs and broadcast them using a leased broadcasting facility instead of producing programs themselves [33][34]. The assertion seems quite persuasive that the qualifications for designation as a PP should be more stringent to strengthen the competitiveness of individual PPs. More competitive PPs, in turn, can run a broadcasting business rather than implementing the quota system of SO broadcasting.

Second, according to the survival function and ratio of business closure risk, while the cumulative survival ratio of PPs stood at 76.24%, most channels that entered the market through a permission/licensing system have survived. The channels that appeared after the registration system showed an abnormally high risk ratio in 2~2.5 years, or about 10 years after market entry. All of these findings clearly confirm that there is a first-runner advantage as well as certain advantages and disadvantages depending on the market entry system. These findings also indicate that government PP promotion policy must provide active support for PPs for 2 to 2.5 years after market entry so that they can become stable providers. In addition, the government needs to monitor the market for unfair practices such as channel refusal and exclusive transactions so that service providers that successfully enter the market do not fall behind [2][17][36]. The findings also shed light on the need to have consistent and systematic rules to manage broadcasting statistics on changes of service providers and channel supply [3][5].

Third, this study reviewed whether the predicted variables previously identified as performance factors affect the K-M survival function. It was found that performance variables such as entry type, horizontal integration, genre, original content programming, in-house production programming, HDTV content programming, cable TV carry [42], satellite TV carry, and DMB carry have a strong relationship with the survival condition of a PP. In particular, the findings empirically verify that management performance factors such as the first-runner advantage [11][33][37], cost leadership strategy [8][19][34][42], differentiation strategy [30][29][42], and focused strategy [8][31] are all probable factors influencing the survival of PP channels. In addition, Cox regression was performed using all of the relevant proven variables to determine which factors most significantly affect the survival of a PP channel. The results revealed that MPP, channel genre, scheduling of HDTV content, and the consistency and quality of the program (the proportion of internally produced programs) are the most important factors. In addition, contrary to the researchersy affect the survival of a PP channel. The results al functio identified in most registration system channels, and the advantage of vertical integration (i.e., where a PP is consolidated with a platform service provider such as terrestrial broadcasters/SOs) was not significantly related to survival. The results indicate that among cost leadership strategies, MPP is the most relevant. In addition, among product differentiation strategies, content quality; such as broadcasting high definition content and the proportion of internally produced programsuis the most relevant. Finally, among focus strategies, a genre variable related to the characteristics of channels is most relevant.

This study also has some limitations. First, additional factors that could affect the survival of PPs were not measured as variables. For example, had channel scheduling status (channel tier, channel number, etc.) and content production status been considered as variables for PP survival, the study could have been enriched. In addition, no financial performance factors were selected due to limitations in data collection. How financial performance affects the survival or closure of PPs needs further review. Second, more solid results could have been

obtained if parametric statistical tests (e.g., the Weibull model) had been used, comparing the results with those obtained from nonparametric regression. Parametric statistical tests block exogeneity; while nonparametric statistical tests reflect the actual situation better because the specific distribution is not considered, they cannot block exogeneity thoroughly. We think that more insights could have been obtained if the two tests had been performed and the results compared. Third, the present study has the limitation that it considers only the primary market in which content is distributed. Follow-up studies should consider action strategies and performance variables in added distribution markets, such as online, mobile, and VOD.

Nevertheless, the present study has the following theoretical implications. First, it focuses on the context of PPs, which are representative business groups that serve as entertainment content suppliers in the pay broadcasting market. PPs represent an area that has been relatively less illuminated in the tradition of domestic and overseas media studies, including journalism and broadcasting scholarship and information economics. No attempts have been made to study these groups from the viewpoint of business administration. Therefore, the fact that the present study shed light on business groups having different attributes from the much-studied manufacturing and IT businesses is perhaps its largest contribution.

Second, the present study paid attention to organizational extinction based on mortality, an issue that has hardly been dealt with in pay broadcasting market-related studies. Therefore, the results can offer insights that add to the context of existing studies on management performance, such as financial performance and ratings, and the tradition of cross-sectional studies. Significantly, the present study utilized survival itself as a final performance indicator and was the first study to examine the pay broadcasting industry in Korea. It makes the significant contribution of examining which PPs survived or were expelled from the market and what action strategies negatively affected survival.

Furthermore, the present study has several policy implications. First, PPs that compete in pay broadcasting markets can be affected by many factors arising at the organizational field level in addition to macroeconomic and social indicators. Therefore, PPs that are content suppliers in pay broadcasting markets should pay attention to diverse factors and opportunities in the organizational field. Next, because the genres of channels, the broadcasting ratio of in-house produced content, and the ability to produce digital content can affect the survival of PPs, the fundamental source of competition is the enhancement of content quality—i.e., product differentiation. This suggests where businesses and policy specialists should concentrate their strategic directions and industry promotion efforts, respectively.

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