The Effect of Promotion Integration Strategy on Sales Performance in the Context of Multiple Platforms: Considering the Moderating Effect of Platform's Market Demand

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Abstract

Price and promotion strategy have been widely discussed in multichannel retailing, but little study was focused on the promotion strategy in the context of multiple platforms. Through transaction data from a company's different platforms, our study investigated the impact of promotion integration strategy on company's overall sales performance on different platforms. Combined with platform's index data about product market demand, the moderating effect of platform's market demand was further evaluated. Using a fixed-effect model, our research found the positive effect of promotion timing integration and the negative effect of promotion depth integration on sales performance. We also found the moderating effect of platform's market demand. Thus, our study generates important theoretical and practical implications for managing promotion activity on multiple platforms.

1. Introduction

Nowadays, in order to get higher online market share, more and more companies sell products through more than one platform. On these multiple platforms, companies always do a lot of promotion activity by using the platform's various functions. Researchers suggested that there exists both synergy and cannibalization effect among multiple platforms [8, 11]. Thus, it is crucial for companies to manage multiple platforms' promotion activity. Existing studies have discussed about the price and promotion strategy in multichannel retailing. Most of them suggested for the promotion integration strategy, which is defined as providing consistent price discount in the various channels simultaneously [16]. But some scholars have opposite opinion, such as [4] and [13]. That research has made contribution about promotion

management in multichannel retailing. However, different channels have varied cost structural [23], which leads to the difference among each channel's promotion decision. But in the context of multiple platforms, such differentiation would be smaller. Moreover, customers can search and compare product and price information with lower costs in the context of multiple platforms than in multichannel retailing. Thus, due to the lower information asymmetry, the conclusion from multichannel retailing may not be suitable in the context of multiple platforms. Therefore, this study aims to investigate how to manage multiple platforms' promotion activity.

Marketing researchers revealed that promotion decision involves two aspects, which includes promotion depth and promotion frequency [9]. For retailers who enter multiple platforms, they must decide the extent of promotion depth integration and promotion timing integration. The former refers to the similarity of different platforms' discount rates for the same product, while the latter stands for whether retailers implement the promotion activity simultaneously in the different platforms. Hence, this study echoes the call of scholars [14] to investigate whether the promotion integration strategy (i.e., promotion depth integration and promotion timing integration) would influence company's overall sales performance on multiple platforms.

Moreover, existing literature suggested that the market environment would influence the effectiveness of company's business strategy [25]. Researchers have demonstrated that some contingency factors would moderate the effect of integration strategy, such as firm characteristic, consumer characteristic and product characteristic [5, 6, 7, 10, 16]. However, those studies ignored the platform's influence. Cross-side network effect have been emphasized on online platform, which refers to the effect that users on each side of the market benefit from the number of users on the other side and that demand is the driving force for user participation

[12, 18]. Hence, in the condition of high product market demand, there would exist more competing sellers on the platform, which further influence focal company's strategy effectiveness. However, there is limited study examining how platform's market demand influence the effectiveness of company's integration strategy [21]. Therefore, this study aims to bridge this gap by examining whether the platform's market demand relieve or magnify the impact of focal company's promotion integration strategy.

With the transaction data from a Chinese company who has stores on two online platforms, the current study investigated the impact of promotion depth integration and promotion timing integration on sales performance. Further, combined with the platform's product market demand index data, we evaluated how platform's market demand moderate the effect of promotion integration strategy. Our research employed a SKU (stock keeping unit) level fixed-effect model to generate several important findings. First, promotion timing integration can positively enhance sales performance. Second, promotion depth integration would negatively influence sales performance. Third, the enhancing effect of promotion timing integration on sales performance was weakened by higher platform's market demand.

Thus, this study contributes to the extant literature in the following ways. First, although the price and promotion strategy in multichannel retailing has been widely discussed, researchers did not focus on the context of multiple platforms. Second, we investigated the moderating role of platform's market demand on the influence of promotion integration strategy, which can contribute to our understanding of why the platform's market environment should be considered when making firm strategy. Finally, our study provides practitioners with valuable insights about how to manage the promotion activity on multiple platforms.

We first review the related literature and then present the hypotheses. Then based on our analysis and findings, we would explain the results and propose several future research directions.

2. Literature review

The price and promotion management in multichannel retailing has received much attention by scholars [14]. Most researchers support for the channel integration strategy [2, 15, 19], which is defined as providing consistent information and integrated functions for customers in different channels [10]. For example, [15] demonstrated that providing consistent product and price information in varied channels can improve the information quality and customer's perceived value. Moreover, other scholars have diverse opinions about multichannel promotion management. For example, [23]

suggested that it is possible for multichannel retailers to charge different price for customers in varied channels. Moreover, [4] pointed out that when the promotion is differed in terms of price discount and frequency, it would lead to the higher total sales. Nevertheless, [13] did not find significant effect of the consistent price on customer's channel choice.

That research has made contribution to the multichannel promotion management, but the focus is on the relationship of online, offline and other channels, such as catalog. Researchers suggested that different cost structural in varied channels would lead to the obvious differences among each channel's maximum promotion depth [23]. However, among multiple platforms, the difference about maximum promotion depth in varied platforms would be smaller. Moreover, in the context of multiple platforms, customers can easily get product information from various platforms. But such comparison and switching behavior incurs high cost in multichannel retailing. Hence, the information asymmetry is lower in the context of multiple platforms and the results of multichannel retailing may not be applicable.

In addition, firm's strategy may not always be effective in each situation [25]. Researchers also pinpointed out that it is important to investigate the contextual factors that influence the effectiveness of integration strategy [21]. Although some studies have found the effect of firm's characteristic, such as firm's experience in online and offline channels [5], human resource capability [16], consumer's characteristic, such as shopping experience [7, 10] and product type [6], little study has investigated the platform's influence. Existing researchers have revealed the cross-side network effect on platform [18], which reflects that users on one side would influence the growth of the other side [20]. Hence, customer's demand on the platform would drive more sellers to participate in the platform's competition [12], which may further influence focal company's strategy effectiveness. Although the effect of channel integration strategy has been demonstrated by a lot of scholars, it is still unclear about how it works in varied levels of platform's market demand. Therefore, this study tends to examine the moderating effect of platform's market demand on the relationship between promotion integration strategy and sales performance.

3. Hypotheses

3.1. The relationship between promotion timing integration and sales performance

Promotion timing integration refers to company's practice to implement promotion activity on varied platforms simultaneously. Existing studies suggested that integrated marketing communication can enhance

customer's positive attitude toward the retailer [17]. In the context of online platform, company needs to implement a lot of promotion and advertising activity to attract customers and get higher Internet traffic. If company provides promotion activity in different platforms simultaneously, it would increase the company's exposure toward customers. Such repeated exposure can increase customer's awareness about the company and its offerings [1, 11], which can further increase customer's likelihood to purchase in the focal company. Therefore, we hypotheses that:

H1. *Promotion timing integration is positively related with sales performance.*

3.2. The relationship between promotion depth integration and sales performance

Promotion depth integration refers to company's practice to maintain consistent promotion depth on varied platforms. Although researchers suggested that inconsistent price information might increase customer's uncertainty and confusion toward the product and seller [15], in the context of multiple platforms, promotion depth integration might negatively relate with sales performance. Because different platforms have their unique characteristic, which is reflected by platform's operation style, consumers' preference and rivals' competitive strategy. Although price reduction is a useful way for company to attract customers and compete with rivals [22], if company remains consistent level of price reduction, it may limit the company's attractiveness and competitiveness on the multiple platforms [3]. Therefore, we hypotheses that:

H2. *Promotion depth integration is negatively related with sales performance.*

3.3. The moderating effect of platform's market demand on promotion integration strategy and sales performance

According to the cross-side network effect, the higher platform's market demand would drive more competitors to enter platform's competition [12], which can further increase product and service choices for customers. Although doing promotion activity simultaneously on varied platforms can increase customer's brand awareness, it may have limited effect on enhancing company's attractiveness to customers. In the condition of high platform market demand, the increased number of competitors and alternative offerings might decrease focal company's attractiveness, which thus lead to lower sales performance. Moreover, due to the limited competitiveness from company's promotion depth integration practice, in the condition of high market demand, alternatives' attractiveness would further magnify the negative effect of promotion depth integration. Hence, we suggest that:

H3a. *Platform's market demand would negatively moderate the relationship between focal company's promotion timing integration and sales performance.*

H3b. *Platform's market demand would positively moderate the relationship between focal company's promotion depth integration and sales performance.*

4. Methods and results

4.1. Data description

We have transaction data from a Chinese company during the period from January 2017 to December 2017. This company was founded in 2000, who mainly sells the melon seeds through both online and offline channels. In the online channel, the company sells product mainly through two online platforms (TMALL.COM and JD.COM). These two platforms differ in terms of operation pattern, competition and consumer preference. TMALL.COM operates like "shopping mall", where exists large number of sellers who can individually manage their own stores and sell the products by using platform's function. While JD.COM combines the operation way of "supermarket" and "shopping mall". For the "supermarket" way, JD.COM purchases products firstly and then sells and deliveries products to consumers. On this platform, "supermarket" is the dominant way and the platform has multiple own warehouses in order to provide quick delivery services to customers. Hence, TMALL.COM exists more competitors and alternative products than JD.COM. Moreover, consumers always purchase for the low-price products in TMALL.COM, such as clothes, foods and cosmetics, but prefer to purchase for high-price products in JD.COM, such as electronic equipment and household appliance.

This company has their own stores in these two platforms and the sales from their own stores covers most of their entire online sales. In order to improve the sales performance, company always do a lot of promotion activities. For managing the promotion activity, marketing manager who takes charge of the one platform should plan the promotion activity in advance and get approval from the general manager. Their most common promotion way is price discount. By using platform's price discount function, the discounted products' website page would display the discount information.

Table 1. Description statistics about business on two platforms

Variable	TMALL.COM	JD.COM
Total order number	17336	19564
Average order price	23.21 (s.e.: 11.28)	30.85 (s.e.: 6.40)
Average number of SKUs on promotion per week	3.83 (s.e.: 3.15)	14.33 (s.e.: 8.84)
Average percentage of price discount per week	17.04% (s.e.: 0.1270)	17.84% (s.e.: 0.1089)

The source data consist of 36900 records from two main platforms of the company. And Table 1 shows the basic information about company's business on these two platforms. Each record corresponds to one purchase order and fulfillment, which contains the transaction time, SKU name, the order volume of the SKU, the original price and transaction price for the SKU and other consumer demographic information. Given the diversity of its products, our analysis includes 10 SKUs which belongs to one product category (melon seeds) but with varied sizes and tastes. Because our data is based on transaction records, we aggregate the transactions at the SKU level in each week. Due to the existence of some time periods without any transactions on two platforms, the final aggregated data includes 301 observations. Moreover, for the variable of platform market demand, we have the platform's transaction quantity index about melon seeds in TMALL.COM. We also have the mainly 10 competitor's transaction volume data in each day in TMALL.COM and JD.COM, which are used as control variables in our study. The measurements of all the variables are listed in Table 2.

Table 2. Measurements of all variables

Notation	Variable	Definition	Measurements
$Lnsales_{m,t}$	Product sales quantity	Logarithm of SKU m's sales quantity in two platforms in week t	LN ($sales\ quantity_{m,i,t} + sales\ quantity_{m,j,t}$)
$prom\_depth\_integ_{m,t}$	Promotion depth integration	The similarity of SKU's discount rate in two platforms in week t, the discount rate is calculated as the difference between original price of SKU minus transaction price of SKU, divided by the original price of SKU	$|dis\_rate_{m,i,t} - dis\_rate_{m,j,t}|*(-1)$
$prom\_tim\_integ_{m,t}$	Promotion timing integration	The percentage of days that two platforms have promotion simultaneously in week t, divided by the total number of promotion days in two platforms	
$compet\_sales_{i/j,t}$	Competitor's sales quantity	Competitor's sales quantity in platform i/j in week t	$\sum_{n=1}^{n=10} competitor\ sales\ quantity_{n,i,t}$
pre_sales_m	Previous week's sales quantity	SKU m's previous week' sales quantity in two platforms	
$festival_t$	Festival	Whether the week t has a traditional or business festival day	If week t has a traditional or business festival day, $festival_t$=1, else =0
$month\_dumy_t$	Month	Each month is defined as the dummy variable	11 dummy variables for each month

4.2 Model specification

We developed a fixed-effect model at the SKU-week level to analyze the longitudinal dataset because the result of the Hausman test that we ran suggested that estimates of the fixed-effect model are consistent, while the estimates of random-effect model are not. Hence, we specified the following two fixed-effect models:

$$
\begin{aligned}
Lnsales_{m,t} = \ & \alpha_m + \beta_1 prom\_depth\_integ_{m,t} \\
& + \beta_2 prom\_tim\_integ_{m,t} \\
& + \beta_3 market\_demand_t \\
& + \beta_4 pre\_sales_m \\
& + \beta_6 compet\_sales_{i,t} \\
& + \beta_7 compet\_sales_{j,t} \\
& + \beta_8 festival_t \\
& + \beta_9 month\_dumy_t \\
& + \varepsilon_{m,t} \qquad (1)
\end{aligned}
$$

$$
\begin{aligned}
Lnsales_{m,t} = \ & \alpha_m + \beta_1 prom\_depth\_integ_{m,t} \\
& + \beta_2 prom\_tim\_integ_{m,t} \\
& + \beta_3 market\_demand_t \\
& + \beta_4 prom\_depth\_integ_{m,t} \\
& \quad \times market\_demand_t \\
& + \beta_5 prom\_tim\_integ_{m,t} \\
& \quad \times market\_demand_t \\
& + \beta_6 pre\_sales_m \\
& + \beta_7 compet\_sales_{i,t} \\
& + \beta_8 compet\_sales_{j,t} \\
& + \beta_9 festival_t \\
& + \beta_{10} month\_dumy_t \\
& + \varepsilon_{m,t} \qquad (2)
\end{aligned}
$$

The only difference between the model 1 and model 2 is that model 2 adds an interaction term between two dimension of promotion integration strategy and platform's market demand, which tests the moderating effect proposed in our hypotheses.

4.3. Heteroscedasticity, serial correlation, multicollinearity

To check for serial correlation, we used Wooldridge test to examine whether there is first order serial correlation. The results indicated the presence of first-order autocorrelation in our panel dataset ($F(1,3) = 66.473$, $p < 0.000$). To check for heteroscedasticity, we performed the Wald test to examine whether the errors are homoscedastic. The result indicates the presence of heteroscedasticity (($\chi^2 = 242.88$, $p < 0.000$). These two issues suggest for using the fixed-effect model with robust standard errors [24]. We also checked for multicollinearity, the highest variance inflation factor is 3.25, which is below the threshold of 10. Moreover, the correlation analysis showed in Table 3 represents that the correlation between variables is satisfied. Hence, these results indicate that multicollinearity is not a major concern in our study.

Table 3 Correlation analysis

Variable	Mean	S. D	1	2	3	4	5	6	7	8
Product sales quantity	147.76	419.37	1							
Promotion depth integration	-0.16	0.15	-0.48	1						
Promotion timing integration	0.14	0.27	0.51	-0.11	1					
Platform's market demand	49134.94	10834.47	0.16	-0.22	0.09	1				
Previous sales	146.74	419.65	0.70	-0.38	0.44	0.16	1			
Competitor's sales quantity in TMALL.COM	103577.6	299286.5	0.16	-0.12	0.13	0.07	0.21	1		
Competitor's sales quantity in JD.COM	25383.6	46564.99	0.00	0.03	-0.02	0.07	0.02	0.13	1	
Festival	--	--	0.05	-0.04	0.02	0.04	0.04	0.13	-0.25	1

4.4. Results

Table 4 presents the fixed-effect regression results for all variables with robust standard errors and the dependent variable is the SKU's sales quantity on two platforms. The results show that promotion timing integration is positively related with sales quantity on two platforms (β=0.65, p<0.000). Thus, H1 was supported. Promotion depth integration is negatively related with sales quantity on two platforms (β=-0.72, p<0.000), which supports H2. Furthermore, the platform's market demand negatively moderates the relationship between promotion timing integration and SKU's sales quantity on two platforms (β=-1.93, p<0.01), which support for H3a. But the moderating effect of platform's market demand does not significantly influence the relationship

between promotion depth integration and SKU's sales quantity on two platforms (β=0.28, p=0.36). Therefore, H3b was not supported.

4.5. Robustness check

In order to check the robustness of our estimation, several alternative measurements are compared. First, we use the sales amount as the alternative way to measure sales performance and obtained the same substantive findings. Second, we use the absolute price discounts to represent for promotion depth, which provide inferior results. Moreover, we aggregate the transaction data at each SKU's month level, which gives similar results.

Table 4 Results of fixed-effect model with robust standard errors

Dependent variable: Product sales quantity	Model 1	Model 2	Model 3	Model 4
Promotion timing integration	0.65*** (6.46)	0.65***(6.50)	21.20 ** (4.01)	21.60** (4.16)
Promotion depth integration	-0.72*** (-8.95)	-0.95 (-0.24)	-0.75*** (-10.64)	-3.78 (-1.22)
Platform market demand	0.83 (1.07)	0.84 (1.27)	0.40 (0.52)	0.53 (0.82)
Promotion depth integration * Platform market demand		0.02 (0.06)		0.28 (0.96)
Promotion timing integration * Platform market demand			-1.89 **(-3.89)	-1.93** (-4.04)
Previous week's sales quantity	0.20*** (5.93)	0.20*** (6.55)	0.17 **(4.49)	0.17*** (4.86)
Competitor's sales volume in TAMLL.COM	-0.05 (-1.09)	-0.05 (-1.04)	-0.06 (-1.38)	-0.06 (-1.3)
Competitor's sales volume in JD.COM	0.28 (1.44)	0.28 (1.45)	0.31 (1.71)	0.31 (1.71)
Festival	0.26 (1.46)	0.26 (1.55)	0.36 (1.68)	0.37 (1.76)
_cons	-8.85 (-0.94)	-8.97 (-1.11)	-4.29 (-0.47)	-5.74 (-0.72)
SKU fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes
R-square	45.73%	45.73%	49.62%	49.70%

Notes: *sig at 0.05, **sig at 0.01, ***sig at 0.001.

5. Discussion

The current research has studied the impact of promotion integration strategy on sales performance and considered the moderating effect of platform's market demand in the context of multiple platforms. The results show that promotion timing integration is positively related with sales performance, which is consistent with most studies' viewpoint that channel integration strategy can lead to positive firm level outcome [5, 16].

However, deviating from most studies in multichannel retailing, promotion depth integration is negatively related with sales performance, which indicates the negative side of integration strategy. The above findings complement the knowledge gap about the promotion strategy on multiple platforms [14].

Moreover, our study also uncovered the role of platform's market demand. We demonstrated that high platform's market demand would negatively influence the effect of promotion timing integration. This result supplements our understanding about platform's influence

on the effectiveness of integration strategy [21]. But our study does not show the significant influence of platform's market demand on the effect of promotion depth integration. A possible explanation could be that when in the condition of high product demand, customers may engage in impulsive purchase and may not care about the nuanced differences in price and promotion in two platforms.

The findings of the current study also offer guidelines for managers to implement promotion activity on different platforms. Specifically, we suggest that providing promotion activity simultaneously on different platforms can lead to the synergy effect, which means that when company offers promotion simultaneously, the whole sales performance is greater than the simple sum of two platforms. But companies are supposed to decide the promotion depth according to consumer and platform's characteristics. Moreover, in the condition of high platform's market demand, the effect of promotion integration strategy is limited, thus companies should complement it with other marketing strategy.

We believe that our findings provide unique theoretical and practical insights about the effect of promotion integration strategy and platform's market demand. However, it still has some limitations that should be considered by future studies. First, the current study only provides the correlational results about the relationship between promotion integration strategy and sales performance. Future study can use field experiment to test for the causal effect of promotion integration strategy on sales. Second, due to the data limitation, we only focused on one company who sells nuts in China. Hence, the results of this study may not be appropriately generalized to other companies and industries. Future study can expand the sample size. Third, this study only considered the level of promotion depth and timing, future study can add in comparison of promotion type and company's deal support.

6. Reference

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