



Effects of Marketing Strategy and Green Supply Chain Management on Double Eleven Shopping Festival Under COVID-19: A Synergy Perspective

Jiayi Chen¹(✉), Hongmei Wang¹, and Mingnan Wang²

¹ School of Economics and Management, Beijing Jiaotong University, Beijing, China
cjyofficial@163.com

² School of Business and Management, Shanghai International Studies University, Shanghai, China

Abstract. The impacts of COVID-19 on supply chain system have been dramatic, reflecting that most supply chains both in China and across the world were insufficiently resilient when facing with multiple risks and changes in supply and demand. The pandemic itself and the strategies that organisations and firms have responded to it, provide opportunities to have an in-depth understanding of the supply chain management in China's context. Green supply chain management (GSCM) practices, integrating internal certification and external recovery strategies within the management process, may be the key to resolving the above problems. In this research, we first explored the strategies of marketing (e.g. price discount) in a special period, Double Eleven Shopping Festival which lasts from 1st November to 11th November. We selected JD as the online shopping platform for the reason that JD is one of the largest e-commerce platforms in China. Then, we tested the dependently and interdependently moderate effect of external GSCM practices (i.e. green recovery) and internal GSCM practices (e.g., green certification) and on the value of price promotion based on synergy theory. Using hierarchical regression, our results show that there is a positive relationship between discounts and sale changes. Both internal and external practices have a positive moderate effect on the value of marketing strategy. Furthermore, the internal and external GSCM practices are complementary in moderating the link between marketing strategy and firms' sales performance. There is an obvious boost of both demand and supply under the synergetic application of price discount strategies and GSCM practices even under the COVID-19 pandemic. These findings provide implications for Chinese organisations in how to respond to the disruptive challenges brought by COVID-19 by shifting their focus on GSCM practices.

Keywords: Marketing strategy · Green supply chain management · E-commerce shopping festival · Synergy theory

1 Introduction

The Double Eleven Shopping Festival in China was initially stemmed from the date of 11th November, which is known as Single's Day. Since 2009, large online retailers in China decided to provide price discounts on that day with the purpose of boosting sales [1]. Over the past decade, digital online shopping has become one of the most important lifestyles among Chinese and online shopping platforms such as Tabao, Tianmao and JD, have become the most frequently available resources for Chinese consumers. In 2019, Singles Day generated over 268.4 billion RMB [2], which is nearly 4 times of Black Friday and Cyber Monday in the US. However, due to the economic deterioration and global lockdown bring by COVID-19, the inefficient logistics system under the lockdown restrictions constrains the willingness of consumers to shop online [3]. Thus, to alleviate such negative effects, the ability to quickly increase the pools of supply side (e.g., supply chain resilience) [4] and the demand side (i.e. customer purchasing desire) [3] is important and necessary for the firms to boost sales during online shopping festival under epidemic.

To date, the role of green supply chain management practices has attracted much attention. Many companies have successfully improved their demand by conducting GSCM practices [5]. For example, Apple take green practices as part of marketing strategy to build green brand and attract much customers [6]. In addition, some research connect green practices with supply chain resilience and indicate that the recycled material and products can be considered as another supplier to cater high demand within uncertainty condition [7]. Such high demand and supply bring by green practices could directly prompt the development of online promotion [8]. Indeed, current literature has emphasize the internal green certification and external recovery play an important role in online shopping festival [9]. However, their conclusion is inconsistent. Thus, based on synergy theory [10], this study examines how GSCM practice (e.g. green recovery and green certification) can influence the effectiveness of price promotion during singles' day shopping festival.

The objective of this research is to present a comprehensive and integrated view of impacts of GSCM on marketing strategies in Chinese organisations by examining the business performance on a shopping festival in China. To be specific, this paper intends to answer the following questions.

- a. How price discount strategies influence the business performance during Double Eleven Shopping Festivals;
- b. What specific green initiatives interdependently moderate the relationship between marketing strategy and sales performance;
- c. How internal GSCM practices and external GSCM practices interdependently influence the effectiveness of marketing strategies and sales performance.

Based on the marketing strategy and green supply chain management literature and synergy theory, we posited the hypotheses of this study (see Fig. 1) and then examined them by analyzing the comprised of merchants and goods information in JD.com during the whole period of double eleven. The findings suggest that both pricing strategies and the application of GSCM within organisations are able to contribute to better performance

in market. These findings enrich the marketing and green supply chain management literature by indicating how the price promotion strategy increases the sales of products during online shopping festival within COVID-19, and external green practices (i.e. green recovery) and internal practices (e.g. green certification) can independently and interdependently moderate the value of price promotion based on the synergy theory. These findings also offer another reason for the firms to synergy marketing strategy and GSCM.

2 Theory Background

Synergy is the concept that the whole is greater than the sum of its parts [10]. Organizational units working together can accomplish more than these same units working alone [11]. When various parts of an organization are integrated together to produce a joint effect that is greater than the sum of the parts acting alone Synergy occurs [12], which has been well applied in firms’ innovation and multi-strategy build [10, 13]. For example, [14] observed that technology synergy is positively associated with new product performance. Also, Rahimi et al. (2016) point that firm integrate advantages about standard strategy and product development would reduce cost of product by large scale production that enhancing profitability [15, 16]. Due to the advantage of exploring the relationship between different strategies and organization initiatives, it’s suit to discovery the connection between marketing (e.g. price promotion) and green supply chain management (green recovery and green certification).

In fact, this theory also focused on the complicated correlations between interactions among business activities around internal and external of the company [10, 17]. Indeed, some research indicate internal green practices can make company cooperate with other supplier which request their supply chain members with green certification [18]. However, few of them focused on the correlation between internal and external green practices during e-commerce shopping festival. Thus, we further explored the internal synergy external green practices on price promotion value on commerce performance. The Fig. 1 below shows our research framework.

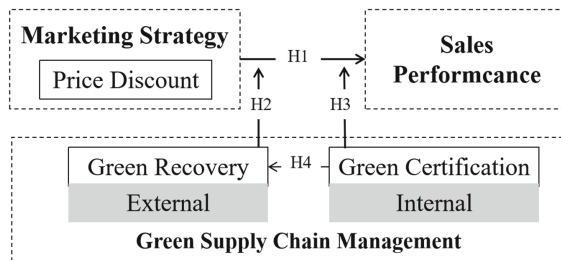


Fig. 1. Research Framework

3 Hypotheses

3.1 Marketing Strategy and Commerce Performance

Pricing strategy is a typical type of marketing strategy where the original price for a certain product or service is reduced with the purpose of maximizing sales. Retail platforms usually employ a variety of pricing strategies to attract and retain customers such as discount pricing, coupons, codes, pay one for two and lucky money [19]. The positive relationship between pricing strategy and sales, as well as consumers' purchase intention, has been widely researched and proved [19–21]. For example, Cuong, (2021) [21] found that the right type of pricing strategy helps to prevent more online users from abandoning their carts when browsing. And more importantly, discount prices are able to attract more first-time shoppers to try a new product or brand [22]. Thus, by lowering the original price to customers, pricing strategies are effective approach in attracting more potential customers, incentivizing purchase intentions and therefore promoting orders and sales growth. That is the major reason why a large number of online retail platforms are choosing pricing strategy as the essential approach to obtain market competitiveness [19]. In view of this, the following assumption is proposed:

H1: Marketing strategy can increase the sales performance during online shopping festival.

3.2 External Practices Synergy with Marketing Strategy

Green recovery is a commitment based on organisations' and firms' sustainability strategy to respond to climate change and environmental deterioration. It involves specific practices including reducing wastes at work, recycling materials for production and reusing those recycled products into supply chain to open a new life cycle, which provides a new choice to maintain high material and stock volume to meet supply shortage caused by marketing strategy [23]. Those recycled products emerged in market with lower prices and official certifications, have more attractions to customers not only for their lower prices, but also for their roles in improving sustainable development [24]. Hence, it is proposed that:

H2: External practices synergy with Marketing strategy can increase the sales performance during online shopping festival.

3.3 Internal Practices Synergy with Marketing Strategy

Environmental system certification (i.e. ISO 14000 family) requires a certificated recognition to comply with the various requirements for the implementation of environmental management system [25]. Companies with ISO14000 directly demonstrate the ability to take green practices, which improve consumers' trustworthiness of the company's green marketing strategy [26]. At the same time, employees and managers must complete professional training with an emphasis on cross-functional collaboration [27], and the experience of cooperation and communication across functions plays an important role in the success synergy of marketing strategy and GSCM in the whole organization [28]. Consequently, it is proposed that:

H3: Internal practices synergy with Marketing strategy can increase the sales performance during online shopping festival.

3.4 External Practices Synergy with Internal Practices

An effective supply chain management system cannot be achieved without the cooperation among various partners and departments within and outside organisations [9, 29]. Green recovery requires products be tracked in the whole reverse logistics [30], which needs effective communication and collaboration between different partners in the supply chain. However, globally identified certification such as ISO 14000 can provide support for simultaneously collaborated work based on a common basis [31]. The organisations that adopted ISO 14000 are able to attract more consumers who set high priority on making green purchases [32]. Therefore, the following assumption is supposed:

H4: The green certification positively moderates the relationship between green recovery and the value of marketing strategy on shopping festival.

4 Method

4.1 Data Collection

Kitchen appliances have become the hot choices for consumers recently due to the restrictions on physical-store shopping under the COVID pandemic. To empirically test the effect of marketing strategy (price promotion) on sale changes during the online shopping festival under COVID-19, JD.com was selected as the target platform. In China, JD.com (JD) is the top retail e-commerce platform. It is China's largest online retailer with a 16.3% market share in total online transactions. It is also one of China's tech giants with an annual profit of \$149.33 billion in 2021 [33]. In 2020, over one million retailers were providing their products and services on JD and the amount of transactions was about 271.5 billion RMB. However, from the JD platform, we could not know the implementation of the green initiatives of the individual companies, so we obtain information about the companies' green initiatives through search engines, such as Factiva. Our database, therefore, contains two parts: information about sales and products as well as marketing strategies of each retailer from the Jingdong platform, and firms' green initiatives data on each retailer obtained from search engines.

We collected the announcements of adoptions of GSCMS from Factiva because Factiva covers the most comprehensive global business news and publicly listed company announcements and Wisenews is a widely used and famous Chinese news database [34]. We use "recycled materials" as the key description for green recovery [35]. In addition, we use ISO 14001 as the proxy for Green Certification. Then we generate the dummy variables (e.g. green recovery and green certification) to measure whether adopt external or internal practices respectively.

We obtained sales-related data on JD's platform by data mining technology. The data set includes weekly data of hood from JD.com, which include products features (e.g., Sales increase, Price settings, Depth, Noise, Wind pressure, Material, Screen, Control method, Wifi, Gesture sensing), sales statistics and price data of the products

Table 1. The description of variables

Variables	Description
Dependent variable	
Sales increase	Sales change of product <i>i</i>
Independent variable	
Marketing strategy	Current price minus the baseline price of product <i>i</i>
Green certification	Dummy variables (1: product <i>i</i> belongs to firms adopt internal green initiatives and 0 = otherwise)
Green recovery	Dummy variables (1: product <i>i</i> belongs to firms adopt External green recovery and 0 = otherwise)
Control variables	
Price settings	Price segment of product <i>i</i> (1–17: One level represents 500 yuan)
Depth	the depth of the product <i>i</i>
Noise	Noise decibels for product <i>i</i>
Wind pressure	Maximum wind pressure for product <i>i</i>
Material	Dummy variables (0: the panel of product <i>i</i> are made of steel; 1: the panel of product <i>i</i> are made of glass; 2: the panel of product <i>i</i> with mix material; 3: the panel of product <i>i</i> with other material; 4: the panel of product <i>i</i> without announce material)
screen	Dummy variables (1: product <i>i</i> with screen; and 0 = otherwise)
control method	Dummy variables (1: product <i>i</i> with push button; 2: product with touch button; 3: product <i>i</i> with intelligent control; and 0 = otherwise)
wifi	Dummy variables (1: product <i>i</i> with wifi and 0 = otherwise)
Gesture sensing	Dummy variables (1: product <i>i</i> with gesture sensing and 0 = otherwise)

from November 4 to 18 (i.e. one week before and after Double Eleven). There are 896 products in our sample, the price of which can change over time. To obtain the average price of a product, we average its price within a specific period. Based on the product price, we derive the measure of price discount. We first computed the average price a week before the shock as baseline price for each product, and then computed the ratio of current price (i.e. average selling price a week after the shock) to baseline price as discount parameter. In addition, we calculated the change in sales of each product by subtracting the sales of the week before the event. A detailed description of all the adopted variables is provided in Table 1.

4.2 Hierarchical Regression Model

This study conducts the cross-sectional hierarchical regression analysis to examine the main effect of marketing strategy on firms' commerce performance during online shopping festivals, the independent moderating effect of internal and external green practices

(e.g., green certification and green recovery), and interdependent moderating roles of two kinds of green practices. The model is as follows [36]:

$$SI_i = \gamma + \beta_1 \cdot MS_i + \beta_2 \cdot MS_i \cdot IGP_i + \beta_3 \cdot MS_i \cdot EGP_i + \beta_4 \cdot MS_i \cdot EGP_i \cdot IGP_i + Z_i + \varepsilon_i \tag{1}$$

where *i* denotes a particular product, The variable MS_i and SI_i presenting the change of sales and price during online shopping festival. IGP_i and EGP_i are presenting the level of firm adoption green certification and green recovery. Z_i is a control vector that includes Sales increase, Price settings, Depth, Noise, Wind pressure, Material, screen, control method, wifi, Gesture sensing, and ε_{it} is the error term. In addition, all independent and moderator variables were mean centered to minimize the possibility of multicollinearity.

5 Result Analysis

5.1 Descriptive Results

We developed a Python-based web crawler to collect data from the JD.com platform store from November 4th to 18th in 2020 and finally obtained a 2-period panel data set. After removing missing and duplicate data, 896 data products are finally selected as the research sample. The statistical descriptions of the main variables are provided in Table 2. Before conducting hypothesis testing, we perform a correlation analysis of the variables, the correlation coefficients between the variables are less than 0.6, indicating that there is no potential multicollinearity between the variables.

Table 2. Descriptive Statistics (N = 896)

Variable	N	Mean	p50	SD	Min	Max	Range
Sales increase	896	388.3	21.5	1483	-1931	22599	24530
Price settings	896	3.83	3	2.566	1	17	16
Depth	896	418	428.5	127.7	0	985	985
Noise	896	51.62	55	19.31	0	78	78
Wind pressure	896	340.7	350	169.5	0	1060	1060
Material	896	1.183	1	0.583	0	4	4
Screen	896	0.012	0	0.11	0	1	1
Control method	896	1.75	2	0.503	0	3	3
Wifi	896	0.061	0	0.24	0	1	1
Gesture sensing	896	0.325	0	0.469	0	1	1
Marketing strategy	896	61.48	25.42	233.5	-1706	2036	3742
Green recovery	896	0.686	1	0.464	0	1	1
Green certification	896	0.735	1	0.441	0	1	1

5.2 Main Results

Table 3 presents the results for the effects of marketing strategy on sales increase followed by Eq. (1). In the first step, we inputted the control variables and the results are shown in column 1 of Table 3, where none of the control variables (i.e., Sales increase, Price settings, Depth, Noise, Wind pressure, Material, Screen, Control method, Wifi, Gesture sensing) were significantly related to sales increase, minimizing endogeneity issues that may arise through omitted variables bias. In the second step, we inputted the main effects of marketing strategy variables with the control variables. The marketing strategy coefficient is positive and significant ($\beta = 0.373$, $p < 0.01$). Hence, H1 was supported. Next, we inputted the two-way interaction terms to test the independent moderating roles of green recovery and green certification. As reported in column 3 and 4 of Table 3, we found that they all positively moderated the relationship between marketing strategy and sales increase, which was significant at the 5% level and 1% level respectively. Thus, H2 and H3 are supported. In the last step, we inputted the three-way interaction terms to test the interdependent moderating roles of green recovery and green certification.

Table 3. Regression test result

	1	2	3	4	5
VARIABLES	SI	SI	SI	SI	SI
MS		0.373***	0.252**	0.257**	0.174**
		-3.08	-2.51	-2.53	-2.12
GR			523.655***		459.091***
			-6.8		-6.46
MS*GR			0.407**		0.298**
			-2.25		-2.12
GC				451.796***	389.097***
				-6.81	-6.31
MS*GC				0.577***	0.392**
				-2.92	-2.54
GR*GC					628.051***
					-6.01
MS*GR*GC					0.624**
					-2.35
Control Variable	Yes	Yes	Yes	Yes	Yes
Constant	226.262	256.560*	149.72	-52.793	-161.375
	-0.96	-1.92	-1.16	(-0.41)	(-1.23)
Observations	896	896	896	896	896
R-squared	0.01	0.014	0.034	0.029	0.044

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Consistent with our hypothesis on the complementary role of green recovery and green certification in shaping the performance effects of marketing strategy, the three-way interaction was positively significant ($\beta = 0.624, p < 0.05$) and showed in column 5 of Table 3, hence, H4 was supported.

5.3 Robustness Test

We further used the method of seemingly unrelated regression (SUR) model to explore whether there are differences between groups (non-GSCM practices and GSCM practices) in magnitude and level of significance of the coefficient on the independent variable (e.g., Marketing strategy) in regression estimates. Compared with the traditional tests by using interaction terms, SUR method allows the error terms from different systems to be correlated. For our research, although the conditions of adopting green activities are different, the social and legal environment that companies faced may be similar, which likely caused error terms violate. Thus, we adopt the SUR method to confirm our main result. We follow the process posted by [37]. Firstly, we divide the total sample into four groups (i.e., green recovery and non-green recovery; green certification and non-green certification) according to the condition enterprises adopting green recycling and green certification initiatives and then use ordinary least squares to estimate model 2 as follows:

$$SI_i = \gamma + \beta_1 \cdot MS_i + Z_i + \varepsilon_i \tag{2}$$

where i denotes a particular product, and the variables MS_i and SI_i present the change of sales and price during an online shopping festival, Z_i is a control factor, and ε_{it} is the error term. Finally, we use SUR to test the differences of the coefficients of marketing strategy variables among the different groups.

Table 4. Robustness test result

	1	2	3	4
VARIABLES	Sales increase		Sales increase	
	Non-GR	GR	Non-GC	GC
MS	-0.06	0.404***	-0.025	0.417***
	-0.101	-0.136	-0.101	-0.138
Control Variable	YES	YES	YES	YES
Constant	75.675**	739.021**	40.923	360.104**
	-36.282	-310.501	-36.088	-161.827
Observations	281	615	237	659
R-squared	0.056	0.014	0.053	0.016
Chi2	7.65***		6.83***	

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Chi2 indicate the result of SUR-test for Marketing strategy coefficients difference.

The results are shown in Table 4. Columns (2) and (4) show that the coefficient of price discount is statistically significant ($\beta = 0.404$, $p < 0.01$; $\beta = 0.417$, $p < 0.01$), while it's not significant in columns (1) and (3). Then, we further used the SUR test to verify the difference in the coefficients between the groups (adopting GSCM practices and non-adopting GSCM practices). The chi2 results showed that the coefficients of marketing strategy between the green recovery and non-green recovery groups were significantly ($\text{chi}^2 = 7.65$, $p < 0.01$), and the result chi2 of 6.83 in the sales increase column for non-green certification versus green certification was also significant ($p < 0.01$), which indicates the groups of firms with green recycling and certification activities can influence the performance of price discount to the sales increase.

6 Discussion and Conclusions

6.1 Discussion

Consumers tend to perform various demands and behaviors as Single's Day Shopping Festival has developed for more than ten years in China [38]. Literature has provided in-depth understanding on the changes of consumers' behaviors under the COVID pandemic [39]. The pandemic may constrain consumers from shopping in physical stores while at the same time reduce consumption willingness online [39]. However, little evidence has been provided to support the argument that marketing strategies especially price promotion, may boost sales online during shopping festival. Thus, it is necessary to explore whether the marketing strategies still play an important role in singles' day carnival. Although current literature indicates green initiatives (e.g. green recovery and green certification) may play an important role in influencing consumers' perceptions and behaviors [40–42]. Its performance with marketing strategy is inconsistent, which makes it difficult to offer some guidelines for firms and relevant theoretical implications. Drawing on synergy theory, we examine how internal GSCM practices (e.g. green certification) and external GSCM practices (i.e. green recovery) independently and interdependently moderate the relationship between price discount and sales performance.

Our findings confirm that firms with marketing strategy and with sustainable concerns and green practices can indeed improve their sales in shopping festival [43]. As mentioned in our hypothesis, pricing strategy for a retailer which is performing under the framework of ISO 14000 is found to be positively related to sales increase [44–46]. Under this circumstance, people are easy to take impulsive purchasing behaviors though they are influenced by the low-income impact from the pandemic [3].

In addition, our findings generally support the propositions of synergy theory concerning the role of the integration between GSCM practices and marketing strategies [41]. Firstly, our results demonstrate that green recovery practices can be viewed as an embedded marketing strategy considered as another kind of price promotion behavior because they can reduce the cost of products, which can further increase consumer purchase intention in combination with price discounts. Also, green recovery behavior can be considered as another supplier which reduces the high supply uncertainty brought by marketing strategy. Secondly, green certification is a reliable green marketing strategy,

which can further stimulate the willingness of consumers to participate in online shopping festivals [47]. While companies with green certification can always obtain goods easily because they usually have a higher level of control in the network [48].

Finally, we identify a synergy relationship between internal and external GSCM practices in the value-realization process of marketing strategy [29]. These findings confirm that green recovery practices, as external practices, may have multiple raw material suppliers and need the support of green certification to reduce variability in business processes across recycling subsidiaries and promote cooperation between different companies [49].

6.2 Implication

This study makes several contributions to our understanding of the effect of green supply chain management practices on the performance of marketing strategy. First, this study expands the current discussion of marketing strategy to e-commerce on China's shopping festival. We discuss how the price promotion influences product sales under COVID-19, filling the gap of quantitative research on consumers' behaviours and business performance under the COVID pandemic. The second theoretical implication is to apply synergy theory to create interface between green practices and marketing strategy performance in especially scene (e.g. singles' day shopping festival under epidemic). Current research pointed out green practices may also influence the sales increase during shopping festival and they get inconsistent conclusions. Our research further considered green supply chain management practices synergy with marketing strategy and shows that both internal and external green practices can independently and interdependently moderate the value of marketing strategy in singles' day festival, which expanding the application of synergy theory.

This study also provides practical implications for firms to better cope with Double Eleven. Firstly, firms need to be aware that price promotion can stimulate impulsive purchase even in situations that customers are highly sensitive to marketing strategy. In addition, green practices directly enhance market performance, demonstrating the changing concerns of Chinese consumers. In China, more customers are willing to spend money to purchase recycled products due to increasing environmental consciousness. Chinese consumers have increased their concern on environment through demand for eco-friendly products and this movement for the environment has expanded across the country due to intensified awareness of living in a healthier way. Thus, those who apply sustainability solutions within and outside organisations are expected to achieve competitive advantage in the marketplace.

6.3 Limitation

These findings indicate that companies and organisations have embedded their green practices and sustainable management strategies within their marketing strategies with the purpose of maintaining competitive in the marketplace. However, this study also includes several limitations. Firstly, the number of products in shopping festivals is not large, although we collect the longitudinal data. In the process of data collection, we exclude samples with some missing data and information achieving Balanced Panel Data.

Future studies can further enlarge the sample size and focus on more kinds of products. Also, we mainly focus on kitchen appliance manufacturing firms. The limited sample size may hinder the overall examination of the impacts of green supply chain practices on online transactions. Finally, this research only considered green initiatives, however, other business strategies (e.g. differentiation strategy and cost leadership strategy) may also play an important role in the success of the online promotion, which needs to be further discussed.

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