

The Insights on Marketing Initiatives Impacting the Bullwhip Effect: Sectoral Study

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The particular phenomenon of disruption in supply chain in which production is more variable than demand is considered as bullwhip effect. The Bullwhip Effect is immensely studied by the researchers around the world but still it is considered as the unsolved problem. The present study analyzes the impact of different promotion initiatives taken by the firms' belonging to different sectors on the bullwhip effect. The empirical data on marketing expenditure is analyzed from ten major and independent Indian sectors to analyze how marketing initiatives of different sectors are causing the disruption in the supply chain. It has been found that the marketing strategies vary according to the different sectors and the expense incurring in marketing is causing the bullwhip effect. The results are contradicting with the existing theory and it has been analyzed that total marketing expenditure is found to be insignificant in explaining the variability existing in production hence the need of further analysis of marketing expenditure into direct and indirect expenditures arises. The indirect as well as direct marketing expenditures are found to have an impact on the variability in production causing disruption of supply chain and this impact varies from sector to sector. The study attempts to statistically measure this impact.

Keywords: Bullwhip effect, supply chain management, promotional effect on supply chain, marketing management

Introduction

The functions of procuring, production, warehousing, logistics and distribution are combined to form supply chain management whose ultimate aim is to satisfy the demand of customer (Christopher, 1994). Since the market is very dynamic due to globalization and change in customers need is more frequent than ever. The competition is no more between the organizations it is between their supply chains to satisfy the demand of customer at the lowest possible cost (Macbeth and Ferguson, 1992). Change in technology, short product life cycle and increased competition lead to demand fluctuations which need to be dealt with utmost care by operations and supply chain managers. This variability existing in demand needs to be forecasted accurately otherwise it either results in excessive inventory or the shortage, which becomes an encumbrance to the optimal functioning of the entire supply chain (Zotteri, 2013). Lee et al. (1997) identified operational factors existing within the supply chain causing the disruption in demand and illustrated the same using different cases. In one particular case on 'Procter and Gamble' the study concluded that only end customer demand fluctuation is not leading to the variability in demand, it is the operational function of supply chain itself which is causing the amplification as demand moves up in supply chain from consumer to the supplier. The studies prior to this also show the disruption in demand and relate it with the managerial decision (Forrester, 1961). Sterman (1989) stimulated the variability of demand using Beer distribution game and named the variability as bullwhip effect. This problem is also considered as the economic problem of production smoothing because variability in production is found to be more than the variability in sale (Blanchard, 1983; Blinder, 1981). Besides the behavioral aspects analyzed using simulations (Sterman, 1989; Paik, 2003; Chatfield and Pritchard, 2013), the operational aspects are discussed using cases and operations capabilities (Lee et al. 1997; Ouyang and Daganzo, 2008; Agrawal et al., 2009). The bullwhip existence, magnitude, causes

and remedial measures are studied within and between industries (Cachon et al., 2007; Fransoo and Wouters, 2000). The reasons that cause the bullwhip effect include information sharing (Zhang, 2005; Ketzenberg et al., 2007), price fluctuations (Sodhi et al., 2014; Duan et al., 2015), order batching (Potter and Disney, 2006), logistics (Sevensson, 2005), forecasting (Jaipuria and Mahapatra, 2014), inventory policies (Dai et al., 2017), number of echelon (Dominguez et al., 2015), vendor managed inventory (Disney and Towill, 2003; Nia et al., 2014) and marketing initiatives (Lummus et al., 2003; Trapero and Pedregal, 2016).

The impact of marketing strategies is evident from the available literature. Green et al. (2012) emphasized on aligning the marketing strategies throughout the supply chain and empirically measured the impact of marketing strategies on supply chain performance. The seminal study on bullwhip effect (Lee et al., 1997) identified promotional expenses as major reason to cause the bullwhip effect in supply chain. The efficiency of supply chain can be increased by elimination of the price promotion for functional product (Fisher, 1997). Marketing often causes problem to the supply chain because it leads to unpredicted demand fluctuations (Lummus et al., 2003).

None of the study is found to measure the impact of various marketing strategies causing the variability in production belonging to different sector. The present study deals with empirical data collected from 10 different sectors over a period of 12 years, to measure the variability of change in production due to the marketing expenses. The objective of the study is to evaluate the impact of different marketing initiatives on explaining the variability of production for different sectors. Marketing strategies implemented in accordance with the sectors explain better variability of production process. Rest of the study is organized as follows. Section 2 deals with the literature review which is categorized into two subsections. Subsection 2.1 deals with the variable identification under the study and subsection 2.2 deals with the empirical studies exploring the bullwhip effect among different sectors. Section 3 explains research methodology followed by discussion and results of regression analysis in Section 4. Conclusion and managerial implication is given in Section 6 and the scope of future research with limitation is explained in Section 7.

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Literature Review

The existence of bullwhip effect is sought first by Forrester (1961) who found that the variability in manufacturer demand is more than what actually exists at consumers' level. Blanchard (1983) studied the automobile industry in U.S. and found that the production is far variable than the sales and the organizations overcome it using inventories. Towill et al. (1992) tried to solve this problem using the ordering and information sharing. Lee et al. (1997) identified the four operational factors that exist within the supply chain causing the bullwhip effect. Price fluctuations and promotion strategies are identified as one of the factor besides the order batching, forecasting and rationing gaming. The various promotion strategies like trade credit (Teng and Lou, 2012), discount coupons (Lummus et al., 2003), rebates (Chen et al., 2007), quantity discount (Munson and Rosenblatt, 2001), advertisement (Yue et al., 2013), etc. are used as a tool to get rid of inventories and to smooth the production process. Discounting is also identified as strategy for retail products which results in reduction of the bullwhip effect if demand is serially correlated (Hamister and Suresh, 2008). Promotion strategies like discounting is done to get rid of inventories held at the manufacturer end, such strategies cause the increase in purchasing power of wholesaler and hence increase the quantity ordered. Due to increased order, wholesaler push orders to retailer. This push might result in the cancellation of future orders for wholesaler if retailers are not able to convert it into the sales (Lee et al., 1997).

The bullwhip is quantified in terms of ratio of variability of order to the variability of demand (Chen et al., 2000; Gupta and Saxena, 2018). Instead of taking the ratio of variances, coefficient of variance is taken as metric to measure bullwhip effect (Zotteri, 2013; Disney and Towill, 2003). Time-based bullwhip ratio with promotional effect (Trapero and Pedregal, 2016) and impact of order with inventory policies on bullwhip (Fisher and Homstein, 2000) are other measures by which bullwhip effect is measured. Various other ratios like order rate variance; inventory variance; work in progress inventory variance are suggested to measure the bullwhip effect (Cannella et al., 2013). The phenomenon of the bullwhip effect is related to the variability existing in the production with respect to the variability existing in the demand. The present study explains that the variability of change in production depends upon the change in demand and different types of marketing expenses (direct and indirect) using regression analysis.

2.1 Variable Identification under Marketing Initiatives

Present study explores the impact of marketing initiatives taken by organizations in their supply chain disruption. The various marketing expenses with its sub-categories like sales promotion, rebate & discount and advertisement are discussed in this section.

Sales promotions (SP) are the non-direct (indirect) expenses that company incurs to build the recall value of its product, range of products and company. Sales promotion offers include customer loyalty programs, public relations, free gifts, after sales services, brokerage and commission charges, etc. Grover and Srinivasan (1992) identified sales promotion as a reason to create a trouble for the retailers. Sales promotion is having mixed impact on the demand to increase profit. For example everyday lowering the prices worked fine with Wal-Mart whereas it was a failure for Sears (Lummus et al., 2003). Fisher (1997) identified that the disruption in demand must be studied according to the type of product. If the organization is dealing with functional products then the elimination of price promotion results in increase of supply chain efficiency. Sales promotion results in retention of customer and the probability of repetitive purchase increases (Keller, 1998). Sales promotion has positive effect on brand recognition leads to increase in more favorable association with customer (Vidal and Ballester, 2005) and stabilize sales. This results

in decrease of production volatility hence results in smooth production process of supply chain. Sales promotion expenses are taken with demand as variable to analyze whether its impact varies according to the sectors in explaining the disruption of production process of supply chain.

Rebate and discount (R_D) is considered as promotional expenses that a manufacturer uses as a tool by which organization seeks to increase the quantity ordered from the customer. These are the price-related promotion given to the customer to increase the sales. For example rebate is considered as a refund that a manufacturer gives to wholesaler on buying an order of certain volume. This is not for the entire customers but for the specific ones which are heavy buyers and the credit of purchases are transferred at end of period or agreement. On the other hand, discount is not period or agreement specific. It is unconditional in nature and given to the entire customers who fulfill the purchase order condition. These types of promotional expenses are termed as direct in nature as these are applicable to direct selling to customer. These rebate and discount exhibits very complex nature in disruption of supply chain. Such policy results in long-term relationship with the retailers and studies show such a guanxi reduces bullwhip effect and improve business performance (Cao et al., 2014). Kotler (1997) found that nearly half of the total budget is spent in trade deals. Lee et al. (1997) states that due to such policies retailers' tend to order more than the expected demand which results in cancellation of further future orders and inventory pile up at upstream supply chain so trade discount over a period of time results in stockpiling. Hence it becomes a matter to analyze how and what are sectors in which these rebate and discounts act as boon or bane. The amount of rebate or discount given is also a matter of study. If the size of rebate is small manufacturer earns a profit but the sectors like automobiles where amount of rebate and discount is substantial manufacturer will not result in profit (Chen et al., 2007). So how the amount of expenses incurred in rebate and discount related to different sectors is still an unexplored area which is addressed by the present study.

Advertisements (ADV) are the expenses incurred in spreading of information about the product and its feature through the paid media and it is considered as not the person specific marketing expenditure, i.e. indirect marketing expenditure. Generally huge expenses are made in advertisement to promote the product and its benefits are amortized over long period of time. Increased advertisement leads to increase in sales only half of the times but the increase in profit is questionable because of extra media cost (Abraham and Lodish, 1990). The advertisement must be strategies. The companies must be very careful since any product cannot be promoted by any type of promotion. For utilitarian product monetary promotions are meaningful whereas hedonic product may be promoted by non-monetary promotions (Vidal and Ballester, 2005). Indirect promotion like advertisement is the oldest marketing practice but the adoption of advertisement must vary from sector to sector. The affect of advertisement on explaining the variability exist in production is addressed by present research.

Marketing expenses (MEx) in present study are in accordance to the Prowess Database which records the field as sum of sales promotion, rebate and discount, advertisement, market survey expenditure apart from usual marketing expenses shown by the companies in their annual reports. Many researchers proved the negative impact of marketing initiatives on variability of sales. Marketing expenses like trade discounts increase the variability of sales and thus result in inventory-related problems (Mela et al., 1998). The volatility present in the sales due to promotion decreases the long-term profit of the organizations (Neslin, 1990). The impact of marketing initiative is studied by Lummus et al. (2003) to conclude that by eliminating both discount and rebate the amplification of demand can be reduced significantly. Besides all these studies firms

incurred marketing expenses to gain market shares and to remain in the competition. In present study the marketing expenses are categorized into direct and non-direct measures as marketing expenses must be strategies according to the type of product. The impact of variables (SP, R_D, ADV and MEx) on volatility in production is studied on 10 identified sectors.

2.2 Empirical Study on Bullwhip Effect

Bullwhip effect is realized across all the industries and has been mentioned along all the management disciplines. Numerous authors studied various case studies across the industries and within the industry. Cachon et al. (2007) studied the bullwhip across the industries and recently Jin et al. (2017) studied intra-industry bullwhip effect. Bullwhip effect is experienced in nearly all types of sectors. Automobile sector (Seles et al., 2016; Chiang et al., 2016) retail sector (Kelepouris et al., 2008; Hamister and Suresh, 2008; Chang et al., 2007), telecom sector (Mahmoudi and Lamothe, 2006), oil sector (Hull, 2005), electronic industry (Kaipia et al., 2006) have already been explored with respect to different countries. The food supply chain is studied which measured the bullwhip effect at outlet level, product level and echelon level (Fransoo and Wouters, 2000). In present study 10 major sectors of Indian economy have been identified. Financial sector is not taken under study which represents 31% of the total market capitalization of Indian economy beside this sector, the identified sectors nearly represent 80% of total market capitalization of Indian economy.

1. Research Methodology

Ten Indian sectors are identified and considered under the study to see the impact of marketing expenses, sales promotion, rebate and discount, advertisement expense as the variables on volatility of production. These are the leading sectors that represent majority of the total market capitalization of Indian economy. The sectors considered in present study are Automobile (13 firms), Consumer Durable (10 firms), Energy (26 firms), Fast-Moving Consumer Goods (FMCG, 77 firms), Information Technology (IT, 57 firms), Oil & Gas (10 firms), Power (19 firms), Real (10 firms), Telecom (16 firms) and Utility sectors (32 firms). Bombay Stock Exchange (BSE) sectoral indices reflect the performance of these sectors on basis of market capitalization, trading frequency, etc. BSE sectoral listed companies are taken under study from the identified sectors are found to be 272 in number as on date 5 June 2017. Cost of goods sold, cost of production, MEx, ADV, R_D, SP are recorded. The cost of production is the proxy variable of production whereas cost of goods sold is the proxy variable of demand during the accounting period (yearly). 12-year data is taken (from 2006 to 2017) using Prowess® Database. Such a time series data which is collected across sectors are termed as panel data. Some of the companies are not 12 years old and hence observations are recorded since inception. This results in an unbalanced panel data having 2804 firm year observations taken under study.

The objective of the study is to see the volatility existing in production with respect to the different marketing initiatives taken by the different sectors. Data on production and sales is recorded with their proxy variables. The change in cost of production (C_P) and change in cost of goods sold (C_G) are obtained from the variables by taking the first-order difference of time series. The two variables, C_P and C_G, are the proxy variables which show the volatility existing in production and demand. The steps involved in research methodology are shown in Figure 1.

The linear regression is applied and the suitability of results is verified by the Gauss-Markov assumptions of linear regression. No problem of multicollinearity (verified by variance inflation factor), autocorrelation (verified by Durbin Watson d-statistics) and heteroscedasticity (verified by Graphical method) has been found in

the entire regression analysis. The model diagnostic testing and regression analysis is performed using the help of STATA® 15.

2. Results and Discussion

The regression is performed taking C_P as dependent variable and C_G with MEx as independent variables combining all the manufacturing companies irrespective of the sectors. The result of the regression equation with model fit test is shown in Table 1. The total marketing expenditure is found to have negative impact (-0.052) on causing the volatility in production but insignificant. The result is contradicting to the available literature, which indicates the need of further analysis.

In the same combined data of all the sectors, marketing expenditure is dissolved into various subparts containing rebate and discount expenditure, sales promotion and advertisement expenses and the regression is performed taking C_P as dependent variable and C_G, R_D, SP and ADV as independent variables. Since all the manufacturing companies are not incurring all types of identified promotions (rebate and discount, sales promotion and advertisement expenses) only those observations are taken which are having values corresponding to all types of promotion strategies. The result of regression is shown in Table 2. Rebate and discount which is direct method of promotion is found to be significant with positive coefficient (4.33). Similarly another direct method, sales promotion is also having the significant positive coefficient (1.983). The indirect method of marketing, i.e. advertisement expenses is found to be insignificant in explaining the volatility exists in production.

Fisher (1997) suggested that the production smoothing problem must be dealt according to the type of product. This leads to the further investigation of identified significant variables according to the type of product. The generalization can be done according to the sector since each sector deals with same type of products hence the sectoral study is required. The regression is now run corresponding to each identified sector. Table 3 denotes the regression result computed by taking C_P as a linear function of C_G and MEx. Marketing expenditure is impacting the variability existing in production at significant positive level in FMCG (0.052), Power (0.5), Telecom (0.17) and Utility (0.57) sectors. Auto, Consumer Durable, Energy, Oil & Gas and IT all are those sectors in which marketing expenditure negatively impact the bullwhip effect but are not found to be significant. Real is the sector where the coefficient is positive but not significant.

To get the insights about the direct and indirect promotion variables on each sector, regression is performed taking C_P as a linear function of C_G, R_D, SP and ADV. The result of the regression is shown in Table 4. Let us first discuss the results of those sectors which are affected by marketing expenses. Surprisingly the FMCG sector which is affected by the marketing expense is not significantly affected by any of the subcomponents. Advertisement (-0.087) and sales promotion (-0.154) both are negatively impacting the bullwhip effect but not found to be significant. Rebate and discount (1.154) is affecting positively but is not found to be significant. In power sector, rebate & discount (1.454) and advertisement (66.227) are positively impacting the bullwhip effect significantly, whereas sales promotion (-6.126) is decreasing but not significant enough. Companies in Telecom sector do not use rebate & discount as a marketing tool, it is the advertisement (1.313) that is causing the bullwhip effect significantly and sales promotions (-0.033) is having negative impact but insignificant. Utility sector is affected by the rebate & discount (5.077) positively and significantly. Remaining two variables are having negative impact but insignificant.

Fig. 1: Steps of Research Methodology.

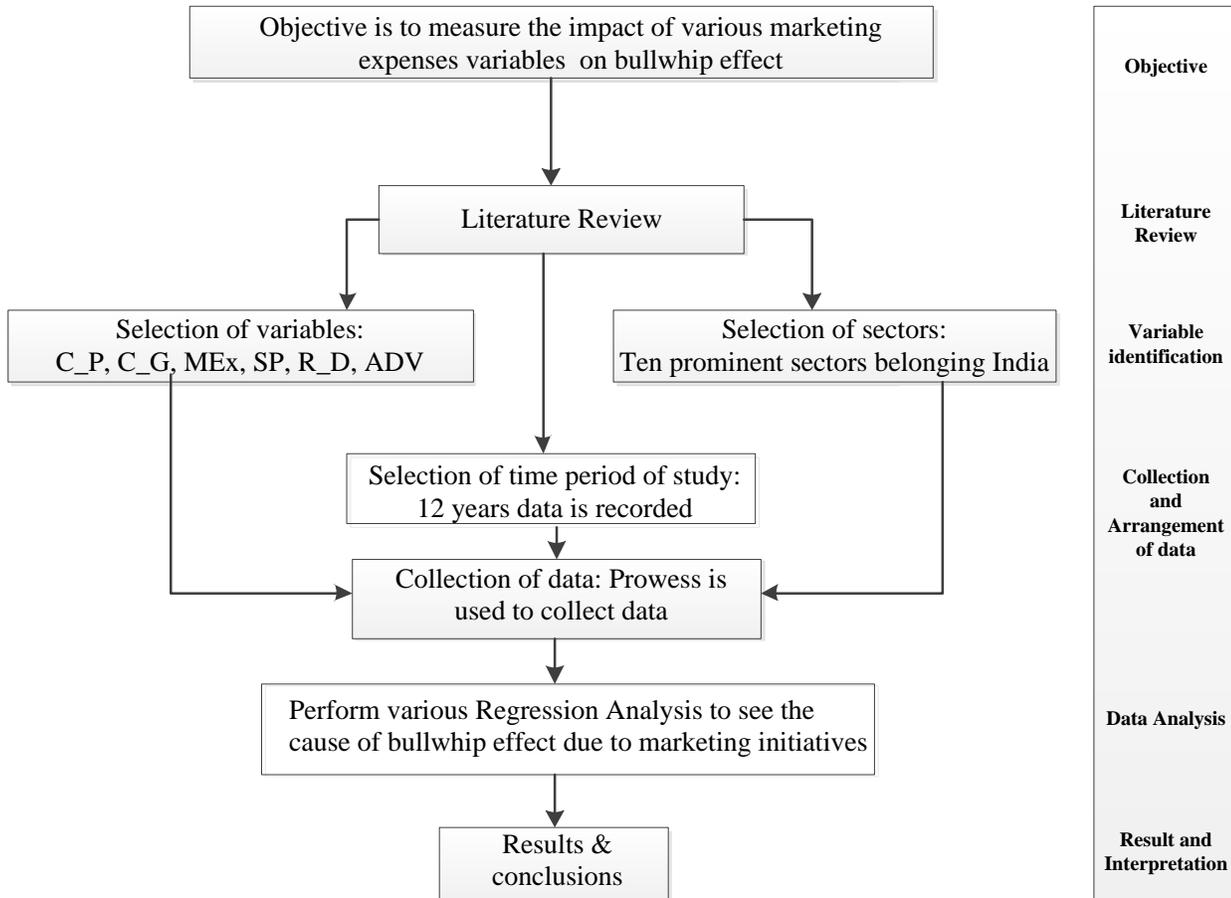


Table 1: Linear regression C_P as function of C_G with MEx.

C_P	Coef.	St. Err	t-value	p-value	Sig.
C_G	0.633	0.005	130.46	0.000	***
Mex	-0.052	0.060	-0.86	0.388	
Cons	506.424	305.405	1.66	0.097	*

Mean dependent var	3797.936	SD dependent var	42156.735
R-squared	0.880	Number of obs.	2474.000
F-test	9038.822	Prob > F	0.000
Akaike crit. (AIC)	54477.543	Bayesian crit. (BIC)	54494.984

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Linear regression C_P as function of C_G, R_D, SP and ADV.

C_P	Coef.	St. Err	t-value	p-value	Sig.
C_G	0.265	0.026	10.04	0.000	***
R_D	4.330	0.285	15.19	0.000	***
SP	1.983	0.929	2.13	0.034	**
ADV	0.169	0.692	0.24	0.808	
Cons	-1352.221	482.805	-2.80	0.005	***

Mean dependent var	4471.818	SD dependent var	12127.490
R-squared	0.740	Number of obs	1289.000
F-test	202.408	Prob > F	0.000
Akaike crit. (AIC)	5874.557	Bayesian crit. (BIC)	5892.889

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression coefficients predicting the C_P as linear function of C_G and MEx (p-values are in bracket).

DV: Change in Production	Sectors									
	Auto	Consumer Durable	Energy	FMCG	IT	Oil & Gas	Power	Real	Telecom	Utility
C_G	0.881 (0.000)* **	0.999 (0.000)** *	0.628 (0.000)** *	0.646 (0.000)** *	0.928 (0.000)** *	0.619 (0.000)** *	0.902 (0.000)** *	0.993 (0.000)** *	0.899 (0.000)***	0.57 (0.000)***
MEx	-0.184 (0.252)	-0.301 (0.204)	-0.167 (0.506)	0.052 (0.06)*	-0.295 (0.55)	-0.079 (0.875)	0.5 (0.082)*	0.01 (0.933)	0.17 (0.005)***	0.57 (0.000)***
Cons	386.498 (0.597)	-319.034 (0.394)	-505.757 (0.851)	227.893 (0.037)**	37.351 (0.84)	-3455.45 (0.719)	-660.478 (0.134)	-5.804 (0.898)	150.866 (0.568)	-727.736 (0.142)
R-squared	0.922	0.986	0.888	0.699	0.932	0.884	0.908	0.997	0.953	0.683
F-test	793.8 (0.000)* **	3290.75 (0.000)** *	734.429 (0.000)** *	869.751 (0.000)** *	3561.782 (0.000)** *	218.049 (0.000)** *	945.027 (0.000)** *	16604.78 (0.000)** *	1434.295 (0.000)***	293.497 (0.000)***

*** p<0.01, ** p<0.05, * p<0.1, DV: Dependent Variable, IDV: Independent Variables

In sectors where the total marketing expenditure is not affecting the bullwhip effect but it is the particular way of promotion expenditure which is impacting the bullwhip effect. In auto sector, rebate & discount (-12.733) is having significant negative impact whereas sales promotion and advertisement is not affecting the volatility of production. Consumer durable is showing the opposite result as shown by auto sector in which sales promotion (1.03) and advertisement (2.401) are found to be significantly positive and rebate & discount is found to be insignificant. In IT sector, sales promotion (9.682) is significantly causing the bullwhip effect and does not use rebate & discount as the promotion tool. In oil & gas sector, rebate & discount (-2.844) is found to be negatively impacting the bullwhip but it is the sales promotion (7.892) which is causing the bullwhip effect. Energy and real sectors are not affected

significantly by marketing expense as well as its direct and indirect components (SP, ADV, R_D).

5. Conclusions and Managerial Implications

The promotional strategies are varying with respect to sector to sector. The energy and real sector are showing the variability in production but it is not due to the promotional expenses. In rest of the identified sectors which are summarized in Table 5, FMCG is found to be more complex in nature because the variability in production is caused by the combined effect of rebate & discount, sales promotion and advertisement but individually these variables are not causing the bullwhip effect. To gain market share, to get rid of inventories and tough competition in market lead the way to promotional activities carried out by companies.

Table 4: Regression coefficient predicting the C_P as a linear function of C_G, R_D, SP and ADV (p-values are in bracket)

DV: Change in Production	Sectors									
IDV	Auto	Consumer Durable	Energy	FMCG	IT	Oil & Gas	Power	Real	Telecom	Utility.
C_G	0.879 (0.000)***	0.491 (0.000)***	0.9 (0.000)***	1.109 (0.000)***	0.3 (0.000)***	0.165 (0.000)***	0.75 (0.000)***	0.993 (0.000)***	0.8 (0.000)***	0.272 (0.000)**
R_D	-12.733 (0.038)**	-1.297 (0.145)	0.005 (0.983)	1.514 (0.484)	-	-2.844 (0.078)*	1.454 (0.077)*	-	-	5.077 (0.000)**
SP	0.686 (0.351)	(1.03) (0.094)*	-0.449 (0.375)	-0.154 (0.879)	9.682 (0.000)***	7.892 (0.053)*	-6.126 (0.243)	0.048 (0.888)	-0.033 (0.823)	-9.554 (0.511)
ADV	-0.874 (0.52)	2.401 (0.000)***	0.169 (0.585)	-0.087 (0.713)	-0.315 (0.733)	-2.561 (0.326)	66.227 (0.012)**	0.017 (0.967)	1.313 (0.009)***	-13.389 (0.431)
Cons	920.799 (0.527)	-782.529 (0.107)*	27.539 (0.819)	-362.583 (0.133)	219.464 (0.404)	899.513 (0.521)	-7616.52 (0.001)***	-22.074 (0.83)	-101.949 (0.855)	-1829.73 (0.251)
R-squared	0.989	0.835	0.894	0.831	0.493	0.694	0.922	0.997	0.942	0.798
F-test	164.652 (0.000)***	31.647 (0.000)***	55.086 (0.000)***	114.23 (0.000)***	65.271 (0.000)***	10.754 (0.000)***	76.399 (0.000)***	5295.909 (0.000)***	359.489 (0.000)***	47.416 (0.000)**

*** p<0.01, ** p<0.05, * p<0.1, DV: Dependent Variable, IDV: Independent Variables

Table 5: Significant marketing variables impacting bullwhip effect in different sectors.

IDV	Sectors									
	Auto	Consum er Durable	FM CG	IT	Oil & Gas	Po wer	Telec om	Util ity		
MEx			√			√	√	√		
R_D	√(Negativ e)				√(Negati ve)	√		√		
SP		√		√	√					
ADV		√				√	√			

In contradiction of the literature available rebate & discount expenditure in case of auto and oil & gas sector is negatively impacting the variability of production whereas it is positively impacting the power and utility sector. Sales promotion is causing volatility in consumer durable, IT and oil & gas sector. Consumer durable is also affected by advertisement which is sought as least among all the promotional expenses in causing the bullwhip effect. Advertisement expenses are causing volatility in telecom sector as well as in power sector.

The present study emphasizes on treatment of production smoothing problem and it has been suggested that the in-depth study of marketing expenses is required to deal with the problem. The marketing strategies adopted by the particular sector may not be appropriate to get rid of bullwhip effect for another sector. The impact of marketing expenses is explained on different sectors. The present study gives direction to the managers about the expenses incurred in promotion such that the volatility in production can be explained.

The present study helps the manager to build the framework for enhancing their marketing capabilities effectively keeping in mind that it does not result in bullwhip effect. In relation to bullwhip effect few things can influence the decision making regarding the expenses incurred in marketing. First, same marketing strategy will not be effective in every sector. The marketing strategies regarding the expenses incurred in direct or indirect marketing must be aligned with respect to the sector. Secondly, there exist marketing strategies which diminish the variability in production significantly; rebate and discount (direct marketing method) can smooth the production process of automobile sector. Such a decision is really helpful in Indian scenario where automobile sector is experiencing a dip of about 27% mainly due to variability existing in production process. In present study it has been shown that FMCG sector is very complex than rest of the sectors and hence the decision making of marketing manager must be align with that of the supply chain managers.

6. Limitations and Future scope

The sector chosen in the study is related to Indian economy, the study can be extended to other economies. The conditions like the geographical region, purchasing power of consumers, and market capitalization of sector in particular economy affects the supply chain of the product and hence the marketing strategies to promote a product. Although most of the studies during literature review are found to be country specific studies but inter countries studies will result in identification of more independent variables and hence the supply chain manager will get more insight about how the marketing strategies are impacting the volatility in production. This is kept as future scope of the study.

Another limitation is related with the limitation of linear regression analysis used as a technique in the present study. The mediator variables like frequency of advertisement, media chosen for advertisement, etc. are not identified and not considered in present study and the relationship between the identified independent variable and dependent variable is also assumed to be linear whereas non-linear relationship can be explored using more advanced techniques like artificial neural networks, etc. Usage of such techniques and the impact of mediation variables are kept as future scope of the study. The impact of marketing initiatives studied at each echelon of supply chain is also kept as future scope of the study.

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