



Indian Institute of Management Calcutta

Working Paper Series

WPS No 829 /June, 2019

**Pricing and Green Promotion Strategies of Firms
under Competition and Collaboration**

Arnab Adhikari

Assistant Professor, Operations Management Group, IIM Ranchi

Phone: 91-8017978829, Email: arnab.a@iimranchi.ac.in

Sumanta Basu*

Associate Professor, Operations Management Group, IIM Calcutta

Phone: 91-9051054433, Email: sumanta@iimcal.ac.in

*Corresponding Author

Balram Avittathur

Professor, Operations Management Group, IIM Calcutta

Phone: 91-9748784974, Email: balram@iimcal.ac.in

Indian Institute of Management Calcutta

Joka, D.H. Road

Kolkata 700104

URL: <http://facultylive.iimcal.ac.in/workingpapers>

Pricing and Green Promotion Strategies of Firms under Competition and Collaboration

Arnab Adhikari

Indian Institute of Management Ranchi

Sumanta Basu & Balram Avittathur

Indian Institute of Management Calcutta

Abstract

In recent times, there is a growing interest among firms to invest in 'green promotion' of their products. Green promotion has shown a positive impact on a firm's profitability. Our survey of existing literature reveals that there is an absence of analytical works that analyse the effect of green promotion on a firm's pricing and promotion decision. We propose a methodology on designing the pricing and promotion strategy of a firm under conventional promotion, green promotion, consumer's green sensitiveness, and product differentiation in a duopoly market. Here, we consider both competition and collaboration among the firms. Under different scenarios based on the promotion strategies selected by the firms, we determine equilibrium promotion intensity, price, and profit. In addition, we derive the criteria that explain the selection of one promotion strategy over others from the perspective of the firms'. Next, we perform a rigorous numerical analysis to exhibit the impact of product differentiation, consumer's green sensitiveness, and cost of promotion on a firm's equilibrium promotion intensity, price, and profit. Finally, we propose a framework to facilitate managerial decision-making regarding promotion strategy selection.

Keywords: Environmental-friendly Promotion, Pricing Strategy, Competition, Collaboration

Pricing and Green Promotion Strategies of Firms under Competition and Collaboration

Arnab Adhikari

Indian Institute of Management Ranchi

Sumanta Basu & Balram Avittathur

Indian Institute of Management Calcutta

1. Introduction

After the introduction of ISO 14001 series in 1996, firms are focussing on devising eco-friendly products and operations. Apart from regulatory pressure, consumers' rising awareness and inclination towards eco-friendly products act as a motivating factor for these organizations. According to a survey conducted by Natural Marketing Institute, 85% of USA consumers express a positive attitude towards green products (Bonnell, 2015). Firms use their promotion strategy through advertising or promotion campaigns to communicate the environmental friendliness associated with their product. It facilitates to build their eco-friendly image in the consumers' mind which, in turn, helps to increase the sale or to justify the price premium of their products. We define this focused promotion strategy as 'green promotion' strategy in line with previously used definitions in literature (Worthington, 2012). Timberland's "Earthkeeper" campaign (Nastu, 2008), Diesel clothing's advertising campaign "Global Warming Ready" (Macleod, 2007), BMW's super bowl ad "Diesel has ch-ch-changed,"¹ are some successful examples of firms' green promotion efforts. Green promotion has also shown a positive impact on an organization's revenue. In 2011, Patagonia, a fashion apparel manufacturer, launched an advertising campaign "Don't buy this product" to increase consumer awareness about the negative impact on the environment caused by one of its best-selling product fleece sweaters. Through its campaign, Patagonia suggests consumers purchase a used Patagonia product instead of a fleece sweater. It leaves a positive image in the market and the company's revenue increased by 30% in 2012, followed by another 6% rise in 2013 (Thangavelu, 2015).

However, some experts and scholars remain sceptical about the effectiveness of green promotion over conventional one from the perspective of a firm's profitability (Zinkhan and

¹ Retrieved from: https://www.greencarreports.com/news/1054930_super-bowl-ad-watch-bmw-says-diesel-has-ch-ch-changed. Accessed on 14th September, 2018.

Carlson, 1995; Do et al., 2012). Companies such as Diesel Clothing, Timberlake, Toyota and BMW incur significant cost while conducting green promotion through advertising on broadcast, print, and online media, and through promotional events (Kaplan, 2011; Warren, 2018). Green products also demand eco-friendly packaging, necessary product certification such as ISO-14000-02, and so on. Environmental-friendly content creation, superior advertising formats, graphic design, and other additional enhancements often result in a higher advertising expenditure under green promotion in comparison to the conventional promotion. Also, activities associated with green promotion events such as free distribution of the eco-friendly sample items or outsourcing to another company all the works related to promotion increase a firm's promotion cost.² If the green promotion strategy fails to generate sufficient demand or perceived value of the product, the firm's profitability is affected. According to a study conducted by Environment Leader group (Ribeiro, 2010), only 33% of the participant firms believe that adoption of green marketing or promotion strategies are very effective whereas 60% of the respondent firms express indifference to the green promotion strategies. Further, organizations with a higher marketing budget, spend merely 6% of their budget on the green promotion strategies whereas smaller firms exhibit higher inclination in investing in green promotion strategies. Also, price sensitiveness of consumers often acts as a hindrance for a firm to achieve desired success. For example, despite the substantial advertising activities, Clorox, a California based consumer product manufacturer, failed to generate significant revenue in case of their eco-friendly cleaning product 'Green Works.' In a similar line, Philips' environmentally friendly venture 'Earthlight CFL Lamp' was not very successful. According to experts, customers' reluctance to the high premium price of these products acts as an obstacle for the firms to achieve the desired success (Long, 2016).

In summary, a firm selling green products faces the dilemma of whether to invest in green promotion given the higher cost that it incurs vis-à-vis the additional revenue that it may potentially fetch through higher volume and product margin. Apart from demand, firms also consider other factors for selecting the green promotion strategy. Among these factors, product differentiation plays an important role in decision making because of its influence on price sensitivity. It is evident that the highly differentiated product of a firm results in lower substitutability, and thus leads to the firm's competitive edge along with high profitability without much promotional effort. Success stories of several organizations such as BMW, Nike,

² Retrieved from: <https://www.everything-environmental.co.uk/marketing.php>. Accessed on 14th September, 2018.

Samsung and Apple demonstrate this phenomenon.³ High conventional promotion budget for these companies may still be justified to acquire new customers by enhancing product perception. For example, BMW's advertising expenditure has increased by around 40% between the years 2012-2017.⁴ These counter-intuitive observations led us to investigate the interaction between two firms under competition (or collaboration) to identify equilibrium green promotion strategy followed by pricing.

This paper contributes to the existing literature by addressing the following research issues. First, it attempts to address the concern of finding an appropriate demand function that captures the influence of promotion intensity, price and product substitutability as perceived by the consumers. The second research question attempts to find the equilibrium promotion and pricing strategy of a firm considering green or conventional promotion, under competition. In recent times, joint ventures between competitors such as the partnership between General Motors and Honda, Ocean Spray and Tropicana, Nestle and Coca-Cola for environmental friendly business operation have attracted a lot of attention (Makower, 2014). Firms use this horizontal collaboration to attract more environmental conscious customers without incurring substantial significant promotion cost. Hence, our third research question studies the impact of collaborative green promotion on firm's decision related to promotion intensity and pricing. In all of these research questions, we investigate the impact of product differentiation and green sensitiveness of consumers on firms' decision making and consumer surplus. The fifth research question focuses on the devising the criteria that demonstrates when a promotion strategy will be preferred over other promotion strategies.

This article answers the first research question by developing a demand function that incorporates price and consumer awareness captured through firm's promotion intensity using a Hotelling model framework. Next it proposes an analytical model to answer the second and third research questions, devising the pricing and the promotion strategies of a firm. Here, we consider four scenarios based on the promotion strategies adopted by the firms: i) both the firms select conventional promotion, ii) one firm selects conventional promotion and other one selects green promotion, iii) both the firms select green promotion strategy, and iv) firms collaborate to design a joint green promotion strategy. For all scenarios, we determine equilibrium promotion intensity, price, and profit. In each of the above-mentioned cases, it

³ Retrieved from: <https://www.smallbusinessdecisions.com/increase-profits-by-focusing-on-your-differentiation-strategy/>. Accessed on 14th September, 2018.

⁴ Retrieved from: <https://www.statista.com/statistics/308877/bmw-advertising-spending-usa/>. Accessed on 14th September, 2018.

investigates the impact of consumer's green sensitiveness, and product differentiation on the decision variables. The comparative analysis of price, promotion intensity, and consumer surplus across scenarios addresses the final research question.

We perform a rigorous numerical analysis to highlight the impact of product differentiation, cost of promotion, and consumer's green sensitiveness on the equilibrium promotion intensity and price. The inter-dependency of equilibrium promotion intensity and price is analyzed for all scenarios. Here, we observe that product differentiation has an increasing effect on the equilibrium price, and promotion intensity under competition. On the contrary, collaboration demonstrates a contradictory (decreasing) impact of product differentiation. The cost of promotion exhibits a decreasing effect on the decision variables under competition whereas it shows an increasing impact when firms engage in collaboration. Consumer's green sensitiveness helps to increase the profit of the competing firm with green promotion through increasing and decreasing the equilibrium price and equilibrium promotion intensity, respectively. Here, the reduction in the promotion intensity facilitates firms to reduce the cost of promotion. Finally, based on the insights obtained from the mathematical model and the numerical analysis, we propose a framework to facilitate managerial decision making to select pricing/promotion strategy based on consumer's green sensitiveness, cost of green promotion, and by understanding the product differentiation.

The article is organized as follows. We present a summarized description of relevant scholarly works in Section 2. We demonstrate the proposed methodology in Section 3 to express equilibrium price and promotion intensity in different scenarios. In Section 4, we perform numerical analyses to exhibit the impact of firm, market and consumer specific parameters on a firm's decision variables. Also, we discuss the managerial insights. Finally, we conclude the article by discussing contributions and future research avenues in Section 5. Detailed proofs of all the propositions are presented in the Appendix.

2. Literature review

Existing literature relevant to our study can be classified into following two categories based on the perspectives of consumer and firm:

- (i) Analysing the impact of green promotion on consumer's decision making
- (ii) Designing a firm's pricing strategy under environmental friendliness

The first stream of literature mostly focuses on exploring activities under green promotion and the impact of green promotion on firm's pricing and consumers' purchase decision. Ginsberg and Bloom (2004) evaluate the impact of different environment-friendly business

policies launched by a firm on consumers' purchase decision and conclude green promotion to be the second most important policy to consider. Banerjee et al. (1995) suggest that the firms' main objective behind green promotion or advertising is to depict an environmental-friendly image among consumers. Further, our literature survey reveals that the scholars mostly focus on the impact of advertising under different types of promotion (Chan, 2004; Chan et al., 2006; Lee, 2010). In the context of China, Zhu and Sarkis (2016) extensively discuss the importance of green marketing and consumerism and their impact on sustainable consumption. A few other studies explore impact of other forms of promotion such as eco-labels (Chan, 2013; Murali et al., 2018), and environmental-friendly certification (Zhu et al., 2012). Chen and Chen (2018) discuss how scrap recycle enforcement can be converted to an effective policy tool in improving product design towards green product. From the perspective of green promotion effect on consumers, scholars (Xie and Kronrod, 2012; Matthes and Wonneberger, 2014) concluded that green advertising increased consumers' utility but also portrayed the expensive image of the products among consumers (Royne et al. 2012). While the existing literature primarily relies on empirical studies (Lee, 2010; Wang et al., 2013) to measure the impact of firm's promotion activities on consumers' purchase decisions, no analytical work has been found to understand firm's behaviours in this situation.

The second stream of existing scholarly works concentrates on designing pricing and coordination strategy taking environmental friendliness into account. Ghosh and Shah (2015) demonstrate how cost sharing contract can be useful to coordinate a dyadic supply chain in the presence of green-sensitive consumer demand. Xu et al. (2017) show how cost sharing contract and two-part tariff contract can coordinate a dyadic supply chain with green technology under cap-and-trade regulation. Xie and Wei (2009) show how advertising and pricing decisions can be coordinated under cooperative advertising in the context of a two-level manufacturer-retailer supply chain. Ding et al. (2015) design a pricing strategy for a dyadic supply chain, taking both collaborative production and government policy incentives into account. In a similar context, Hafezalkotob (2017) devises pricing strategy incorporating energy-saving objective under both competition and cooperation for two green supply chains and concludes that by applying an appropriate tariff mechanism, the government can achieve financial, social, and environmental objectives. Chen and Sheu (2017) design a non-differentiated pricing strategy for a retailer who sells both traditional and green product taking consumer's preference, risk aversion, and competition into account. They concluded that the differentiation between the prices of products did not yield in the best result from the perspective of pricing. On a similar problem context, Raza et al. (2018) propose an integrated analytical model to determine greening effort,

inventory decisions, and pricing decisions for a retailer who sells both traditional product and environmental-friendly product. Ma et al. (2018) devise a dynamic pricing strategy for an infinite time horizon two-stage supply chain framework taking carbon tax into account. Zhang et al. (2015) analyse the effect of consumer's environmental awareness (CEA) on the coordination of a dyadic retailer-manufacturer supply chain where a firm sells both conventional and green product. Similarly, Hammami et al. (2017) investigate the impact of CEA and environmental regulations on a retailer's pricing strategy considering carbon emission intensity for both continuous and discrete settings. They conclude that CEA acts as a crucial factor to achieve better environmental performance. Hong et al. (2018) propose a differential pricing strategy considering different levels of green awareness customers under asymmetric information.

Our in-depth investigation of scholarly works hints at the absence of substantial analytical works that focus on solve competing firm's joint decision problem of promotion and pricing with inputs from firm, product attributes and customers. While the linkage between green promotion and purchase decision making is established through empirical studies, the second set of literature explicitly focuses on contract theory with environmental friendliness as one of the product attributes. We position this paper to bridge the gap between empirical and analytical studies in the field of green promotion and pricing.

3. Model

This section demonstrates the analytical model in a duopoly market setting where firms compete in promotion intensity and price. To understand the deviation of equilibrium strategies exercised by firms, we define scenarios based on the promotion strategies chosen by the firms.

3.1. Mechanism

We consider a two-stage game with promotion intensity, namely, conventional or green, simultaneously decided by the firms following by a simultaneous price competition in the second stage. The promotion intensity can be depicted as the fraction of the total number of consumers informed about the firm's product through its promotional messages.

Throughout the paper, we use index $i, i \in \{1, 2\}$ to define firm and index $k, k \in \{I, II, III, IV\}$ to define the competitive scenario. Let the intensity of conventional promotion strategy, product price, and the cost of conventional promotion under scenario k be expressed as $(\theta_i)_k$, $(p_i)_k$, and C_A , respectively. Also, the intensity of green promotion strategy, product price, and the cost of green promotion of firm i under scenario k be expressed

as $(\theta_{iG})_k$, $(p_{iG})_k$, and C_G , respectively. Unit production cost and product differentiation parameter are denoted as c and τ , respectively. r signifies the basic willingness to pay (WTP) of a consumer who buys any of the firm's product under conventional promotion. A consumer's green sensitiveness to a firm's product is captured through the parameter β . We consider the following assumptions for the proposed models.

Assumptions

Assumption 1. The information set is perfect, certain, symmetric or complete.

Assumption 2. Consumers do not have prior knowledge about any of the firm's products. Considering unitary demand from a consumer, they consider buying a product only after receiving the promotional messages from the firms. When consumers have information about both the products, they purchase one of the products, based on their individual preference.

Assumption 3. Following the scholarly articles such as Chan (2004), Chan et al. (2006), and Zhu and Sarkis (2016), we consider advertising as the mainstay of promotion strategy and hence primarily advertisement budget determines promotion cost. When a firm i independently decides its promotion intensity θ_i , $\theta_i \in [0, 1]$, $i \in (1, 2)$, it results in θ_i fraction of the informed customers in the market with the promotional cost incurred by the firm as $\frac{C_k(\theta_i)^2}{2}$, $C_k \in \{C_A, C_G\}$ [Jorgensen and Zaccour (1999), He et al. (2009)].

Assumption 4. The cost of green promotion is considered to be higher than the cost of conventional promotion ($C_A < C_G$), due to the superior advertising formats and other additional enhancements as mentioned in the introduction. The firms equally share the cost of promotion under collaboration, $\frac{C_G}{2}$.

Assumption 5. The value of consumer green sensitiveness $\beta = 0$ for products with conventional promotion and $\beta > 0$ for products with green promotion (Sternthl and Craig, 1973; Kareklas et al., 2012). Thus, we represent consumer's WTP to the product with green promotion is $(r + \beta\theta_G)$ for promotion intensity as θ_G and r being basic WTP for conventional products.

3.2. Generalized demand function under firms' promotion strategies

In this sub-section, we develop a generalized form of demand function considering promotion strategies of both the firms.

Let promotion intensities of firms 1 and 2 can be denoted as θ_1 and θ_2 , respectively. According to figure 1, $(1 - \theta_1)(1 - \theta_2)$ fraction of the consumers is not informed and hence do

not buy any of the products. However, $\theta_1(1-\theta_2)$ fraction of the consumers is only aware of the product of firm 1 and they procure it at a price p_1 . Similarly, $\theta_2(1-\theta_1)$ fraction of all the consumers procure the product at the price p_2 . Now, $\theta_1\theta_2$ fraction of the consumers is informed about both the products and select one of these. Here, we incorporate the Hotelling Model (Hotelling, 1929) to determine the shift of the consumers' demand (informed about both the products) to a specific product.

We assume that the differentiated products are distant from the consumer by x and $(1-x)$, respectively, $x \in [0,1]$. The net utility from one unit of product of firms 1 and 2, can be expressed as: $u_1 = r - \tau x - p_1$ and $u_2 = r - \tau(1-x) - p_2$. Following the Hotelling Model (Hotelling, 1929), let \hat{x} represent consumer's indifference in preference between procuring the product from firms 1 and 2. Solving $u_1 = u_2$, \hat{x} can be expressed as:

$$\hat{x} = \left[\frac{1}{2} - \left\{ \frac{p_1 - p_2}{2\tau} \right\} \right], \text{ such that } |p_1 - p_2| < \tau$$

Now, the fraction of the people who are informed about both the products and buy product 1, can be written as $\theta_1\theta_2\hat{x}$. From the same set of informed consumers, the fraction purchasing product 2 is written as $\theta_1\theta_2(1-\hat{x})$.

Combining the demands received from two sources of informed consumers, the fraction of the consumers who buy products 1 and 2 can be written as: $\theta_1(1-\theta_2) + \theta_1\theta_2\hat{x}$ and $\theta_2(1-\theta_1) + \theta_1\theta_2(1-\hat{x})$ respectively.

Substituting the value of \hat{x} , the demand Q_i of the product of firm $i, i \in \{1,2\}$ can be represented as:

$$Q_i = \theta_i \left[1 - \frac{\theta_j}{2} \left\{ 1 + \left(\frac{p_i - p_j}{\tau} \right) \right\} \right], i \in \{1,2\}, j \in \{1,2\}, i \neq j.$$

Next we identify four scenarios depending on promotion strategies chosen by the firms to establish demand functions followed by equilibrium promotion and price expressions.

3.3. Promotion strategies of firms under different scenarios

The four scenarios discussed in this paper are as follows:

Scenario I: Both the firms select conventional promotion strategy.

Scenario II: One firm selects conventional promotion and another firm selects green promotion.

Scenario III: Both the firms select green promotion strategy.

Scenario IV: Firms select collaborative green promotion strategy.

It is worthwhile to mention that when two or more different firms collaborate in promoting a similar product, that can be defined as ‘horizontal cooperative sales promotion’ (Varadarajan, 1986). As mentioned earlier, recent examples of collaboration between competitors such as General Motors and Honda, Ocean Spray and Tropicana, Nestle and Coca-Cola, and so on for eco-friendly business strategy design emerge as a new phenomenon. We extend the concept of ‘horizontal cooperative sales promotion’ considering that the competitors collaborate in the green promotion activities.

We summarize the promotion intensities, consumer utility, indifference points, and fraction of the informed customers about a firm’s product, are presented in Table 1.

Table 1

Promotion intensities, consumer utility, indifference points, and fraction of the informed customers about a firm’s product under different scenarios

	Scenario I (Both select Conventional)	Scenario II (firm 1 selects green and firm 2 selects conventional)	Scenario III (Both select green)	Scenario IV (Collaborative green promotion)
Promotion intensities of the firms under the respective promotion strategy				
Firm 1	$(\theta_1)_I$	$(\theta_{1G})_{II}$	$(\theta_{1G})_{III}$	$(\theta_{12G})_{IV}$
Firm 2	$(\theta_2)_I$	$(\theta_2)_{II}$	$(\theta_{2G})_{III}$	$(\theta_{12G})_{IV}$
A consumer’s utility under different promotion strategy				
Firm 1	$r - \tau x - (p_1)_I$	$r + \beta(\theta_{1G})_{II} - \tau x - (p_{1G})_{II}$	$r + \beta(\theta_{1G})_{III} - \tau x - (p_{1G})_{III}$	$r + \beta(\theta_{12G})_{IV} - \tau x - (p_{1G})_{IV}$
Firm 2	$r - \tau(1-x) - (p_2)_I$	$r - \tau(1-x) - (p_2)_{II}$	$r + \beta(\theta_{2G})_{III} - \tau(1-x) - (p_{2G})_{III}$	$r + \beta(\theta_{12G})_{IV} - \tau(1-x) - (p_{2G})_{IV}$
Indifference Point between two firms				
	$\hat{x}_I = \left[\frac{1}{2} - \frac{\left\{ (p_1)_I - (p_2)_I \right\}}{2\tau} \right]$	$\hat{x}_{II} = \left[\frac{1}{2} + \frac{\left\{ \beta(\theta_{1G})_{II} - (p_{1G})_{II} - (p_2)_{II} \right\}}{2\tau} \right]$	$\hat{x}_{III} = \left[\frac{1}{2} + \frac{\left\{ \beta((\theta_{1G})_{III} - (\theta_{2G})_{III}) - (p_{1G})_{III} - (p_{2G})_{III} \right\}}{2\tau} \right]$	$\hat{x}_{IV} = \left[\frac{1}{2} - \frac{\left\{ (p_{1G})_{IV} - (p_{2G})_{IV} \right\}}{2\tau} \right]$
Fraction of the consumers informed about a specific product				

Firm 1	$(\theta_1)_I(1-(\theta_2)_I)$	$(\theta_{1G})_{II}(1-(\theta_2)_{II})$	$(\theta_{1G})_{III}(1-(\theta_{2G})_{III})$	$(\theta_{12G})_{IV}(1-(\theta_{12G})_{IV})$
Firm 2	$(\theta_2)_I(1-(\theta_1)_I)$	$(\theta_2)_{II}(1-(\theta_{1G})_{II})$	$(\theta_{2G})_{III}(1-(\theta_{1G})_{III})$	$(\theta_{2G})_{III}(1-(\theta_{1G})_{III})$
Fraction of the consumers informed about both the products				
	$(\theta_1)_I(\theta_2)_I$	$(\theta_{1G})_{II}(\theta_2)_{II}$	$(\theta_{1G})_{III}(\theta_{2G})_{III}$	$\{(\theta_{12G})_{IV}\}^2$

Now to answer the first research question, following the method described in section 3.2, the demand function as well as the profit function of a firm $i, i \in \{1, 2\}$ under all scenarios are written in Table 2:

Table 2

The demand function and the profit function of a firm under different scenarios

Scenario	Demand function	Profit function
1	$(Q_i)_I = (\theta_i)_I \left[1 - \frac{(\theta_j)_I}{2} \left\{ 1 + \left(\frac{(p_i)_I - (p_j)_I}{\tau} \right) \right\} \right]$ $i \in \{1, 2\}, j \in \{1, 2\}, i \neq j$	$(\pi_i)_I = \left[\{(p_i)_I - c\} (Q_i)_I - \frac{C_A ((\theta_i)_I)^2}{2} \right].$
2	$(Q_{1G})_{II} = (\theta_{1G})_{II} \left[1 - \frac{(\theta_2)_{II}}{2} \left\{ 1 - \left(\frac{\beta(\theta_{1G})_{II} - ((p_{1G})_{II} - (p_2)_{II})}{\tau} \right) \right\} \right]$ $(Q_2)_{II} = (\theta_2)_{II} \left[1 - \frac{(\theta_{1G})_{II}}{2} \left\{ 1 + \left(\frac{\beta(\theta_{1G})_{II} - ((p_{1G})_{II} - (p_2)_{II})}{\tau} \right) \right\} \right]$	$(\pi_{1G})_{II} = \left[\frac{\{(p_{1G})_{II} - c\} (Q_{1G})_{II}}{-\frac{C_G ((\theta_{1G})_{II})^2}{2}} \right],$ $(\pi_2)_{II} = \left[\frac{\{(p_2)_{II} - c\} (Q_2)_{II}}{-\frac{C_A ((\theta_2)_{II})^2}{2}} \right]$
3	$(Q_{iG})_{III} = (\theta_{iG})_{III} \left[1 - \frac{(\theta_{jG})_{III}}{2} \left\{ 1 - \beta \left(\frac{(\theta_{iG})_{III} - (\theta_{jG})_{III}}{\tau} \right) + \left(\frac{(p_{iG})_{III} - (p_{jG})_{III}}{\tau} \right) \right\} \right]$ $i \in \{1, 2\}, j \in \{1, 2\}, i \neq j.$	$(\pi_{iG})_{III} = \left[\frac{\{(p_{iG})_{III} - c\} (Q_{iG})_{III}}{-\frac{C_G ((\theta_{iG})_{III})^2}{2}} \right].$
4	$(Q_{iG})_{IV} = (\theta_{12G})_{IV} \left[1 - \frac{(\theta_{12G})_{IV}}{2} - \frac{(\theta_{12G})_{IV} ((p_{iG})_{IV} - (p_{jG})_{IV})}{2\tau} \right]$ $i \in \{1, 2\}, j \in \{1, 2\}, i \neq j.$	$(\pi_{iG})_{IV} = \left[\frac{\{(p_{iG})_{IV} - c\} (Q_{iG})_{IV}}{-\frac{C_G ((\theta_{12G})_{IV})^2}{4}} \right].$

Proposition 1

(i) The profit function of a firm for any scenario is concave in its promotion intensity if concavity conditions presented in Table 3 are satisfied. For any of these scenarios, the equilibrium promotion intensity of firm i , $(\theta_i)^*$, $(\theta_i)^* \in \{(\theta_i)_I^*, (\theta_{1G})_{II}^*, (\theta_2)_{II}^*, (\theta_{1G})_{III}^*, (\theta_{1G})_{III}^*, (\theta_{1G})_{IV}^*\}$, can be determined from the generalized expression given below:

$$A_1(\theta_i)^* + 2A_2((\theta_i)^*)^2 + 3A_3((\theta_i)^*)^3 + \frac{A_4}{((\theta_i)^*)^2} = 0.$$

(ii) For all scenarios, the profit function of a firm is concave in its price. Using the value of promotion intensities determined in the part (i) of Proposition 1, the equilibrium price of firm i can be represented as follows:

$$\begin{aligned} (p_i)^* &= \left\{ c + \tau \left(\frac{2}{3(\theta_i)^*} + \frac{4}{3(\theta_j)^*} - 1 \right) \right\}, \\ (p_{1G})_{II}^* &= \left\{ c + \tau \left(\frac{2}{3(\theta_{1G})_{II}^*} + \frac{4}{3(\theta_2)_{II}^*} - 1 \right) + \frac{\beta(\theta_{1G})_{II}^*}{3} \right\}, \\ (p_2)_{II}^* &= \left\{ c + \tau \left(\frac{2}{3(\theta_2)_{II}^*} + \frac{4}{3(\theta_{1G})_{II}^*} - 1 \right) - \frac{\beta(\theta_{1G})_{II}^*}{3} \right\}, \\ (p_{1G})_{III}^* &= \left\{ c + \tau \left(\frac{2}{3(\theta_{1G})_{III}^*} + \frac{4}{3(\theta_{jG})_{III}^*} - 1 \right) + \frac{\beta}{3} ((\theta_{1G})_{III}^* - (\theta_{jG})_{III}^*) \right\}, \\ (p_{1G})_{IV}^* &= \left\{ c + \tau \left(\frac{2}{(\theta_{12G})_{IV}^*} - 1 \right) \right\}, \text{ where, } i \in \{1, 2\}, j \in \{1, 2\}, i \neq j \end{aligned}$$

(iii) Using the value of promotion intensities determined in the part (i) of Proposition 1, the equilibrium profit of firm i , $(\pi_i)^* \in \{(\pi_i)_I^*, (\pi_{1G})_{II}^*, (\pi_2)_{II}^*, (\pi_{1G})_{III}^*, (\pi_{1G})_{III}^*\}$, for the scenarios I, II, III, and IV, can be obtained from the generalized expression presented below:

$$(\pi_i)^* = \left[A_0 + A_1(\theta_i)^* + A_2((\theta_i)^*)^2 + A_3((\theta_i)^*)^3 - \frac{A_4}{(\theta_i)^*} \right].$$

(iv) For all scenarios, the equilibrium price and profit of a firm are increasing in product differentiation τ .

(v) For scenario II, the equilibrium price and the profit of the firm following green promotion is increasing in β whereas, the equilibrium price and the profit of the firm following conventional promotion is decreasing in β .

(vi) For scenario III, the equilibrium price and the profit of firm i is increasing in β if its promotion intensity is higher than the promotion intensity of competitor j , $(\theta_{iG})_{III} > (\theta_{jG})_{III}$, $i \in \{1,2\}, j \in \{1,2\}, i \neq j$.

The expressions of A_0, A_1, A_2, A_3 , and A_4 can be read from Table 3. (To get the table, Please contact authors)

Referring to part (ii) of Proposition 1, the equilibrium price of a firm decreases with an increase in its promotion intensity as well as its competitor's promotion intensity. A higher promotion intensity leads to more awareness within consumers, thus leads to an increase in competition resulting in price reduction. From the optimal profit expression as presented in part (iii), a firm's profit increases with promotion intensity till a threshold as an increase in the demand compensates for reduction in marginal profit. Further, we observe that the presence of the identical equilibrium price in case of Scenario IV as firms jointly decide the same promotion intensity in the first stage. Also, the cost of promotion, (C_A or C_G) and the product differentiation (τ) exhibit a significant impact on the equilibrium profit, and promotion intensity. Customer's green sensitiveness (β) emerges as an important factor in competitive scenarios such as II and III. For scenario II, the demand for the products of the firm with green promotion and with conventional promotion increases and decreases, respectively with rising β . For this reason, the firm with green promotion can increase its price whereas the firm with conventional promotion reduces its price to maintain the demand. It yields the higher and the lower profitability of the firm with green promotion and the firm with conventional promotion, respectively. In case both firms opt for green promotion (scenario III), the firm with higher green promotion will charge a higher price point as higher number of green-sensitive consumers will be informed about its product than the product of its competitor. The parameter β exhibits no effect on the equilibrium price and the profit of the firms under collaboration (scenario IV). The impact of product differentiation (τ) is largely intuitive as it leads to an increase in equilibrium price across all scenarios. Increasing τ results in the lower substitutability of the firm's product and causes a higher price and profit of the firms. We demonstrate the impact of τ and β on the equilibrium promotion intensity through numerical analysis for better illustration, presented in Section 4.

Proposition 2

(i)

- a) $(p_i)_I^* > (p_j)_I^*$, if $(\theta_i)_I^* > (\theta_j)_I^*$. Otherwise, $(p_i)_I^* < (p_j)_I^*$. $i \in \{1,2\}, j \in \{1,2\}, i \neq j$
- b) $(p_{iG})_{III}^* > (p_{jG})_{III}^*$, if $(\theta_{iG})_{III}^* > (\theta_j)_{III}^*$. Otherwise, $(p_{iG})_{III}^* < (p_{jG})_{III}^*$. $i \in \{1,2\}, j \in \{1,2\}, i \neq j$
- c) $(p_{1G})_{II}^* > (p_2)_{II}^*$ if $(\theta_{1G})_{II}^* > (\theta_2)_{II}^*$. $(p_{1G})_{II}^* < (p_2)_{II}^*$ if $(\theta_{1G})_{II}^* < (\theta_2)_{II}^*$ and $\frac{\beta}{\tau} < U_1$.
- d) $(p_{iG})_{IV}^* = (p_{jG})_{IV}^*$

(ii)

- a) $(p_{iG})_{III}^* > (p_i)_I^* > (p_{iG})_{IV}^*$, if $(\theta_{12G})_{IV}^* > (\theta_i)_I^* > (\theta_{iG})_{III}^*$. $i \in \{1,2\}$.
- b) $(p_i)_I^* > (p_{iG})_{IV}^* > (p_i)_{III}^*$, if $(\theta_{iG})_{III}^* > (\theta_{12G})_{IV}^* > (\theta_i)_I^*$. $i \in \{1,2\}$.
- c) $(p_{iG})_{IV}^* > (p_{iG})_{III}^* > (p_i)_I^*$, if $(\theta_i)_I^* > (\theta_{iG})_{III}^* > (\theta_{12G})_{IV}^*$. $i \in \{1,2\}$.

(iii)

$(p_{1G})_{III}^* > (p_{1G})_{II}^* > (p_{1G})_{IV}^*$ and $(p_{2G})_{III}^* > (p_2)_{II}^* > (p_{2G})_{IV}^*$, if the following conditions are satisfied:

- a) $(\theta_1)_I^* > (\theta_{1G})_{II}^* > (\theta_{1G})_{III}^*$,
- b) $(\theta_2)_I^* > (\theta_2)_{II}^* > (\theta_{2G})_{III}^*$,
- c) $3(\theta_{1G})_{III}^* > (3(\theta_{2G})_{III}^* + (\theta_{1G})_{II}^*)$.
- d) $\frac{\beta}{\tau} < U_2$.

The values of $U_s, s \in \{1, 2\}$, U_1 and U_2 can be obtained from Table 6.

Proposition 2 elaborates the conditions for dominance of one promotion strategy over others from a firm's perspective. For the first three scenarios, if a firm's promotion intensity is higher than its competitor, then its equilibrium price will exceed the price of its competitor. Higher promotion intensity results in the higher demand and a firm leverages its position by charging a higher price. For scenario IV, the equilibrium prices of both firms are the same as they jointly decide the promotion intensity. Also, when a firm changes its promotion strategy from conventional to the green and reduces its promotion intensity under green compared to the conventional one, firm's equilibrium price increases irrespective of competitor's promotion strategy. For the firm that follows conventional promotion in scenario II, the value of green

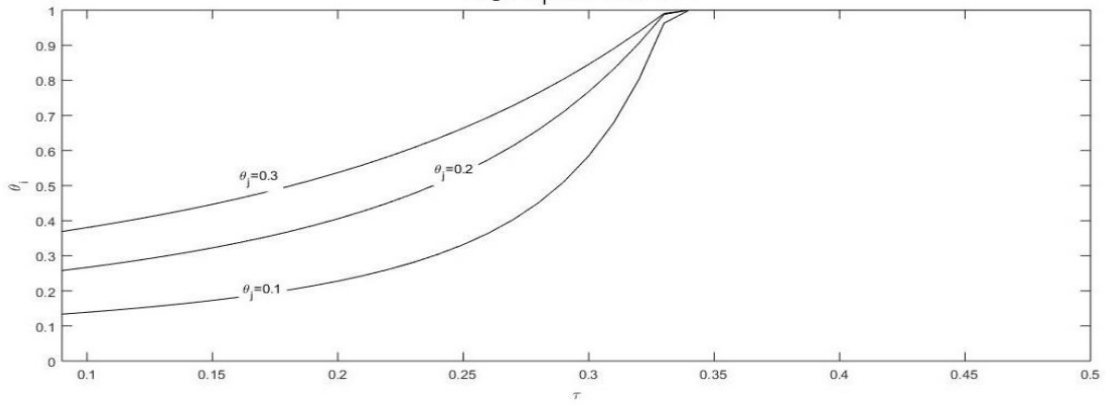
sensitiveness to product differentiation ratio, $\frac{\beta}{\tau}$, plays an important role. If the ratio $\frac{\beta}{\tau}$ lies below the threshold specified in part (i) of proposition 3, the equilibrium price of the firm with conventional promotion under scenario II, is higher than the price of its competitor under scenario II. If the value of $\frac{\beta}{\tau}$ is less than the threshold specified in part (iii) of proposition 2, then price of a firm that follows conventional promotion under scenario II, is less than its equilibrium price under scenario IV when it adopts collaborative green promotion.

4. Numerical analysis and discussion

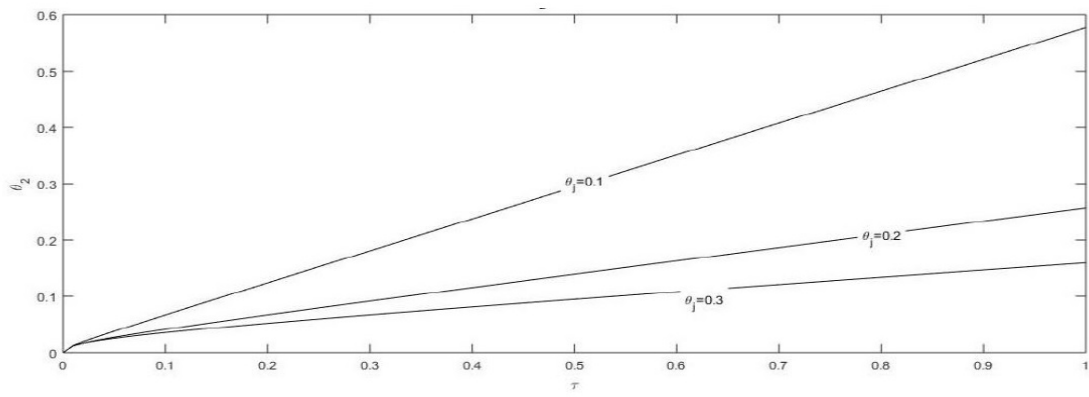
In this section, we discuss the insights obtained from the proposed models through numerical analysis. In the context of a firm's promotion strategy, we perform numerical studies from three different perspectives, namely product-specific, promotion-specific, and consumer-specific perspectives which demonstrate the impact of product differentiation, cost of a firm's respective promotion, and consumer's green sensitiveness, respectively on a firm's promotion intensity. From the perspective of a firm's pricing decision and profitability, we present the variation in price and profit levels of the firms for the first three scenarios. All numerical experiments were conducted on a Windows 7 machine with 1 TB HDD capacity and 6 GB RAM using MATLAB R2013b version.

4.1. Impact of product differentiation on a firm's promotion intensity across the scenarios

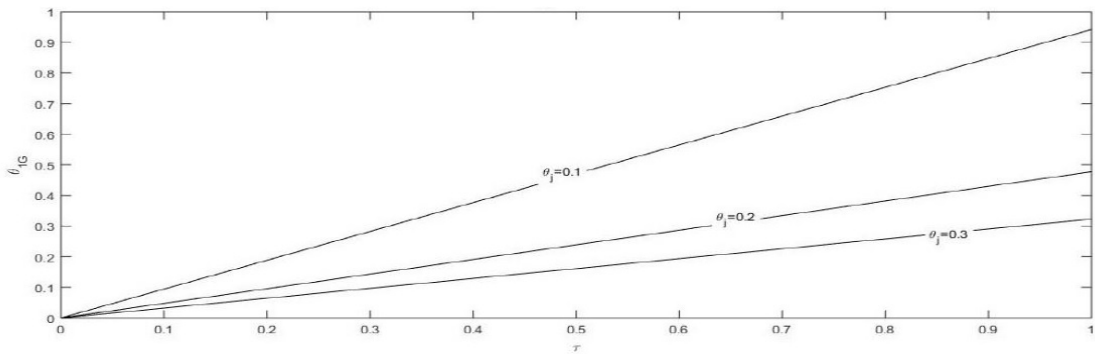
Here, we demonstrate the impact of product differentiation parameter (τ) on a firm's promotion intensity in all scenarios presented in figures 1 and 2. We observe that a firm's equilibrium promotion intensity increases in τ under scenarios where firms engage in competition such as scenarios I, II, and III, and decreases where firms involve in the collaboration which is scenario IV. When the product of a firm is highly differentiated from that of its competitor, it motivates the firm to raise awareness about the exclusivity of its product and the demand by increasing the promotion intensity. It explains the reason behind maintaining the higher promotion intensity of the organizations with the differentiated product such as BMW, Nike mentioned in section 1. On the contrary, in an identical situation in Scenario IV, the highly differentiated product attracts a higher number of consumers, and the firms have less incentive to choose a higher promotion intensity. For this reason, the product differentiation (τ) parameter has a decreasing effect on a firm's promotion intensity under Scenario IV.



(a) Impact of product differentiation parameter on promotion intensity of a firm who follows conventional promotion under scenario 1.

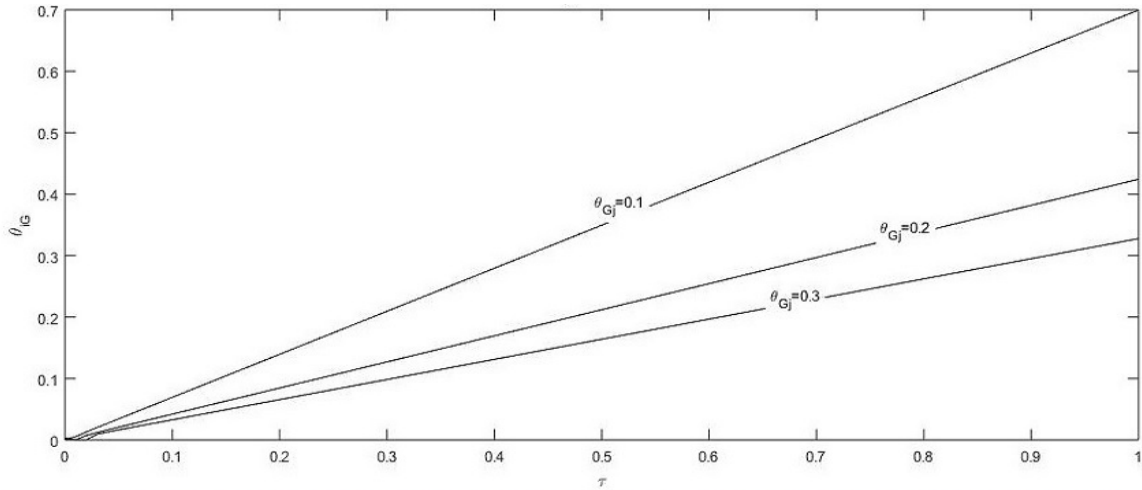


(b) Impact of product differentiation parameter on promotion intensity of a firm who follows conventional promotion under scenario 2.

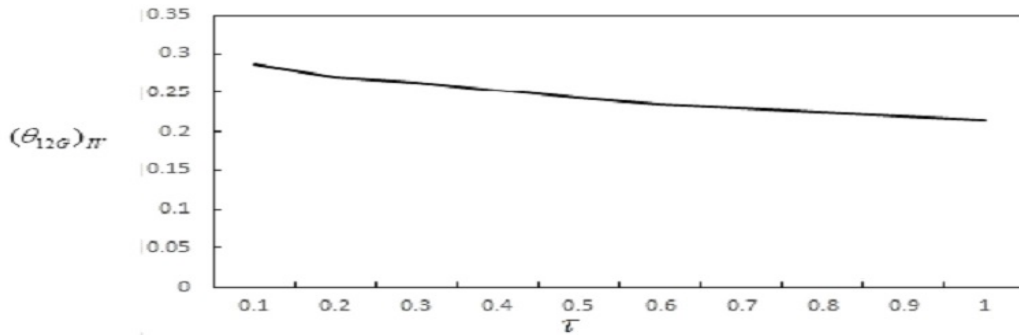


(c) Impact of product differentiation parameter on promotion intensity of a firm who follows green promotion under scenario 2.

Fig. 1. Impact of product differentiation on promotion intensities of the firms for scenarios I and II



(a) Impact of product differentiation parameter on promotion intensity of a firm who follows green promotion under scenario 3.

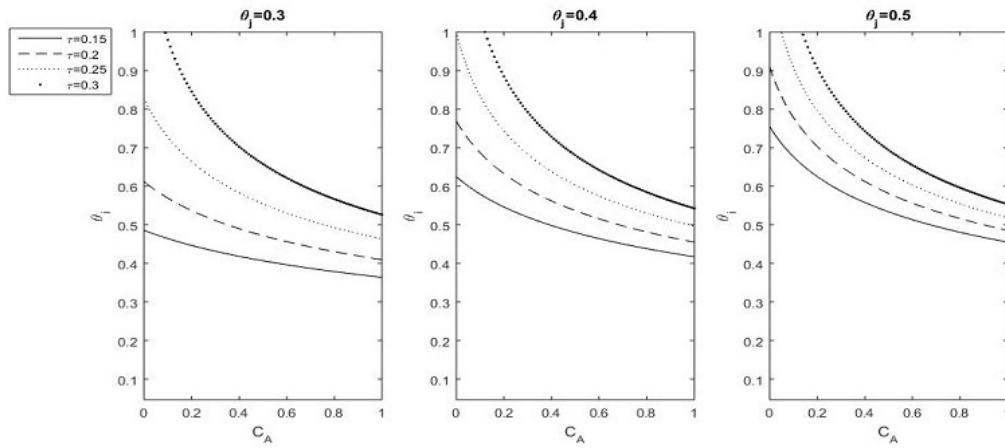


(b) Impact of product differentiation parameter on promotion intensity of a firm who follows collaborative green promotion under scenario 4.

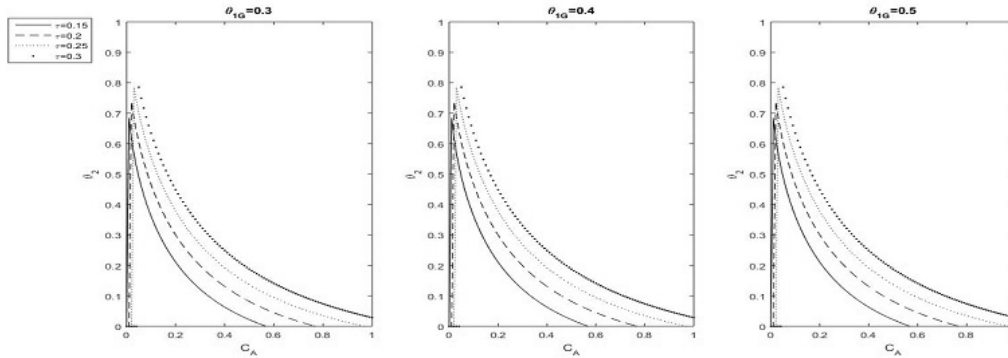
Fig. 2. Impact of product differentiation on promotion intensities of the firms for scenarios III and IV

4.2. Impact of cost of promotion on a firm's promotion intensity across the scenarios

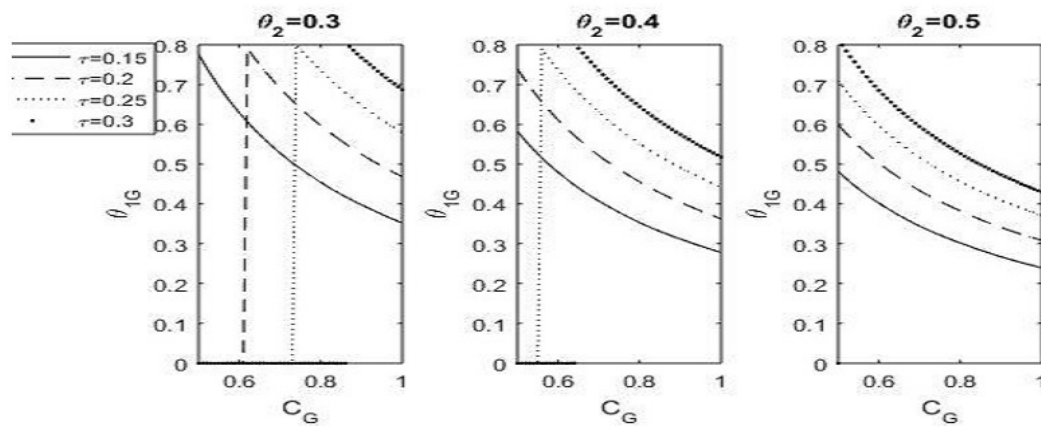
The effect of the cost of promotion on the promotion intensity of the firms is depicted in the figures 3 and 4 for all scenarios. Higher cost of promotion discourages firms to increase the promotion intensity under competition. It demonstrates the rationale behind the reduction in the advertising expenditure of the firms such as Unilever and Procter and Gamble mentioned in section 1. On the contrary, the firms raise promotion intensity with rising promotion cost under collaboration up to a specific threshold. The firms try to achieve higher profit level by increasing the promotion intensity as the increase in demand surpasses the increase in shared cost. When we investigate the joint impact of product differentiation and cost of promotion on promotion intensity, we understand that the firms prefer to increase intensity level with increasing product differentiation. Understandably cost of promotion has an inverse impact on promotion intensity.



(a) Impact of cost of promotion on promotion intensity of a firm who follows conventional promotion under scenario 1

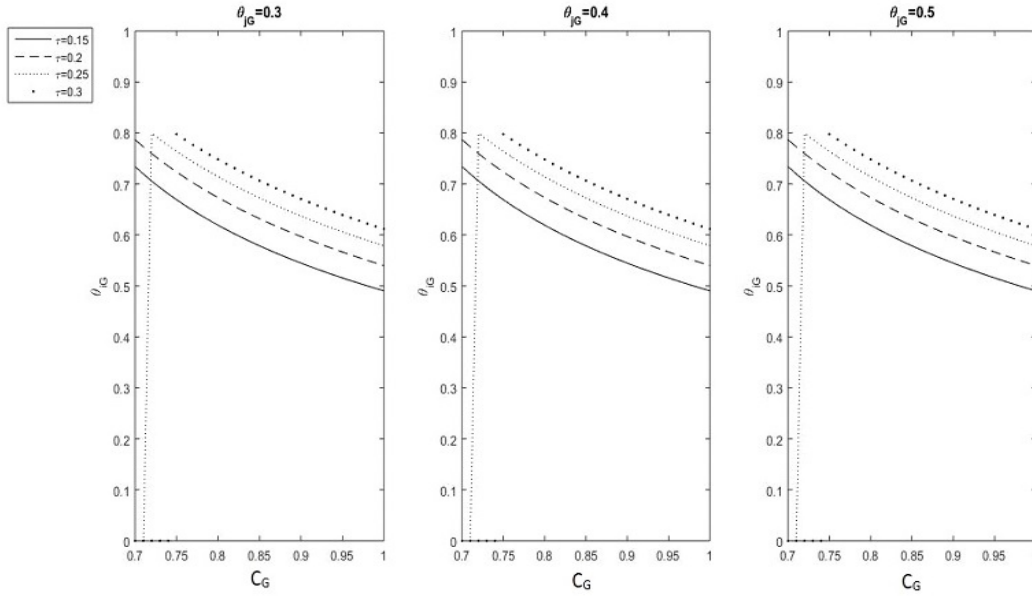


(b) Impact of cost of promotion on promotion intensity of a firm who follows conventional promotion under scenario 2

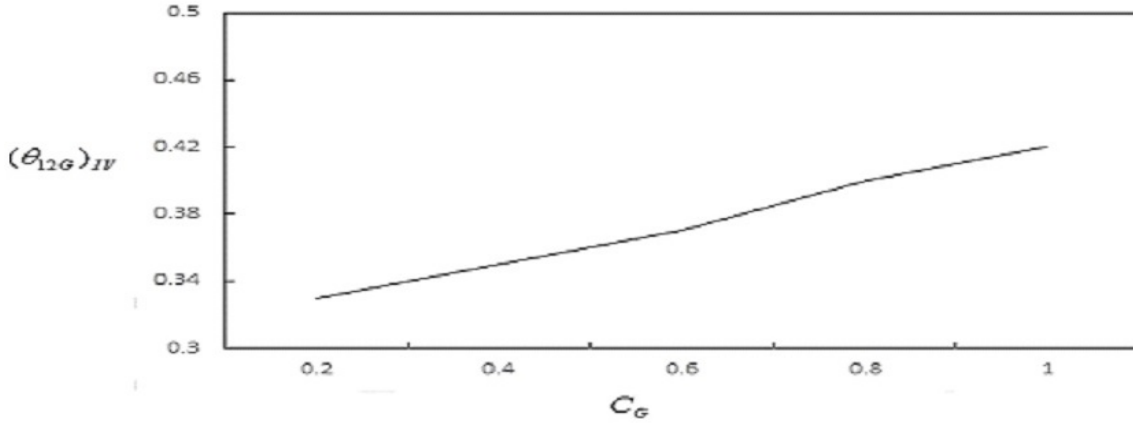


(c) Impact of cost of promotion on promotion intensity of a firm who follows green promotion under scenario 2.

Fig. 3. Impact of cost of promotion on promotion intensities of the firms for the scenarios I and II



(a) Impact of cost of promotion on promotion intensity of a firm who follows green promotion under scenario 3.



(b) Impact of cost of promotion on promotion intensity of a firm who follows collaborative green promotion under scenario 4.

Fig. 4. Impact of cost of promotion on promotion intensities of the firms for the scenarios I to IV

4.3. Impact of green sensitiveness on a firm's promotion intensity across the scenarios

We demonstrate the impact of green sensitiveness (β) on the promotion intensities of the firms under scenarios II and III in Figure 8. It is evident that the firm that adopts conventional promotion under scenario III raises its promotion intensity with rising β to maintain the demand. On the other hand, when the value of β increases, firm with green promotion reduces its promotion intensity as it can still maintain its demand because of highly differentiated product. Under scenario III, a firm continues raising its promotion intensity till a threshold level of green sensitiveness parameter (β). Further, we observe that a firm increases its promotion intensity if the competitor increases in order to maintain its customer base. Our

analysis reveals that the equilibrium promotion intensity under scenario IV, collaborative promotion does not depend on green sensitiveness (β). For this reason, we do not exhibit the impact of green sensitiveness on the promotion intensity in Figure 8.

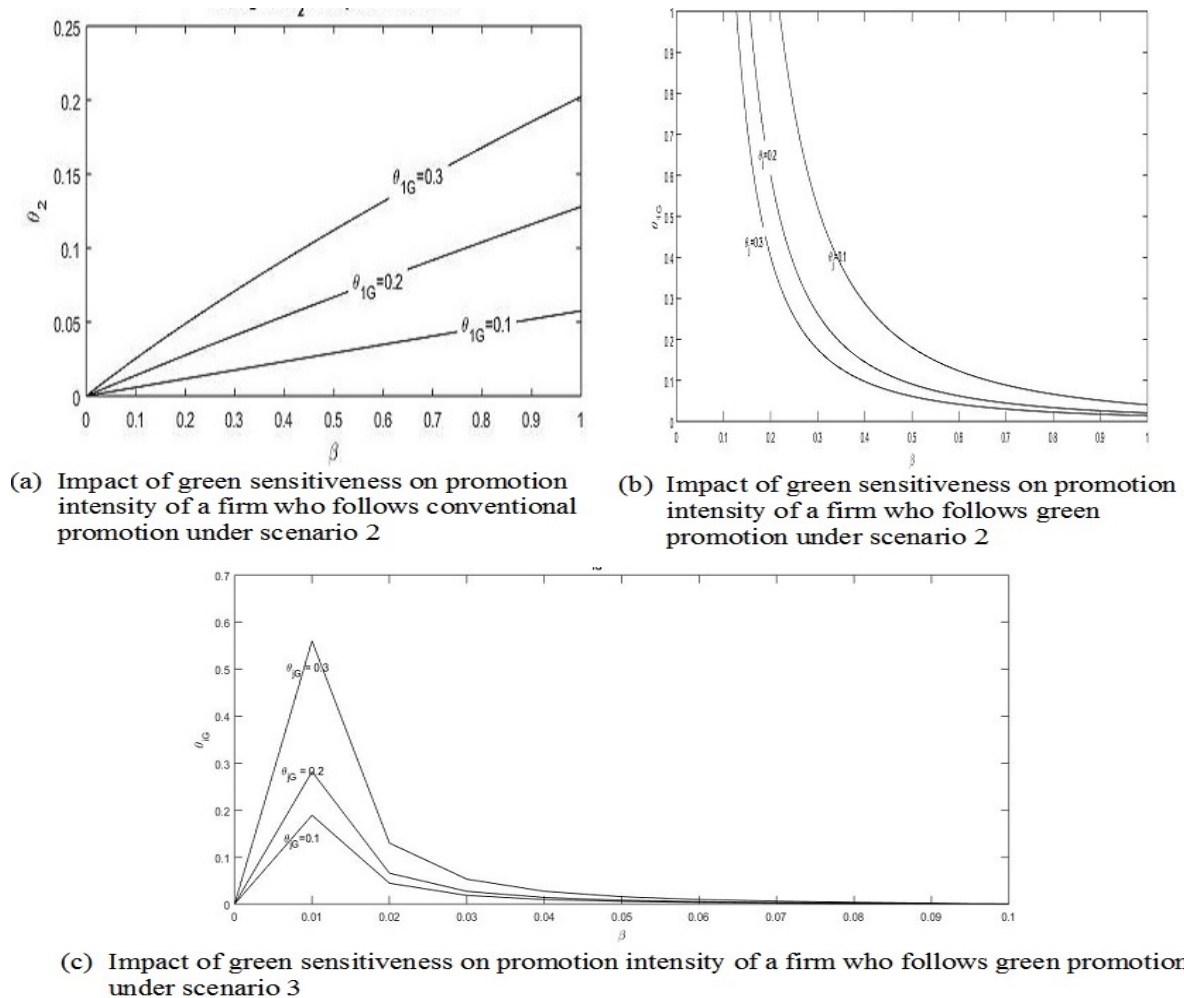
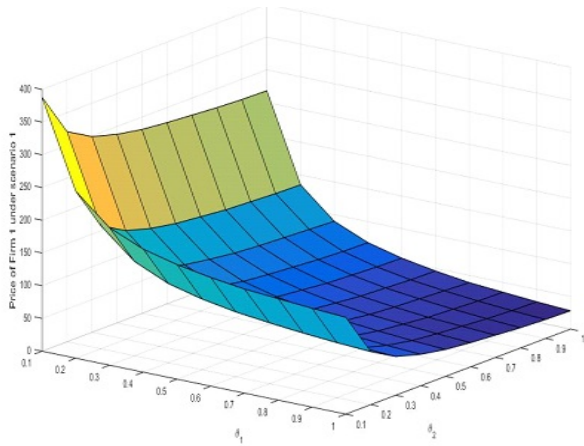


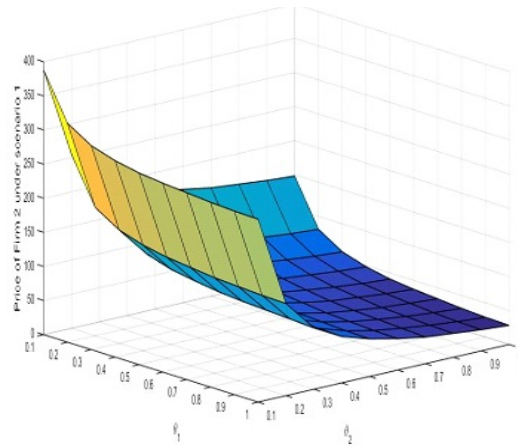
Fig. 5. Impact of green sensitiveness on the promotion intensities of the firms for scenarios II and III

4.4. Variation in the price and profitability of the firms across the scenarios

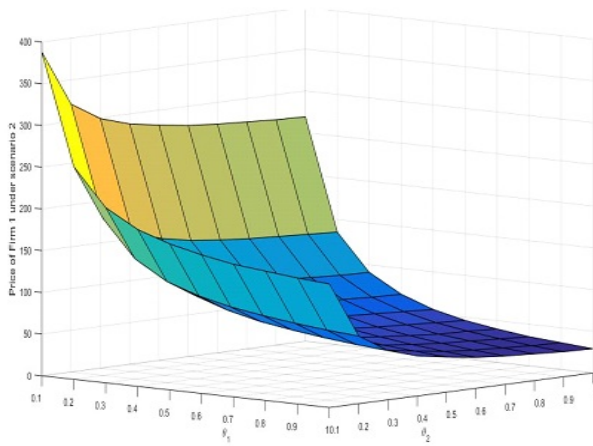
Figures 6 and 7 exhibit the variation in the price and profitability, respectively of the firms under scenarios I, II, and III with varying promotional intensities by firms 1 and 2. We observe that a firm's price and profitability decrease with the rising promotion intensity. As the competitor increases its promotional intensity, the firm is forced to reduce the price and hence to lose out on profitability. Also, the higher variability in the price and profit of the firms have been observed with the increasing difference of promotion intensities of two firms.



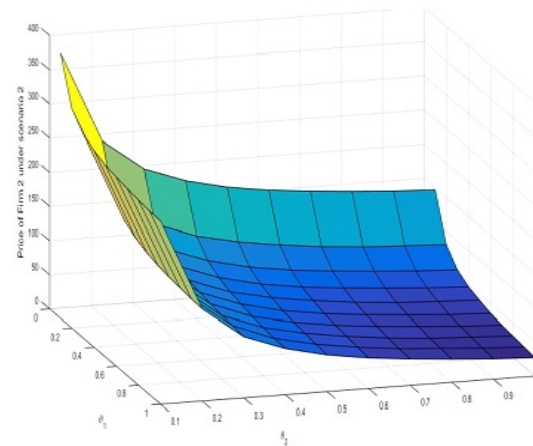
(a) Variation in the price offered by firm 1 under scenario 1 with the promotion intensities of firm 1 and 2



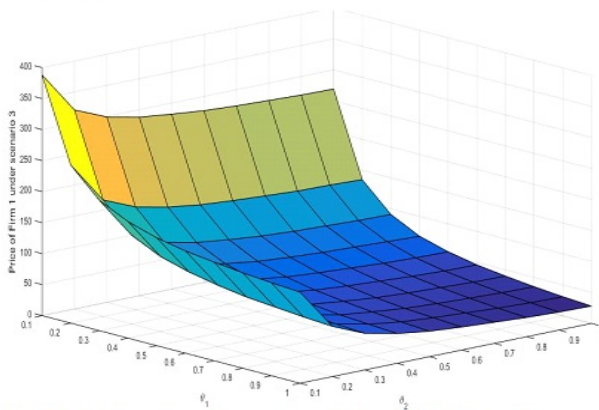
(b) Variation in the price offered by firm 2 under scenario 1 with the promotion intensities of firm 1 and 2



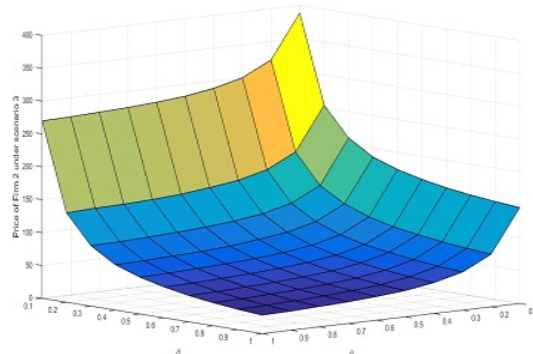
(c) Variation in the price offered by firm 1 under scenario 2 with the promotion intensities of firm 1 and 2



(d) Variation in the price offered by firm 2 under scenario 2 with the promotion intensities of firm 1 and 2

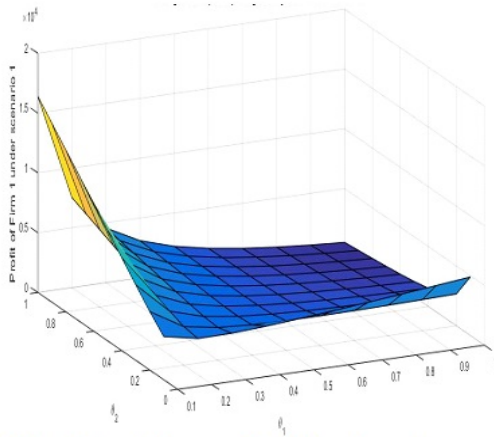


(e) Variation in the price offered by firm 1 under scenario 3 with the promotion intensities of firm 1 and 2

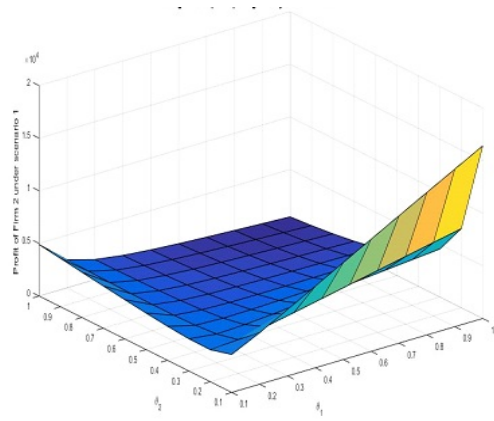


(f) Variation in the price offered by firm 2 under scenario 3 with the promotion intensities of firm 1 and 2

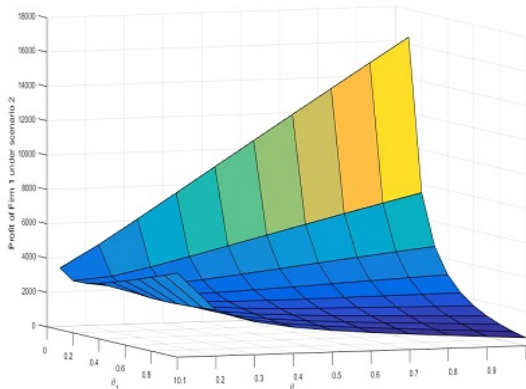
Fig. 6. Variation in the prices of the firms with the promotion intensities of the firms 1 and 2 across scenarios I, II, and III



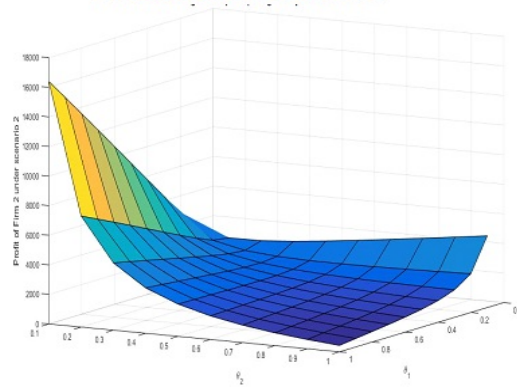
(a) Variation in the profit of firm 1 under scenario 1 with the promotion intensities of firm 1 and 2



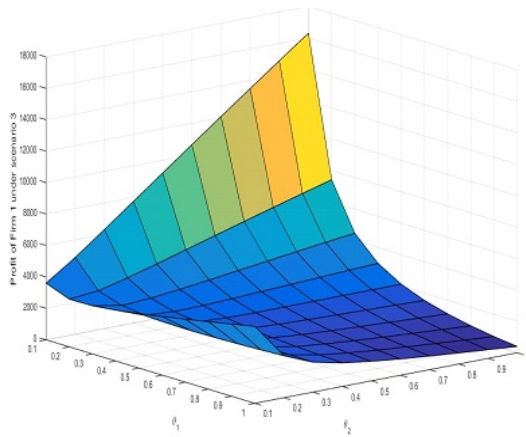
(b) Variation in the profit of firm 2 under scenario 1 with the promotion intensities of firm 1 and 2



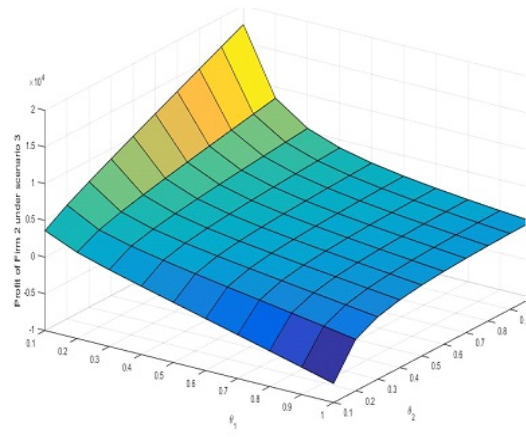
(c) Variation in the profit of firm 1 under scenario 2 with the promotion intensities of firm 1 and 2



(d) Variation in the profit of firm 2 under scenario 2 with the promotion intensities of firm 1 and 2



(e) Variation in the profit of firm 1 under scenario 3 with the promotion intensities of firm 1 and 2



(f) Variation in the profit of firm 2 under scenario 3 with the promotion intensities of firm 1 and 2

Fig. 7. Variation in the profitability of the firms with the promotion intensities of the firms 1 and 2 across scenarios I, II, and III

4.5. Managerial implications

In this section, we first present a brief summary of the managerial insights obtained from the proposed analytical model and numerical analysis. Next, we propose a framework to facilitate a firm's decision-making related to the selection of promotion strategy based on consumer's green sensitiveness and cost of green promotion. The summarized description of the impact of product differentiation, cost of promotion, and consumer's green sensitiveness on a firm's promotion intensity, price, and profit, as well as on the consumer surplus, is presented in Table 8.

Table 8

Summarized description of the impact of product differentiation, cost of promotion, and consumer's green sensitiveness on the decision variables

Scenarios	Decision Variables of firms	Factors		
		Cost of Promotion $\{C_A, C_G, C_{12G}\}$.	Product differentiation parameter (τ)	Consumer's green sensitiveness (β)
I	Promotion	(-)	(+)	Not applicable
	Price	(+)	(+)	Not applicable
	Profit	(+)	(+)	Not applicable
II	Promotion intensity	(-)	(+)	(+) for green (-) for conventional
	Price	(+)	(+)	(+) for green (-) for conventional
	Profit	(+)	(+)	(+) for green (-) for conventional
III	Promotion	(-)	(+)	(*)
	Price	(+)	(+)	(+) for higher intensity (-) for lower intensity
	Profit	(+)	(+)	(+) for higher intensity (-) for lower intensity
IV	Promotion	(+)	(-)	No impact
	Price	(-)	(+)	No impact
	Profit	(-)	(+)	No impact
Consumer Surplus				

Scenarios	Factors	
	Product differentiation	Consumer's green sensitiveness(β)
I	(-)	No impact
II	(**)	(**)
III	(**)	(**)
IV	(+)	(+)

Here, (+) and (-) indicates that the specific factor exhibits an increasing and decreasing effect, respectively on the decision variables. (*) denotes the mixed impact of a specific factor on the decision variables such as an increasing effect up to a threshold of that specific parameter and decreasing effect after the threshold value or vice-versa. (**) captures the effect of τ or β depending on the promotion intensities.

5. Conclusion

Since the beginning of the 21st century, there is growing interest among firms following environmental- friendly measures to invest in the 'green promotion' of their products. Our exploration of existing literature reveals no scholarly work considering a game theoretic setup to address decision problems of the stakeholder such as promotion intensity and price for green products. This paper addresses five research questions with comparative and creates a framework for effective decision making across scenarios. A generic demand expression is created using Hotelling model by considering price, promotion intensities and product differentiation while answering the first research question. Next, we propose a methodology in designing the pricing and promotion strategy of a firm under the firm's conventional promotion, green promotion, consumer's green sensitiveness, and product differentiation in a duopoly market considering both competition and collaboration among the firms. Under different scenarios, we compute equilibrium promotion intensity, price, and profit to answer the next two research questions. Answer to the fourth question determines the consumer surplus under above-mentioned scenarios to understand the impact on customers. For better understanding of the results obtained, we perform a rigorous numerical analysis to facilitate the graphical depiction of the insights. Following the last research question, we demonstrate the impact of product differentiation, consumer's green sensitiveness, and cost of promotion on a firm's equilibrium promotion intensity, price, and profit. The key insights of this article can be expressed as follows:

- Higher promotion intensity reduces and raise firm's profitability and consumer surplus, respectively.

- Product differentiation has increasing and decreasing effect on the firm's profitability and consumer surplus, respectively.
- Impact of consumer's green sensitiveness on firm's profitability and consumer surplus depends on the promotion intensities selected by the firms.

From the perspective of future research avenues, the study on the impact of green promotion in the context of dyadic manufacturer- retailer supply chain can be an interesting area. Also, consideration of spatial differentiation in selecting promotion strategy can attract the attention of the scholars. Consideration of information asymmetry in the proposed model can be another probable research avenue.

Reference

- Bagwell, K. (2007). The economic analysis of advertising. *Handbook of industrial organization*, 3, 1701-1844.
- Banerjee, S., Gulas, C. S., & Iyer, E. (1995). Shades of green: A multidimensional analysis of environmental advertising. *Journal of Advertising*, 24(2), 21-31.
- Bloomberg (2017). WPP Drops as Major Client Unilever Slashes Advertising Costs. Retrieved from : <https://www.bloomberg.com/news/articles/2017-04-06/wpp-drops-as-major-client-unilever-slashes-advertising-spending>. Accessed on 14th September, 2018.
- Bonnell, A (2015). Consumer Attitudes Toward Green Brands Reach All-Time High. Retrieved from: <https://blog.marketresearch.com/sustainability-in-america-consumer-attitudes-toward-green-brands-reach-all-time-high>. Accessed on 14th September, 2018.
- Chan, R. Y. (2004). Consumer responses to environmental advertising in China. *Marketing Intelligence & Planning*, 22(4), 427-437.
- Chan, R. Y., Leung, T. K. P., & Wong, Y. H. (2006). The effectiveness of environmental claims for services advertising. *Journal of Services Marketing*, 20(4), 233-250.
- Chan, E. S. (2013). Managing green marketing: Hong Kong hotel managers' perspective. *International Journal of Hospitality Management*, 34, 442-461.
- Chen, Y. J., & Sheu, J. B. (2017). Non-differentiated green product positioning: Roles of uncertainty and rationality. *Transportation Research Part E: Logistics and Transportation Review*, 103, 248-260.
- Chen, Y. J., & Chen, T. H. (2018). Fair sharing and eco-efficiency in green responsibility and green marketing policy. *International Journal of Production Economics*.

- Ding, H., Zhao, Q., An, Z., Xu, J., & Liu, Q. (2015). Pricing strategy of environmental sustainable supply chain with internalizing externalities. *International Journal of Production Economics*, 170, 563-575.
- Do Paço, A. M. F., & Reis, R. (2012). Factors affecting skepticism toward green advertising. *Journal of advertising*, 41(4), 147-155.
- Ebina, T., Matsushima, N., & Shimizu, D. (2015). Product differentiation and entry timing in a continuous time spatial competition model. *European Journal of Operational Research*, 247(3), 904-913.
- Ghosh, D., & Shah, J. (2015). Supply chain analysis under green sensitive consumer demand and cost sharing contract. *International Journal of Production Economics*, 164, 319-329.
- Ginsberg, J. M., & Bloom, P. N. (2004). Choosing the right green-marketing strategy. *MIT Sloan Management Review*, 46(1), 79.
- Hammami, R., Nouira, I., & Frein, Y. (2018). Effects of Customers' Environmental Awareness and Environmental Regulations on the Emission Intensity and Price of a Product. *Decision Sciences*.
- Hafezalkotob, A. (2017). Competition, cooperation, and cooptation of green supply chains under regulations on energy saving levels. *Transportation Research Part E: Logistics and Transportation Review*, 97, 228-250.
- He, X., Prasad, A., & Sethi, S. P. (2009). Cooperative advertising and pricing in a dynamic stochastic supply chain: Feedback Stackelberg strategies. *Production and Operations Management*, 18(1), 78-94.
- Hong, Z., Wang, H., & Yu, Y. (2018). Green product pricing with non-green product reference. *Transportation Research Part E: Logistics and Transportation Review*, 115, 1-15.
- Hotelling, H. (1929). Stability in competition. *Economic Journal*, 39(153), 41–57.
- Jørgensen, S., & Zaccour, G. (1999). Equilibrium pricing and advertising strategies in a marketing channel. *Journal of optimization theory and applications*, 102(1), 111-125.
- Kaplan, J (2011). Top 10 Green Marketing Campaigns. Retrieved from Retrieved from <https://www.energyseek.co.uk/2011/10/26/top-10-green-marketing-campaigns/>. Accessed on 14th September, 2018.
- Kareklas, I., Carlson, J. R., & Muehling, D. D. (2012). The role of regulatory focus and self-view in “green” advertising message framing. *Journal of Advertising*, 41(4), 25-39.
- Lee, K. (2010). The green purchase behavior of Hong Kong young consumers: The role of peer influence, local environmental involvement, and concrete environmental knowledge. *Journal of international consumer marketing*, 23(1), 21-44.

Long, M (2016). 2 Green Marketing Fails and Where They Went Wrong. Retrieved from: <https://www.mediapost.com/publications/article/280843/2-green-marketing-fails-and-where-they-went-wrong.html>. Accessed on 14th September, 2018.

Ma, X., Ho, W., Ji, P., & Talluri, S. (2018). Coordinated Pricing Analysis with the Carbon Tax Scheme in a Supply Chain. *Decision Sciences*.

Macleod, D. (2007). Diesel Global Warming Ready. Retrieved from: <http://theinspirationroom.com/daily/2007/diesel-global-warming-ready/>. Accessed on 14th September, 2018.

Makower, J. (2014). State of Green Business: Collaboration becomes an accelerator. Retrieved from: <https://www.greenbiz.com/blog/2014/01/27/state-green-business-collaboration-becomes-accelerator>. Accessed on 14th September, 2018.

Matthes, J., & Wonneberger, A. (2014). The skeptical green consumer revisited: Testing the relationship between green consumerism and skepticism toward advertising. *Journal of advertising*, 43(2), 115-127.

McGrew, J. (2011). SUPER BOWL Ad Watch: BMW Says Diesel Has Ch-Ch-Changed. Retrieved from : https://www.greencarreports.com/news/1054930_super-bowl-ad-watch-bmw-says-diesel-has-ch-ch-changed. Accessed on 14th September, 2018.

Murali, K., Lim, M. K., & Petruzzi, N. C. (2018). The effects of ecolabels and environmental regulation on green product development. *Manufacturing & Service Operations Management*.

Nastu, P. (2008). Timberland Launches Earthkeeper Campaign, Product Collection. Retrieved from: <https://www.environmentalleader.com/2008/06/timberland-launches-earthkeeper-campaign-product-collection/?amp=1>. Accessed on 14th September, 2018.

Pasquarelli, A (2017). How a Millennial Mindset Is Helping This 116-Year-Old Firm. Retrieved from: <http://www.adageindia.in/marketing/cmo-strategy/how-a-millennial-mindset-is-helping-this-116-year-old-firm/articleshow/56874083.cms>. Accessed on 14th September, 2018.

Ratcliff, C. (2013). Telling Stories: five successful marketing examples. Retrieved from <https://econsultancy.com/telling-stories-five-successful-marketing-examples/>. Accessed on 14th September, 2018.

Raza, S. A., Rathinam, S., Turiac, M., & Kerbache, L. (2018). An integrated revenue management framework for a firm's greening, pricing and inventory decisions. *International Journal of Production Economics*, 195, 373-390.

Ribeiro, S. (2010). Green Marketing: What Works, What Doesn't. Retrieved from <http://greeneconomypost.com/green-marketing-8729.htm>. Accessed on 14th September, 2018.

- Royne, M. B., Martinez, J., Oakley, J., & Fox, A. K. (2012). The effectiveness of benefit type and price endings in green advertising. *Journal of Advertising*, 41(4), 85-102.
- Sternthal, B., & Craig, C. S. (1973). Humor in Advertising. *The Journal of Marketing*, 37(4), 12-18.
- Thangavelu, P (2015).The Success of Patagonia's Marketing Strategy. Retrieved from <https://www.investopedia.com/articles/personal-finance/070715/success-patagonias-marketing-strategy.asp>. Accessed on 14th September, 2018.
- Varadarajan, P. (1986). Horizontal cooperative sales promotion: A framework for classification and additional perspectives. *The Journal of Marketing*, 61-73.
- Wang, J., Yam, R. C., & Tang, E. P. (2013). Ecologically conscious behaviour of urban Chinese consumers: the implications to public policy in China. *Journal of Environmental Planning and Management*, 56(7), 982-1001.
- Worthington, I. (2012). *Greening Business: Research, Theory, and Practice*. Oxford University Press.
- Xie, J., & Wei, J. C. (2009). Coordinating advertising and pricing in a manufacturer–retailer channel. *European Journal of Operational Research*, 197(2), 785-791.
- Xie, G. X., & Kronrod, A. (2012). Is the devil in the details? The signaling effect of numerical precision in environmental advertising claims. *Journal of Advertising*, 41(4), 103-117.
- Xu, X., He, P., Xu, H., & Zhang, Q. (2017). Supply chain coordination with green technology under cap-and-trade regulation. *International Journal of Production Economics*, 183, 433-442.
- Zhang, L., Wang, J., & You, J. (2015). Consumer environmental awareness and channel coordination with two substitutable products. *European Journal of Operational Research*, 241(1), 63-73.
- Zhu, Q., Sarkis, J., & Lai, K. H. (2012). Internationalization and environmentally-related organizational learning among Chinese manufacturers. *Technological Forecasting and Social Change*, 79(1), 142-154.
- Zhu, Q., & Sarkis, J. (2016). Green marketing and consumerism as social change in China: Analyzing the literature. *International Journal of Production Economics*, 181, 289-302.
- Zinkhan, G. M., & Carlson, L. (1995). Green advertising and the reluctant consumer. *Journal of Advertising*, 24(2), 1-6.