The diffusion pattern of new products: evidence from the Korean movie industry

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Abstract
The new product diffusion is based on the innovation diffusion theory assuming a new product is a type of innovation. New product diffusion patterns can inform various market characteristics. Thus, managers would benefit from studying the history of patterns to forecast how consumers react when a new product is introduced. This study focuses on capturing chronological changes in new product diffusion pattern for the case of Korean movie box office data, and applying the Bass model. We found that the level of innovation effect increases gradually for 15 years, which suggests that moviegoers have become more individualistic in recent years. However, the level of imitation effect increases only for domestic movies, which might be caused by the uncertainty avoidance tendency due to the lack of sequels or franchise products of domestic movies. This study enhances our understanding of historical changes of product diffusion patterns.

Keywords New product diffusion · Bass model · Movie industry · Chronological change · Entertainment marketing
Introduction

Understanding the market is the first step in making any decision related to marketing management. If a company enters or targets a market without building sufficient knowledge on the market, the core marketing decisions such as market segmentation and targeting and brand positioning will be insubstantial. New product diffusion patterns of a product category can inform a variety of market characteristics such as consumer structure, consumer heterogeneity, and consumer attributes. Thus, marketing managers must study the history of product diffusion patterns in a market to forecast how the consumers react when a new product is introduced in future. The new product diffusion literature has been built on the innovation diffusion theory assuming a new product is a type of innovation. The theory has been defined as the process whereby that “innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1983). Thus, existing research related new product diffusion has generally dealt with the key elements of the diffusion process: innovation (i.e., product characteristics), communication channels, social system, and time. For instance, the major research stream has focused on the micro issues such as incorporating social network concepts or network externalities into the diffusion models (Goldenberg et al., 2001, 2009; Nair et al., 2004; Tellis et al., 2009) and defining or discussing takeoffs and saddles (Golder & Tellis, 1997; Mahajan & Muller, 1998; Muller & Yogev, 2006; Vakratsas & Kolsarici, 2008). More macro research views have dealt with multi-generational diffusion models (Bayus, 1994; Mahajan & Muller, 1996; Norton & Bass, 1987, 1992) and diffusion models across brands, product categories, or markets (Dekimpe et al., 1998; Ganesh et al., 1997; Kauffman & Techatassanasoontorn, 2005; Krishnan et al., 2000). Despite plentiful research attempting to compare the diffusion patterns among product categories in a country or across countries (Chandrasekaran & Tellis, 2008; Sultan et al., 1990; Talukdar et al., 2002; Van den Bulte & Stremersch, 2004), only a few studies have aimed to describe longitudinal changes of a product category’s diffusion pattern in a market (Clark et al., 1984; Kohli et al., 1999; Van den Bulte, 2000). Therefore, this study focuses on capturing chronological changes in new product diffusion pattern to fill the research gap.

To depict the historical variability in new product diffusion pattern, we utilize box office data in the Korean movie market. A movie has a characteristic of an experiential product, whose quality is hard to assess before actual consumption, thus guiding moviegoers to pursue quality signals for purchase decisions. Some buy tickets owing to interesting movie posters or trailers while others are attracted by positive online reviews or recommendations of their acquaintances. However, due to the socio-cultural changes over time, the arrangement of a new movie’s diffusion also adjusts in process with time. Thus, by detecting the chronological changes, movie marketers can not only consistently adapt their strategies and practices but also prepare a long-term managerial plan. Unfortunately, however, even though a few academic articles have applied box office data to explain the movie diffusion pattern (Chance et al., 2008; Dellarocas et al., 2007;
Lee et al., 2012, 2017, 2019; Marshall et al., 2013; Sawhney & Eliashberg, 1996), none of them have demonstrated time-varying tendency of new product diffusion at a macro level. The current study could expand this notion of movie diffusion research by examining the chronological changes in movie diffusion pattern by applying the Bass diffusion model to the Korean movie market data.

The remainder of this article is organized as follows: the next section summarizes related literature and suggests the research question. Section three presents the data sample and variables. Section four explains the details of the empirical model and the results. In the final section, the findings, implications, limitations, and possible directions for future research are discussed.

**Theoretical background**

**Bass diffusion model**

This study aims to demonstrate how the new product diffusion pattern has changed chronologically in the Korean movie market. The Bass model is broadly utilized to forecast new product adoption of consumers (Bass, 1969). According to Bass’ (1969) model, a market could be classified into two groups of consumers. One group, labeled as innovators, is influenced by external factors such as advertisements, media reports, and product availability. The other group, labeled as imitators, is affected by internal factors including word-of-mouth generated by the previous adopters. The innovators mainly form the early market while the imitators generally appear when the early market disappears. These two motivation types, the innovation effect and the imitation effect, define the diffusion pattern of a new product (Lee et al., 2019). The probability that unconvinced consumers will adopt a new product is a linear function of the two effects. The model also assumes that every potential consumer will adopt the new product in the final phase based on no repeated purchases. Therefore, the diffusion model, as shown in Eq. 1, consists of three parameters to be estimated: coefficient of innovation \( p \), coefficient of imitation \( q \), and ultimate market potential \( m \).

\[
S_t = \left( p + q \frac{\sum_{i=1}^{t-1} S_i}{m} \right) \left( m - \sum_{i=1}^{t-1} S_i \right)
\]

where \( S_t \) is the number of adopters at time \( t \).

The Bass model was initially designed to forecast the diffusion complexion for consumer durable goods (Bass, 2004; Norton & Bass, 1987). This origination of the Bass model indicates that the model is suitable for describing a diffusion pattern of a product category having a long-life span, such as refrigerators, televisions, air conditioners, and irons. However, the model has also been successfully applied to movie-going behavior because of its relevance to the movie selection process and resemblance to single-purchase characteristic (Chance et al., 2008; Dellarocas et al., 2007; Lee et al., 2012, 2017, 2019; Marshall et al., 2013; Sawhney & Eliashberg, 1996).
Even though a single movie is not a product category but a single product, a movie has some common features that consumers can be grouped by when they adopt a new product, and the non-adopters are affected by the previous adopters through word-of-mouth. Additionally, similar to consumer durables, a movie is rarely repeatedly purchased in theaters. Furthermore, the high level of fitness between box office data and the Bass model verified in previous research legitimizes these applications.

**Chronological changes in new product diffusion pattern**

Most of the previous research on new product diffusion has attempted to compare the diffusion patterns among a few product categories in a single market. However, few of them have made an effort to compare the diffusion patterns across markets. Sultan et al. (1990) meta-analyzed the estimated parameters from 15 articles on diffusion models. From the regression analyses with the two Bass model coefficient, $p$ and $q$, as dependent variables, they found that European data generate higher coefficients of innovation than US data. Talukdar et al. (2002) extended the previous research by paying attention to all parameters, $p$, $q$, and $m$. They analyzed the dataset consisting of sales data for six product categories across 31 countries. The authors revealed that illiteracy has a negative effect on $p$, introductory lag has a positive effect on $q$, and purchasing power parity, urbanization, and international trade have a positive effect on $m$. Van den Bulte and Stremersch (2004) conducted a meta-analytic test to verify the effect of national culture and income heterogeneity on new product diffusion pattern by collecting data from the published papers citing the Bass model across 77 countries. Among the Hofstede’s (2001) cultural dimensions, the authors discovered that power distance and masculinity were positively associated with $q/p$ ratio, while individualism and uncertainty avoidance have a negative association with the ratio. Chandrasekaran and Tellis (2008) focused on the difference in new product time-to-takeoff across countries. By studying the data of 16 new products across 31 countries, they recognized that the time-to-takeoff is considerably shorter in the developed countries than in the developing countries and the duration is longer in the societies having high in-group collectivism and uncertainty avoidance.

Despite the successive studies discussing the cross-cultural difference of new product diffusion patterns, the attempts to capture historical changes of diffusion patterns in a market have been rather limited. Clark et al.’s (1984) was one of the earlier studies exploring the trend of new product diffusion. They labeled the sum of the innovation and imitation coefficients of the Bass model, $p + q$, as contagion level, where higher contagion level indicates faster dissemination in the market. According to the results, they suggested that the contagion level shows an increasing pattern, largely accounted for by the enhancement of the imitation coefficient, as the introduction time of consumer appliances advances. Kohli et al. (1999) examined data for 32 consumer durables to discover the relationship between the year of launch and the diffusion pattern of the product. The article provides the significant correlations between the year of launch and the coefficient of imitation, that is, the more recent the introduction, the higher will be the imitation coefficient of
the product. Because of this trend, the time for peak sales also decreases over time. Van den Bulte and Stremersch (2004) also considered the year in which the sales data start as a control variable in their meta-analysis and revealed the significant and negative effect on $q/p$. Considering that the ratio implies the inclination of the diffusion curve, the finding points out that the new product diffusion patterns show more pronounced S-shape as the launch year increases. Moreover, Van den Bulte (2000) stated that the existence of new product diffusion acceleration is a standard contention. To prove the statement, the author used data on 31 electrical consumer durables over 74 years. The author operationalized vintage as the year a product achieved 5% household penetration and found that the variable has a positive impact on diffusion speed. However, the systematic effect disappeared when macroeconomic variables, such as purchasing power, unemployment level, and demographic changes, were controlled in the model. Chandrasekaran and Tellis (2008), again, included the year of product category commercialization (“vintage”) as a control variable and detected significant and negative effects on diffusion takeoff. They concluded that a modern product has shorter time-to-takeoff owing to the increasing innovators in a market. Talukdar et al. (2002), as mentioned above, found a negative impact of illiteracy on the innovation coefficient. Since illiteracy generally decreases as a society makes progress, it is naturally expected that the coefficient of innovation grows over time. Even though existing research do not provide identical results, we can assume that both innovation and imitation coefficients increase gradually because of macroeconomic changes.

**Chronological changes in movie diffusion and its determinants**

If new product diffusion pattern changes over time in a way that shows a growing level of the Bass model coefficients, diffusion of movies would not be an exception. However, even though various studies have applied box office data to the Bass model (Dellarocas et al., 2007; Lee et al., 2012, 2017, 2019; Marshall et al., 2013; Sawhney & Eliashberg, 1996; Zhang et al., 2020), studies focusing on chronological changes of movies diffusion are extremely scarce. Therefore, a meta-analytic approach is required to identify the evidence of the historical change in a single market. South Korean movie market is an appropriate sample for the examination because it has open box office database covering all the domestic market and it has an extraordinarily high level of movie attendance (more than four times a year per person since 2013). Because the Bass model estimation is sensitive to the scale of data, we grouped the previous studies into two groups. Chang (2008) and Zhang et al. (2020) used weekly box office data and the rest of the following studies use daily box office data of the Korean movie market. Chang (2008) collected 40 movies released from 2003 to 2004 to draw the mean values, 0.294 for $p$, 0.458 for $q$, and 1.732 for $q/p$. Zhang et al. (2020) compiled 198 movies released from 2006 to 2008 and found the values 0.585 for $p$ and 0.265 for $q$. Contrastingly, recent research utilizes daily box office data to ensure higher model fitness. Lee et al. (2012) analyzed 40 movies from 2005 to 2010 to calculate the mean values of coefficients: 0.038 for $p$, 0.061 for $q$, and 1.641 for
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Kim and Hong (2015) reported the mean values by investigating 175 movies from 2011 to 2013: 0.078 for $p$, 0.193 for $q$, and 2.47 for $q/p$. Lee et al. (2017) collected 50 movies from 2014 to 2015 and found that the mean values of $p$ and $q$ are 0.051 and 0.055, respectively. Similarly, Lee et al. (2019) summarized the Bass model estimation utilizing the data of 100 movies from 2014 to 215 and found that mean values of $p$, $q$, and $q/p$ are 0.047, 0.047, and 1.747, respectively. Unfortunately, however, the previous studies do not show any distinct pattern of the Bass model coefficients owing to different model specifications and sampling criteria.

Another approach to predict the historical change of movie diffusion is to track the fluctuation of the determinants of the Bass model coefficients. Bass (1969) defined that the innovators are influenced by marketing communication such as advertisements and media publicity while the imitators are influenced by word-of-mouth generated by the previous adopters. Thus, a majority of the existing research follow the notion by introducing marketing communication–related variables as the determinants of $p$ and word-of-mouth related variables as the determinants of $q$ (Chang, 2008; Dellarocas et al., 2007; Lee et al., 2017, 2019; Wang et al., 2010; Zhang et al., 2020). Contrary to the research concerning the deterministic factors at the product level, some studies discuss the determinants at the market level. Talukdar et al. (2002) incorporated the penetration level of television and newspapers and the number of international phone calls as consumers’ information accessibility, and illiteracy level as consumers’ ability to process information. The authors included the Gini index and the number of distinct ethnic groups as population homogeneity based on the assumption that personal interactions are boosted within a homogeneous society. In South Korea, the smartphone ownership rate has reached 95% as of 2018, thus allowing consumers to access product-related information and word-of-mouth with no restriction (Pew Research Center, 2019). Additionally, the Gini index of South Korea has also decreased from 0.388 in 2011 to 0.345 in 2018, which indicates increasing income homogeneity (Korean Statistical Information Service, 2019). Accordingly, it is justifiable to expect a recent enhancement in both innovation and imitation coefficients in the Korean movie market.

Furthermore, another body of research investigates the effect of the Hofstede’s (2001) cultural factors on the Bass coefficients (Jain & Maesincee, 1998; Lee et al., 2019; Steenkamp et al., 1999; Van den Bulte & Stremersch, 2004; Yaveroglu & Donthu, 2002). Most of them found empirical evidence that higher individualism relates to higher $p$ and lower $q$ values while higher uncertainty avoidance relates with lower $p$ and higher $q$ values. According to Hofstede and Minkov (2010), the Korean society shows an extremely low level of individualism (18 out of 100) and a high level of uncertainty avoidance (85 out of 100), while countries in Western Europe and North America score fairly well in the opposite direction. However, considering westernization or globalization of Korean society, increasing level of individualism and decreasing level of uncertainty avoidance could be presumed. Thus, it can be expected that the Korean movie market would show a growing level of $p$ but a lowering level of $q$. Based on the above conflicting arguments, hypotheses
demonstrating distinct direction on the change of new product diffusion pattern cannot be established. Therefore, we suggest the following research questions.

**Research questions:** Does the diffusion pattern of movie market change chronologically? How do the coefficients of the Bass model vary over time?

**Methods**

**Research context**

Due to the confinement during the COVID-19 era, the world movie industry has been under unprecedented recession. The Korean film market has not been an exception. According to the Korean Film Council (2022), in 2021, the total market size of Korean movie industry was evaluated to be 1024 billion KRW which is about two fifths of the size in 2019. The Korean movie industry had grown gradually until the pandemic occurred. As of 2019, Korean consumers visited a theater 4.37 times a year on average which is the highest level in the world. In addition, the number of theater-released movies reached 647 in which domestic movies occupies 30% of them. Meanwhile, the annual market share of domestic movies shows 51% which is almost consistent over the past decade (Korean Film Council, 2020).

Despite the considerable market size of Korean movie industry, there have been concerns on the highly concentrated market structure. The industry exceedingly depends on the three vertically integrated media conglomerates, CJ, Lotte, and JoongAng. The three media groups operate multiplex franchises: CGV, Lotte Cinema, and Mega Box, consecutively. The multiplex chains seized 97.2% of market share, 49.5%, 29.1%, and 18.6%, as of 2019. Moreover, the big three not only have retail company but also manage distribution unit: CJ ENM, Lotte Entertainment, and Megabox Plus M, respectively. Even though Megabox Plus M remains a mid-sized distributor, the other two companies had continuously placed their name on the annual top 5 market share in 2010’s.

**Sample**

To discover the historical changes in the movie diffusion pattern, we utilized the data of the annual top 20 Korean movies and top 20 foreign movies from 2005 to 2019 in the Korean domestic market. The Korean Film Council provides the domestic box office database (kobis.or.kr) which covers every theater employing online ticketing system, thus covering more than 99% of existing theaters. Considering that the usual national films’ annual market share marginally exceeds 50%, the sample consists of domestic movies and foreign movies equivalently. Additionally, because of inadequate coverage of the database, the sample does not include the data before the 2005. Plus, the annual top 40 movies generally
possess more than 70% of total sales so that we have 40 movies in a year, therefore, 300 Korean and 300 foreign movies in total.

**Measures**

To answer the research question raised above, the present research needs to estimate the Bass model coefficients, the innovation effect $p$, the imitation effect $q$, and the market potential $m$, in advance. Since the Bass model requires only one variable for estimation, $S$, which is the number of adopters at time $t$, we measure the daily adopters of a movie as the daily audience (AUDIENCE). Each movie has daily audience data for the number of days played on screens or for a maximum of 42 days. After the Bass model estimation, the research question demands additional estimation for system of equations including the three estimated parameters as dependent variables. In the system of equations, a continuous variable to describe the year a movie released (YEAR) is introduced for capturing yearly change pattern of the Bass model coefficients. Moreover, to discover the dissimilarity between the domestic and foreign movies, a dummy variable indicating whether the movie is produced by a domestic firm or not (DOM) is included.

As a control variable, the ratio of marketing cost (MKTRATIO), market share of domestic movies (DOMSHARE), and the total number of audiences (AUDTOT) were considered. Since a movie’s diffusion pattern is highly sensitive to seasonality, the variables were collected yearly (Radas & Shugan, 1998). The ratio of marketing cost was calculated by dividing the average marketing cost of all released Korean movies per year by the average total production cost. Owing to the difference in cost structure between domestic movies and foreign movies, only Korean movies’ data were used for calculation. The direct distributed Hollywood movies practically have no production cost in the Korean market and licensed foreign movies charge a fee for publication right, which is relatively smaller than the production cost of domestic movies. Because of this reason, foreign movies are inadequate for calculating marketing cost ratio. Market share of domestic movies was computed by dividing the total number of audiences of Korean movies per year by the total number of audiences per year. The total number of audiences was measured in millions per year. The summary of variable descriptions is provided in Table 1.

**Results**

**Bass diffusion model estimation**

Since the research question deals with chronological changes of new product diffusion described by the parameters of the Bass model, parameter estimation is needed in the first stage. We fit the number of daily audiences of each movie into the generalized Bass model, incorporating daily seasonality to obtain the three estimated parameters: coefficient of innovation $p$, coefficient of imitation $q$, and ultimate market potential $m$. Based on the fact that most movie audiences visit
| Variable   | Description                                | Measure                                                                 | Source         |
|------------|--------------------------------------------|------------------------------------------------------------------------|----------------|
| AUDIENCE   | Daily audience of a movie                  | The number of audiences of a movie each day                           | kobis.or.kr    |
| YEAR       | Year a movie released                       | The year a movie released from 2005 to 2019 (coded as 1 to 15)         |                |
| DOM        | Nationality of a movie                     | Dummy variable indicating whether the movie is produced by a domestic firm or not |                |
| MKTRATIO   | Ratio of marketing cost                    | Marketing cost ratio of domestic movies each year [(averaged marketing cost ÷ averaged total production cost)× 100] | kofic.or.kr    |
| DOMSHARE   | Market share of domestic movies            | Audience share of domestic movie each year [(total number of audiences of domestic movies ÷ total number of audiences)× 100] |                |
| AUDTOT     | Total number of audiences                  | Total number of audiences each year (in million)                       |                |
theaters on weekends starting from Friday night, this study employs the generalized Bass model to capture the daily fluctuating demand through a multiplicative form (Bass et al., 1994). From the estimation results, 24 cases show a negative value in the imitation effect coefficient, thus the value is treated as 0 due to discordance with the assumption of positive coefficients. Table 2 summarizes the results. The average value of the innovation coefficient \( p \) was 0.042 in the domestic sample and 0.048 in the foreign sample. Conversely, the average value of the imitation coefficient \( q \) was 0.053 and 0.042, respectively. In the imitation effect, domestic movies showed a much larger value than foreign movies. However, the innovation effects were approximately indistinguishable. The difference between the domestic sample and the foreign sample is more salient when comparing the ratio of imitation effect to innovation effect. The ratio was 2.619 for domestic movies, while it was 1.282 for foreign movies. Accordingly, the estimation results exhibit that Korean movies hold weaker innovation effect and stronger imitation effect than foreign movies. Figure 1 demonstrates the longitudinal changes of the two model coefficients based on the nationality. In domestic movies, both innovation and imitation coefficients show a gradually increasing pattern from 2005 to 2019. However, in foreign movies, only the innovation coefficient shows an increasing pattern with relatively large fluctuation compared to the domestic movies in the same period. Equation 2 presents the generalized Bass model used for the estimation and the summary of the descriptive statistics of the Bass model estimation results.

\[
AUDIENCE_t = \left( p + q \frac{\sum_{i=1}^{t-1} AUDIENCE_i}{m} \right) \left( m - \sum_{i=1}^{t-1} AUDIENCE_i \right) \\
\times \left[ 1 + \delta_1 FRI + \delta_2 (SAT + SUN + HOLI) \right]
\]

Next, the descriptive statistics of independent variables and their correlation coefficients were calculated. The mean value of the marketing cost ratio was approximately 30, which implies that a domestic movie has generally spent 30% of their total production budget on marketing activities for 15 years. The mean value of the domestic movie market share was slightly greater than 50, which indicates that more than 50% of moviegoers have chosen Korean movies for the period. The average

| Estimated parameter | Domestic                      | Foreign                      |
|---------------------|-------------------------------|------------------------------|
|                     | Avg  | S.D  | N   | Avg  | S.D  | N   |
| \( p \): innovation effect | 0.042 | 0.021 | 300 | 0.048 | 0.024 | 300 |
| \( q \): imitation effect* | 0.053 | 0.034 | 300 | 0.042 | 0.033 | 300 |
| \( m \): market potential | 3,943,281 | 4,179,478 | 300 | 2,931,628 | 2,274,476 | 300 |
| \( q/p \) | 2.619 | 16.107 | 300 | 1.282 | 2.588 | 300 |

*11 cases in domestic sample and 13 cases in foreign sample were recoded as ‘0’ due to the negative coefficient
Fig. 1 Chronological changes of the estimated Bass model parameters: Domestic movies (upper) and foreign movies (lower)
value of the total number of audiences was 186 million per year. The correlation coefficient between the ratio of marketing cost and the total number of audiences is significantly high. However, since the two variables are not included in the same equation, multicollinearity does not cause a problem. More detailed statistics for the data are listed in Table 3.

\section*{Seemingly unrelated regression estimation}

Furthermore, to test the historical changes of movie diffusion, we estimated system equations establishing the three estimated parameters as outcome variables. Owing to the relatively larger values of the estimated market potential, the values were rescaled in million. Since the three parameters ($p$, $q$, and $m$) were estimated from the same model, they should be assumed to be correlated. Thus, we employed seemingly unrelated regression (SUR) for model estimation to handle the interdependency between the error terms of Eq. 3. The ratio of marketing cost was included in the $p$ equation due to the previous findings regarding the deterministic effect of marketing communication on the innovation coefficient. Market share of domestic movies was considered in the $q$ equation because the less-involved moviegoers, who usually show herd behavior, tend to choose domestic films due to the familiarity and language issue. In other words, a higher market share of domestic movies indicates more less-involved consumers in the market and could lead to higher imitation effect. The total number of audiences was entered in the $m$ equation on account of reliance of a movie’s market potential upon the total market size. Table 4 reports the results of the SUR estimation.

\begin{equation}
\hat{p} = \beta_{11} + \beta_{12} \text{YEAR} + \beta_{13} \text{DOM} + \beta_{14} \text{YEAR} \times \text{DOM} + \beta_{15} \text{MKTRATIO} + \epsilon_1
\end{equation}

\begin{equation}
\hat{q} = \beta_{21} + \beta_{22} \text{YEAR} + \beta_{23} \text{DOM} + \beta_{24} \text{YEAR} \times \text{DOM} + \beta_{25} \text{DOMSHARE} + \epsilon_2
\end{equation}

\begin{equation}
\frac{\hat{m}}{1,000,000} = \beta_{31} + \beta_{32} \text{YEAR} + \beta_{33} \text{DOM} + \beta_{34} \text{YEAR} \times \text{DOM} + \beta_{35} \text{AUDTOT} + \epsilon_3
\end{equation}

In the innovation coefficient equation, year had a marginally significant and positive effect ($\beta = 6.924 \times 10^{-4}$, $p = 0.085$). However, the interaction effect of year and
nationality was insignificant. The result explains that the Korean movie market has shown an increasing trend of innovation effect. Moreover, there was no difference in innovation effect between domestic movies and foreign movies. In the imitation coefficient equation, the year had no significant effect while the interaction term had a significant and positive effect ($\beta = 0.002$, $p = 0.001$). This suggests that the Korean movie market has displayed a growing level of imitation effect only for the domestic movies, not foreign movies. Besides this, the market share of domestic movies also had a significant and positive effect ($\beta = 0.002$, $p = 0.001$) on the imitation coefficient. As assumed earlier, higher market share of domestic movies could lead larger imitation effect at market level because Korean moviegoers show stronger herd behavior to Korean movies. Lastly, in the market potential coefficient equation, both year and the interaction term had no significant effect. The nationality of movies alone had a marginally significant and positive effect ($\beta = 1.089$, $p = 0.055$). The market potential of hit movies was revealed as stable, and the domestic movies was shown to have a larger potential for 15 years.

### Discussion

**Chronological changes in the innovation and imitation effects**

This research examines how the diffusion pattern of movies varies chronologically in the Korean movie market. To depict the historical transition in the movie diffusion pattern, the data of the top-ranked movies for 15 years, from 2005 to 2019, were collected from the Korea Box Office Information System. With the generalized Bass model employed for illustrating the diffusion pattern of individual movies, we fit the number of daily audiences of each movie to estimate model parameters: $p$, $q$, $m^*$.
For the next step, establishing the three parameters as dependent variables, the system equations were estimated simultaneously with SUR to discover how the pattern changes over time and whether any significant determinants among market characteristics exist. Our results show that the level of innovation effect increases gradually for 15 years. This chronological change suggests that the Korean moviegoers have become more individualistic. According to prior research, it can be assumed that an increasing number of Korean consumers choose movies based on their tastes without considering other consumers’ choices (Lee et al., 2019). However, these chronological changes do not occur in the imitation effect. Korean moviegoers have also been demonstrating augmentation of herding behavior only when deciding for domestic movies. This asymmetric behavior might be caused by the uncertainty avoidance tendency due to the relative lack of sequels or franchise products of domestic movies in comparison with Hollywood blockbusters. In the imitation coefficient equation, the market share of domestic movies is revealed to have a positive and significant effect. Since domestic movies are favored by less-involved consumers due to the familiarity and language issue, higher market share of domestic movies indicates the higher share of less-involved moviegoers in the market. Based on the definition of involvement, that is a “person’s perceived relevance of the object based on inherent needs, values, and interests” (Zaichkowsky, 1985), a higher share of less-involved consumers naturally tends to have salient imitating behavior in a market. Although there is no significant effect of time on the market potential coefficient, the results show that when Korean domestic movies rise to the highest box office position, they could enjoy higher market capacity. Because of the language issue, most moviegoers prefer to watch a movie filmed in their native language. Additionally, Korean domestic movies, along with K-pop and TV series, are recognized to have sufficient quality to attract global consumers. For example, lots of Korean video contents are highly placed in over-the-top (OTT) services such as Netflix in various countries. Furthermore, the fact that “Parasite” filmed by Joon-ho Bong won the Palme d’Or in the Cannes Film Festival and four Oscars reveals the competitiveness of not just an exceptional artist but that of the Korean film industry as well.

**Theoretical contributions**

The current research could provide some theoretical implications. First, this study could mitigate the deficiency of research aiming to capture historical changes of product diffusion patterns in a market. Even though there have been various studies comparing the diffusion patterns among product categories in a market (Chandrasekaran & Tellis, 2008; Sultan et al., 1990; Talukdar et al., 2002; Van den Bulte & Stremersch, 2004), longitudinal research examining the diffusion patterns in a market has been rather scarce (Clark et al., 1984; Kohli et al., 1999; Van den Bulte, 2000). Marketing management should not only focus on the market environment analysis but also on studying the dynamical changes in environment over time to capture the chronological changes in market characteristics, which could provide a diverse research agenda. For example, the increasing level of innovation coefficient
in Korea demands a reevaluation of Hofstede’s (2001) cultural dimensions across countries. Additionally, the findings imply possible chronological changes in market structure, that is, the enhancing ratio of high-involved consumers to low-involved consumers. Second, our work could enhance the understanding of the Korean movie market. A few studies have applied box office data to the Bass model to explain the product diffusion pattern (Chang, 2008; Kim & Hong, 2015; Lee et al., 2012, 2017, 2019; Zhang et al., 2020). However, due to different model specifications and sampling criteria, they have failed to reach an agreement on how the Korean movie market is characterized. Based on the findings of the increasing innovation effect in the entire market and the increasing imitation effect in domestic movies, it can be inferred that the Korean moviegoers display a growing level of herd behavior when watching domestic movies and a snob effect when watching foreign movies. Third, the asymmetric patterns between domestic movies and foreign movies could support the notion of the country of origin effect. Arguably, the US film industry is the dominating market power worldwide. This reality gives representing status to Hollywood movies in the product categories, thus making moviegoers watch the US made films without considering choices of others. In other words, when a product is originated from a representative country, the diffusion pattern of the product would show significant innovation effect. Future research needs to examine the effect of country of origin as one of the potential determinants of new product diffusion.

**Practical implications**

The results of the present study could help marketing managers in the movie industry. First, the result that the share of innovative consumers increases for the whole market indicates that the revenue share of the early market relative to that of the mainstream market would also increase. The enhanced importance of early market will require more marketing resources right before and after the movie release because the product life cycle becomes shorter. Moreover, considering that the early market is affected by marketing communication activities, movie marketers should allocate their budget on mass communication strategies such as advertising and media exposure, and quality signaling strategies such as wide release and professional reviews. Second, the outcome that the imitating effect increases limitedly in domestic films points that the product life cycle of domestic movies is longer than foreign movies, thus requesting more dynamic marketing strategy. As mentioned before, mass communication and quality signaling are, again, critical for domestic films in the early market; however, communication among consumers is more decisive for domestic films in the mainstream market. Thus, movie marketers need to monitor the change of market composition to dynamically adjust the allocation of the marketing budget. Third, to generate and disperse word-of-mouth on a movie, not only promotional activities but also forethought in the early phase of new product development is required. To make moviegoers talk, a movie must provide materials to be talked about. For domestic movie studios, placement of Easter eggs, cameos, or twisted endings in production stage could help trigger and disseminate word-of-mouth on a movie.
Limitations and future research

Despite the various implications, the current research has room for improvement. First, since the sample of the research consists of highly successful products, namely top 20 domestic movies and top 20 foreign movies from each year, the results cannot represent the entire movie market. However, because the total revenue of the 40 top-ranked movies occupies nearly two-thirds of annual market revenue in the sample, our results attain considerable representativeness for the market share. Second, this study does not provide empirical evidence on why the movie diffusion patterns vary over time in the Korean market but provides some possible explanations on the issue. As explained above, the enhancement of innovation effect could be a consequence of the increasing level of individualism in Korean society. Unfortunately, however, the cultural dimensions created by Hofstede (2001) have not been tracked formally in Korea, thus making empirical analyses impossible. If official indexes portraying macroscopic change in society are provided, future research could discover more evidence on why the longitudinal transition of product diffusion patterns exists. Third, the SUR model does not incorporate a sufficient number of determinant factors, thus resulting in a low level of model fitness. The purpose of the current research was to explore how the new product diffusion pattern of Korean movie market changes chronologically, and not to discover the underlying mechanism of the change. Along with the society-level factors, future research could consider more various market-level characteristics to reveal the determinants of the diffusion pattern variability. Fourth, the longitudinal pattern found in this research may not be extended after the Coronavirus disease 2019 (COVID-19) outbreak. Even though the pandemic would disappear in some time, continued lockdown or social distancing will change movie-going behaviors, leading people to watch movies through OTT services or to avoid newly released films screened in densely populated places and times. Therefore, researchers can study the impact of the COVID-19 on the diffusion patterns of movies separately.

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