

소셜 커머스 시장의 롱테일 현상에 대한 실증 연구

An Empirical Analysis on Long Tail Patterns with Online Daily Deals

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초 록

전자상거래 시장에서 롱테일 경제가 출현함에 따라 80/20 룰로 알려진 파레토 법칙의 일반적인 적용에 의문이 제기되고 있다. 이러한 제품 집중도의 변화는 인터넷 인프라 기반기술 위에 구현된 대량맞춤(mass customization)에서 기인한다고 예측된다. 본 연구는 그루폰과 유사한 소셜 커머스 웹사이트로부터 얻은 실거래 정보를 실증 분석하여 제품 및 고객 집중도를 분석하였다. 분석 결과, 이전 전자상거래 연구와 같이 소셜 커머스에서도 파레토 법칙과 다른 롱테일 패턴이 나타났다. 더욱이 email 또는 SMS를 통한 홍보가 판매 집중도 패턴에 영향을 미치는 것으로 파악되었다. email과 SMS를 통한 홍보는 모두 소셜 커머스 쿠폰 판매를 증가시킬 것이라는 예상과는 달리, SMS 홍보는 쿠폰 전반적으로 판매를 증가시키나, 소량 판매 제품의 경우 email 홍보는 오히려 제품 판매를 감소시키는 결과를 보였다.

ABSTRACT

The renowned Pareto rule of 80/20 has been challenged in the electronic marketplace with the emergence of long tail economy. Mass customization on top of the Internet infrastructure is expected to explain these changes of product concentration. In this paper, we empirically analyzed the micro-transactional data of a Groupon-like daily deal web site to identify the changes of product and customer concentration. The results show the long tail pattern aligned with the previous research on the e-commerce literature on the long tail. We find that the notification setting on email or SMS about daily deal influences the patterns of sales concentration. The information through email and SMS is expected to enable consumers to know about daily bargains and purchase the coupons eventually. However, the email notification for niche products results in the decreased sales while the SMS notification for overall product promotes overall products.

키워드 : 롱테일, 제품 다양성, 판매 집중도, 소셜 커머스

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1. Introduction

The daily deal industry initiated by Groupon has been said to bring more than 700 copycat businesses, attract huge amount of investment from venture capitals, and change the way a number of online shoppers find bargains for local products such as restaurant coupons [6]. For 2011, Groupon generated revenue of \$1.6 billion, up 419% compared to 2010. Gross billings were \$4.0 billion, up 437% from \$745.3 million in 2010. Groupon's active customer base was more than 33 million, up 275% year-over-year [15]. Living Social, the second-largest website devoted to daily coupons, is said to grow quickly as well to generate \$1 billion in revenue in 2011 [6]. Numerous web sites similar to the original model are operational internationally. Groupon and Living Social have been leading a virtual land grab, with dozens of companies angling for a bigger share of the fast-growing market and swallowing start-ups at a rapid rate [18].

The online daily deal business model differs from the traditional electronic commerce in that the deal company allows merchants to sell discounted services or products to the customers of the deal company directly. At the end of the day, the deal company earns a portion of the merchant's profit. Furthermore merchants normally offer deals which are significantly discounted compared

to merchants' retail prices. Using a group buying formula, a minimum and maximum number of deals are made available. In addition, deals are typically only offered for 24 hours, although daily deal websites are increasingly offering alternative, longer deal buying periods to increase sales and allow multiple deals to run in a single location concurrently.

Descriptions of the deals are often emailed to customers when the deal goes live, sometimes with creative or humorous descriptions. The practice of sending these emails has been criticized by e-mail marketing professionals and users [5]. However, evidence suggests this aggressive strategy is effective at generating sales [17]. Some sites allow members to receive an e-mail either daily or weekly, or to be notified of all current offers. Customers purchase the deal on the deal-of-the-day website, rather than directly from the merchant. The websites then retain the customer data, rather than the merchant.

Once the minimum number of deals has been sold, customers' credit cards are charged, and the deal is delivered as an electronic voucher redeemable at the merchant or service provider's location. The promotional value of the vouchers purchased from deal-of-the-day websites typically expire after a certain period, but maintain the original value paid.

Common products and services sold through deal-of-the-day websites include restaurants and bars, salons and spas, special

events, health and fitness products, and travel packages. Deal-of-the-day web sites provide electronic commerce offering bargain deals per region typically for a period of 24 hours. Members of deal-of-the-day websites receive online offers and invitations in postal mail, email and social networks. Making use of the group buying methodology a minimum and maximum volume of deals are set for sale. Daily deal sites are extending their products rapidly from restaurant and bars, tourism-related services, education services, health and fitness services, medical services, salon and spa even to fancy tasting menus and other luxury offerings as well [21]. They provide ideal environment for us to look into the issues of product variety. It has been widely known that a few best-selling products have been dominant in many markets. 80/20 rule called as “Pareto principle” is often used to describe this phenomenon of sales concentration in the electronic commerce. However, Chris Anderson publicized the term “Long Tail effect” that niche products will explain higher market share due to the introduction of the Internet [1]. However, not much has been revealed about the product variety and its impact on the sales concentration with online daily deals.

Our purpose of carrying out this study is to test empirically if they have “Long Tail” in the online daily deal site both from the viewpoint of product and customer. The industry has quickly grown up and shown the representative of getting matured in a short

time period. In this article, tests for product and customer variety have been performed with an analysis of micro-transactional data which was received from a Groupon-like daily deal site. The results show the long tail pattern aligned with the previous research on the e-commerce literature on the long tail. We find that the notification setting on email or SMS about daily deal influences the patterns of sales concentration.

The remainder of this article is organized as follows. Section 2 presents a literature review related with online daily deals and product variety. Section 3 describes the research design and hypotheses. Section 4 presents models and interprets the results, and Section 5 discusses about the empirical results.

2. Literature Review

80/20 principle has been long referred by the economics and marketing literatures referring the literature of Pareto [19]. With the adoption of the Internet, the Long Tail effect has generated widespread interest in academic arena. Mass customization on top of the Internet infrastructure is expected to explain these changes of product concentration. Search costs are lower for popular products than for niches, which may lessen the Long Tail effect. Chevalier and Goolsbee look into the online book sales and Elberse and Oberholzer-Gee study the distribution of aggregate-level video sales [9, 14]. They find that

the number of less-popular products that sell only a few copies a week has increased. Brynjolfsson et al., present supply and the demand-side factors that may drive the Long Tail effect [4, 5]. Meanwhile Elberse and Oberholzer-Gee empirically show that online retailing has demand move toward the tail of the distribution [14]. Little research empirically deals with the impact of product customer variety on the sales concentration except for Tan and Netessine [20]. Literature on daily deal industry is limited as the industry is relatively young. A survey study of small businesses partnering Groupon is performed in the research of Dholakia [12]. A couple of analytical models with descriptive statistics to explain the daily deal economics and marketing strategy are presented [8, 13, 17]. Han et al., raise the issues of revelation of personal information when customers provide online service provides with their personal information that may be misused for other purposes [16]. Our paper complements previous research and differentiates itself by using micro-transaction data for almost a year and by focusing on the effect of email and SMS preference on the concentration of product sales in daily deal industry.

3. Research Design and Hypotheses

The company we study used to be one of

the global top 5 daily deal sites. It sells wide range of services from restaurant, café, health-care, and so forth. All of the products are sold exclusively through the company's website and mobile web. The products for mobile web are differentiated from the ones for web site in that the coupons through mobile web are limited to the daily use only and account for a negligible percentage of overall sales during the period we examined. This limits our study to the Internet channel.

We formulate our hypotheses on how varied products and customers are in the daily deal industry and how the preference on email or SMS notification can lead to changes in the purchasing patterns of consumers. Previous literature pointed out that Internet channel exhibits a significantly less concentrated sales distribution when compared with traditional channels [5].

H1 : Daily deal site exhibits a less concentrated distribution of product sales.

For the viewpoint of customer, the same type of hypothesis can be presented.

H2 : Daily deal site exhibits a less concentrated distribution of customer purchase.

Additionally, general models of electronic word of mouth in the marketing predict that consumers have more information with the infrastructure of email and SMS to improve

their purchasing decisions [10, 11]. Each of the email and SMS notification preference may affect the sales pattern of the Internet channel in different ways. On one hand, consumers are notified about the daily deal with the time gaps between email and SMS. The consumers with the SMS notification option can react more spontaneously than the ones with email option. On the other hand, consumers with the email option may be likely to purchase in case they open the mail to choose to read the mail of which the content they are interested in. We hypothesize that the preference of email and SMS should lead to a sales pattern with more weight on niche products.

H3 : Demand-side factors, such as the preference on email/SMS notification, have a positive effect on the sales of niche products on the Internet.

4. Data and Model

We use a dataset consisting of online daily deals which vary from restaurant to beauty and spa. By analyzing the transactional dataset the company provided, we first calculate the aggregate sales for each of the 3,096 products in each channel between May 2010 and May 2011. The list price of deals ranges from 0 to 1 million KRW (equivalent to approximately US\$1,000) and averages 69,500 KRW

(approximately US\$70). Discount Rate represents the discount rate and varies widely from 0% to 99%. Deals are classified into categories afterwards. Restaurants account for the largest category with 37%. Beauty and spa have 18%, followed by exhibition with 12%, café with 9%, bar with 8%, travel with 6%, and the remaining categories with 10%.

We present models with the order of analyses for distribution of product sales and customer purchase and Influence of the preference of email and SMS notification.

We use the Lorenz curve and Gini coefficient to study the concentration of product sales. <Figure 1> presents the Lorenz curve of product sales and customer purchase.

$$\ln(\text{Sales}_j) = \beta_0 + \beta_1 \ln(\text{Sales Rank}_j) + \varepsilon_j \quad (1)$$

$$\ln(\text{Sales}_j) = \beta_0 + \beta_1 \ln(\text{Purchase Rank}_j) + \varepsilon_j \quad (2)$$

The Sales Rank is an ordinal ranking of the frequency with which each product item was purchased, and the log linear curve described by the equation (1) is known as a Pareto curve. Previous research has shown that it fits the relationship between product sales and sales rank very well [3, 5, 19]. With this equation, β_1 measures how quickly product or customer j 's demand decreases as the sales rank increases.

In addition, we estimate a negative binomial regression model to understand how the preference on email or SMS notification can

lead to changes in the purchasing patterns of consumers. We estimate the following equation :

$$f(y_i|X_i) = \frac{e^{-\mu_i} \mu_i^{y_i}}{y_i!}, y_i = 0, 1, 2, 3, \dots, \quad (3)$$

where y_i is the unit sales of total, the bottom 40%, 50% and 60% of products, X_i is a vector of explanatory variables, $E(y_i | X_i) = \mu_i = \exp(X_i\beta + \varepsilon_i)$ is the conditional mean, and ε_i is the unobserved heterogeneity that follows a log-gamma distribution. Bottom 40% of product represents the niche product comparatively. We have purchase rank variable (in natural logs) and binary dummy variables for the email and SMS preference.

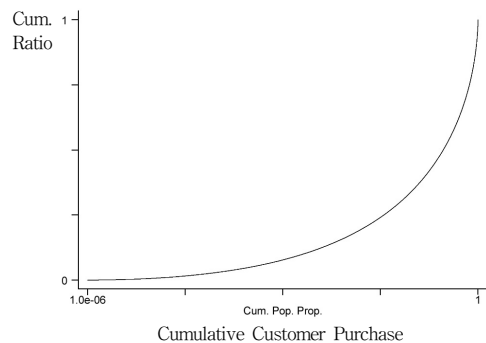
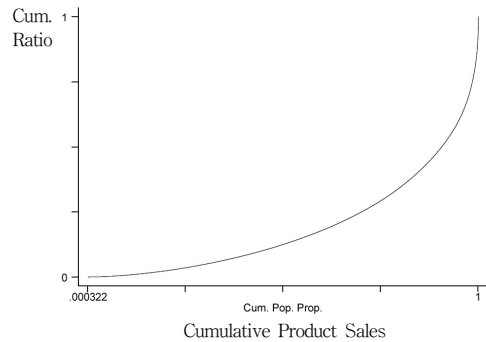
5. Results

5.1 Distribution of Product Sales and Customer Purchase

The Gini coefficient of the cumulative product sales is 0.65. From the Lorenz curve, we can obtain the fact that the bottom 80% products generate 34.6% of sales. For customer purchase, the Gini coefficient is 0.66 and the bottom 80% customers explain 29.9%. Using the Lorenz curve and Gini coefficient, we have shown that daily deal industry has longer tail than 80/20 principle. We then fit the sales and sales rank data to the following log-linear relationship and compare the Sales

Rank coefficient obtained when using data as the Lorenz curve and Gini coefficient have limitation to conclude if such a difference is statistically significant.

We first estimate the equation (1) or (2) separately both from the view point of product and customer data and report both sets of findings in Models 1 and 2 of <Table 1>. Both coefficients are highly significant. The β_1 coefficient is -1.035 for the product data and -1.267 for the catalog data. Based on the results of Lorenz curve analysis and regressions, we are not able to reject H1 and H2 respectively in that the top 20% products generate 65.4% of sales and the



<Figure 1> Lorenz Curve of Product Sales and Customer Purchase

top 20% customers explain 70.1%. Furthermore, the coefficients for *Sales Rank* and *Purchase Rank* both models are statistically significantly negative.

<Table 1> Pareto Curve Estimation

	Model 1 : Product Sales	Model 2 : Customer Purchase
Constant	24.008*** (0.070)	26.943*** (0.009)
Sales Rank	-1.035*** (0.010)	
Purchase Rank		-1.267*** (0.001)
Adjusted R ²	0.782	0.790
Sample size	3,096	947,931

Notes : Models 1 and 2 present the coefficients from the equation (1) and (2) estimated using ordinary least squares (OLS). The dependent variable is the logged amount of sales. Standard errors are in parentheses.

p < 0.05; *p < 0.01.

5.2 Influence of the Preference on Email and SMS Notification

The findings for the influence of the preference on email and SMS notification are presented in <Table 2>.

With the result from the model 2, we cannot help rejecting H3 partly as the influences across the models above are found to be inconsistent. However, the notable point in the <Table 2> is that the coefficient for email and SMS vary across the models. The coefficients of both email and SMS in the pooled data are positive and statistically significant. This indicates that the preference to turn on email and SMS notification influence the sales of total products positively. However, for 40% from the bottom products, the coefficient

<Table 2> Influence of the Preference of Email and SMS Notification

	Model 1 : Pooled data	Model 2 : 40% from the bottom	Model 3 : 50% from the bottom	Model 4 : 60% from the bottom
Constant	8.178*** (0.009)	1.572*** (0.010)	2.279*** (0.009)	3.025*** (0.008)
Purchase Rank	-0.565*** (0.001)	-0.099*** (0.001)	-0.148*** (0.001)	-0.200*** (0.001)
email (on = 1, off = 0)	0.004*** (0.002)	-0.006*** (0.002)	0.000 (0.002)	0.001 (0.002)
SMS (on = 1, off = 0)	0.038*** (0.002)	0.001 (0.002)	0.003 (0.002)	0.006*** (0.002)
Pseudo R ²	0.136	0.006	0.015	0.027
Sample size	975,602	975,602	975,602	975,602

Notes : Models 1, 2, 3 and 4 present the coefficients from the equation (3) estimated using negative binomial regression. The dependent variable is the units sales of the bottom x% of products, where x varies across the four models. Standard errors are in parentheses. **p < 0.05; ***p < 0.01.

of email preference is statistically significant and negative while for 60% from the bottom products, the coefficient of SMS preference is statistically significant and positive.

6. Discussions

This study begins by analyzing the unique transactional data set of which the company has grown with a few people to hundreds of employees within a year. It can be said that the company accounts for a substantial share of the fast growing daily deal industry. Our empirical results show that the long tail pattern in daily deal industry aligned with the previous research on the long tail. The results for email and SMS notification preference can be interpreted as both email and SMS preferences are positive on the sales of overall product. However, the consumers' option of email notification leads to decreased sales of niche products while the SMS notification option effectively lead to increase sales of overall products. We find that the notification setting on email or SMS about daily deal influences the patterns of sales concentration. The information through email and SMS is expected to enable consumers to know about daily bargains and purchase the coupons eventually. However, the email notification for niche products results in the

decreased sales while the SMS notification for overall product promotes overall products. This may represent that consumers are likely to screen the niche products which do not fit their interest with the email notification or the consumers who receive emails may react to superstar products rather than niche products.

There exist a number of other directions where this study could be extended. First, the data analysis can be expanded to measure alternative methods that have been explored in other empirical research [5, 20]. Second, the extension to draw the managerial implications may well be explored. For instance, what other kinds of the customization factors influence the niche product sales? Customization for preferred region may lead consumers to take a look at the niche product description. Another point regarding consumers' inception to the web channel is that daily deal sales can be driven by other media than email or SMS such as portal web site, TV and street signboard advertising.

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