

# Marketing efforts and sales revenue: A panel data analysis of Indian agri-input firms

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## ABSTRACT

This study analyses the effect of marketing efforts like advertising and distribution expenses on the sales revenue of agri-input firms in India. The study is based on panel data collected from 64 randomly selected sample firms over the period from 2002 to 2011. Fixed Effect Model (FEM) and Random Effect Model (REM) were estimated to evaluate the effectiveness of marketing efforts on sales. The empirical results revealed that both advertising and distribution expenses have significant and positive impact on sales. The advertisement elasticity was 0.0007, while the distribution elasticity was 0.0002. These results help the managers in allocating the resources to different marketing efforts in a better manner, so as to improve the effectiveness of marketing expenditure.

**KEY WORDS :** Marketing efforts, Advertising, Distribution, Sales revenue

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Marketing efforts are essential for the organic growth of any firm. Marketing efforts are closely related to the ability of firms to fulfill the needs of various stakeholders. Not surprisingly, firms spend billions of dollars on marketing. For instance, Proctor and Gamble has spent more than \$4.9 billion in advertising. The total advertising budget of U.S. companies exceeded \$285 billion during 2006 (Advertising Age, 2007). The same is the case in developing countries. The total advertising expenditure of India in 2011

was estimated about \$6.9 billion (Casbaa AD, 2011). This could be an indicator to show how marketing expenses account for considerable share of annual budget. Marketing-related business costs increased to approximately 50 percent from 20 per cent of total costs over the past 50 years (Sheth and Sisodia, 1995a and b).

In spite of the huge marketing expenditure, firms often confront with lack of concrete measures or knowledge of returns obtained from investment in marketing. Marketing function has long been criticized for low productivity and accountability (Sheth and Sisodia, 2002). Under such large investments, marketing managers have the responsibility to optimally allocate these resources and demonstrate that these investments generate appropriate returns for the firm. There is a need to translate marketing resource allocation and their performance consequences into financial and firm value effects (Srivastava and Reibstein, 2005). Subsequently, it has become even more important for marketing managers to understand and measure marketing's impact on firm value (Lehmann, 2004).

Impact of marketing efforts in agribusiness sector does not draw adequate attention although the problem continued

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in general businesses. Based on above framework, the main purpose of this study is to determine the relationship and degree in terms of advertising and distribution expenditure on sales revenue of agri-inputs firms in India.

A number of studies have been done to understand the interrelationship between advertising and other forms of promotions with sales. A brief review of the research studies conducted at different points of time is presented in the following sections.

The economic effect of advertisement expenses has been a much debated topic. Verdon *et al.* (1968) studied the relationship between advertising and aggregate demand and found that advertising had a positive relation with aggregate demand, but Ekelund and Gramm (1969) could not establish any positive relationships. Lee (1994) took data of U.S. brewing firms and showed that poor performance of a firm led to more advertising investments and hence more risk taking attitude. Leong *et al.* (1996) found a strong positive relationship between advertising expenditure and sales. Similarly, Elliot (2001) revealed that advertising has a significant positive effect on food industry sales and this relationship between advertising expenditure and sales appears to be stable. Pagan *et al.* (2001) studied the effectiveness of advertising on sales using bivariate Vector Auto Regression model and showed that one time increase in advertising expenditure leads to increase in the sales of orange with one month lag. It was also found that the impact of advertising expenditure on grape fruit sales was more immediate and relatively large. While analyzing a company's advertising expenditure and its sales during the recession, Kamber (2002) found a measurable relationship between advertising expenditure and sales, after controlling other factors, such company size and past sales growth, etc. A study conducted by Sudarsan (2007) showed that advertising influenced sales, though its relative effectiveness was different for different categories of firms. In a study, Sharma and Sharma (2009) and Andras and Srinivasan, (2003) revealed that the effect of advertisement on sales is more for manufacturing companies and less for non-manufacturing companies. Banerjee *et al.* (2012) found that there was cointegration between Integrated Marketing Communication and Net Sales revenue in the personal care industry in India. They also proposed an appropriate error correction model which showed the speed of adjustment of the variables.

The conclusion of above review divulges that there is no consensus on the economic effects of advertising expenses on sales revenue. Different studies have shown diverse results. In general, majority of the studies have used time series data and detected positive relationship between advertising on sales. Given such empirical evidences, this study predicts a statistically significant and positive relationship between advertising expenditure and sales

revenue of agri-inputs firms in India with the following hypothesis:

H<sub>1</sub>: Advertising expenditure has a positive and significant influence on sales revenue of agri-inputs firms in India.

With the advent of lean production, total quality management and just-in-time deliveries, organizations are building closer working relationships with a reduced number of suppliers. Stewart (1965) indicated that additional sales volume could result from reduced prices through distribution efficiencies. It is further emphasized by Rhea and Schrock (1987a and b) that distribution effectiveness closely related to customer satisfaction and sales performance. To provide utility, the traders and producers ..... *et al.*, 1968). Goods represent little value for purchasers until "placed in a temporal and spatial context" to enjoy the physical and psychological attributes related to possession (Bowersox, 1969). Many authors (Rolnicki (1997), Rosenbloom (2003) and Coughlan *et al.* (2005) agreed that inside the marketing mix (price, product, place and promotion), the marketing channel variable tends to be the best way to obtain sustainable competitive advantage. They suggested that the production technology, the promotional efforts and the pricing can be easily reproduced than the distribution strategy. Not only the academic community but also the practitioners have paid attention to distribution channels. Therefore, firms spend substantial amount in order to ensure that their products/ services are available to customers in an adequate and timely manner. Baidya and Basu (2008) found that marketing expenditure in terms of advertising, price, promotion and distribution expenditure was positively and significantly influenced sales revenue.

The recent view, especially in the Indian context is that expenditure on distribution primarily tends to create availability thereby sales (Sahay and Pillai, 2009). Obaji (2011) indicates distribution has positive effects on the sales of a product and the channel members should influence several key decisions such as customer service, delivery, and maintain inventory control. Based on above empirical evidence, the study formulated the second hypothesis as:

H<sub>2</sub>: Distribution expenditure has a positive and significant influence on sales revenue of agri-inputs firms.

## METHODOLOGY

The present study specifically attempts to measure the effect of marketing efforts on sales revenue of agri-inputs firms in India. The required data were collected from the data base, Prowess, a corporate database of Centre for Monitoring Indian Economy (CMIE). A time period of 10 years, starting from 2002 to 2011 was considered as the requisite data for the study were available only for this time period.

The study aimed to focus on all agri-inputs firms which are part listed in Bombay Stock Exchange (BSE). An exhaustive list of firms pertaining to agri-inputs industry from CMIE database was compiled. Out of these 215 listed firms, only 64 firms (29.9 per cent of total agri-inputs) formed the sample size. The other firms were not considered because of data limitations due to merger / take over, change of industry sector over the period of the study and non- availability of complete report of the firm etc. Thus, only 64 firms from CMIE database were studied and rest of the firms which were either not in operation in any year during the time period (2002 to 2011) or which were in operation but the requisite data on marketing and financial indicators were not available.

In the present study, correlation analysis and panel data regression method were employed to address the objectives of the study. The panel data regression model is of two types viz., Fixed Effects Model (FEM) and Random Effects Model (REM). As the sample includes 64 companies covering a period of ten years, panel data regression model is the most suitable because it allows overcoming the unobservable, constant and heterogeneous characteristics of individual firms. Between these two models, the model with highest explanatory power to the balanced panel was employed. A balanced panel data is a dataset with no missing value. Hence, the usual identification tests and the Hausman's Chi-square statistics were employed to select the best alternative.

The relationship between marketing efforts and sales revenue is expressed as:

$$\ln \text{Sales}_{it} = \alpha + \beta_1(\text{Advert.exp}_{it}) + \beta_2(\text{Dis.exp}_{it}) + \beta_3 \ln(\text{Firm size}_{it}) + \beta_4(\text{Age}_{it}) + v_i$$

where,

i denotes firms (1 to 64 firms - cross-sectional dimension)

t denotes time period (1 to 10 years - time-series dimension)

Sales = Log of annual sales revenue (Indian Rupee) of firm i for time period t

Advert.exp = Actual annual advertising expenses (in Indian Rupee) of firm i for time period t

Dis.exp = Actual annual distribution expenses (in Indian rupee) of firm i for time period t

Firm size = Log of total assets (in Indian Rupee) of firm i for time period t

Age = The number of years of firm i since in operation.

Above equation was estimated by times series panel regression using Gretl software and STATA software in order to capture the time varying effect of advertising expenditure and distribution expenditure on sales revenue

## ANALYSIS AND DISCUSSION

Multivariate panel data regression analysis was

employed to estimate the impact of marketing efforts on sales revenue of agri-inputs firms. The forthcoming section presents diagnostic tests to check for the violation of regression assumptions, if any, followed by the results derived from panel regression analysis.

Diagnostic tests are employed to test for the presence of non-stationarity, serial/auto correlation, multicollinearity and heteroskedasticity in the panel data models that affect the efficiency of the estimators. The F-test value obtained was 0.120 with p-value = 0.729 which was more than 0.05 implying that autocorrelation is not existed. Heteroskedasticity test was also done by first fitting the models with panel-level heteroskedasticity by means of Iterated Generalized Least Square and then fitting the model by Feasible Generalized Least Square without considering heteroskedasticity. The log likelihood of both the regressions is then compared as to whether they are significantly different or not by calculating the likelihood ratio, which is distributed as Chi-square. The result indicated a significant presence of panel heteroskedasticity in the regression model based on Chi-squared value (2466.33) with (p-value = 0.00). To control for heteroskedasticity, robust standard errors have been computed by clustering the data in order to tackle the presence of panel heteroskedasticity.

In a panel data analysis, it is crucial to investigate whether the pooled data are stationary or not. Stationarity of the variables is must because non-stationary series cause spurious relationship between variables that in turn leads to distorted results. Harris and Tzavalis (1999) unit root test could be employed (Singh and Dhingra, 2013; Canarella *et al.*, 2012).

Table 1 presents the HT statistic, z and the p-values for variables under study. The results revealed that all variables were stationary (p-value < 0.01) and can be used for analysis.

**Table 1: Harris-Tzavalis (HT) unit root test for panel data stationarity**

Variables	Statistic	Z	P-value
Sales	-0.2837	-14.754***	0.000
Advert.exp	0.2814	-2.096***	0.018
Dis.exp	0.2992	-1.699***	0.044
Firm size	0.0162	-8.037***	0.000
Age	-0.333	-13.593***	0.000

\*\*\* indicate significance of value at P=0.1

The average value of sales revenue for selected sample was Rs. 9955.865 million with a minimum and maximum value of Rs. 1.3 million and Rs. 329484.3 million, respectively (Table 2). The standard deviation was Rs. 24713.3 million from average value which suggested that there was a rather wide dispersion in the sales revenue of the sample agri-input firms. Advertising expenditure

(Advert.exp.) had a mean value of Rs. 52.348 million with the maximum and minimum value of Rs. 1132 million and Rs 0.1 million, respectively. The standard deviation was Rs. 115.5843 which suggested that there was a wide dispersion on the advertising expenditure among sample firms. This result suggests that there were some firms, which reduced their advertising budget due to maturity and well recognition in the market and among the customers. The mean value of distribution expenditure (Dis.exp.) was Rs. 402.168 million with maximum and minimum value of Rs. 9541.5 million and Rs 0.1 million, respectively. The standard deviation (SD) was Rs.1073.73 million which was very high comparing with advertising expenditure. The mean value of firm size was Rs. 9788.869 millions with having a maximum value of Rs. 206598.1 million and a minimum value of Rs. 9.6 millions, respectively. The standard deviation was Rs. 22125.89. It must be also pointed out that the sizes of these firms highly varied considering the minimum and maximum size. Finally, the average age of the firm was 31 years, standard deviation was 14.34 and the maximum and minimum age was 65 and 11 years, respectively.

**Table 2: Descriptive statistics for dependent and explanatory variables (n=64)**

Variable	Mean	Median	Std. Dev	Min.	Max.
Sales (Rs. in million)	9955.865	2127.95	24713.30	1.3	329484.3
Advertising (Rs. in million)	52.348	5.70	115.58	0.1	1132.0
Distribution (Rs. in million)	402.168	47.85	1073.73	0.1	9541.5
Firm size (Total assets)	9788.869	1404.75	22125.90	9.6	206598.1
Firm age (Years)	31.378	30.50	14.34	11.0	65.0

The correlation analysis exhibited a positive and significant relation between sales revenue and marketing efforts variables *i.e.* advertising and distribution expenditure at 1 per cent level of significance with co-efficient of 0.37 and 0.89, respectively (Table 3). However, sales revenue was positively and strongly correlated with firm size at 1 per cent level of significance with co-efficient of 0.912 and at a weak correlation with age at 0.13. Advertising and distribution expenditure could be an effective mechanism to boost the sales revenue.

**Table 3: Correlation analysis of firm performance and marketing efforts measures**

Variables	Sales	Advert.exp	Dis.exp	Firm size	Age
Sales	1.000				
Advert.exp	0.374**	1.000			
Dis.exp	0.894**	0.336	1.000		
Firm size	0.912**	0.431	0.763	1.000	
Age	0.161**	0.225	0.173	0.200	1.000

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively

The Random Effects Model (REM) is used for estimating sales-marketing efforts relations based on Hausman specification test result. The regression result is presented in Table 4. It could be observed that all the explanatory variables positively and significantly influenced the sales revenue with 1 per cent level of significance. The R<sup>2</sup> value of 0.69 indicated that about 69 per cent of the variation in the sales revenue has been explained by the explanatory variables included in the model. The Wald test in the random effects model confirmed the joint significance at 1 per cent of all regressors. The Breusch-Pagan Lagrangian Multiplier test rejects the Null hypothesis that the variance of the  $u_i$  equals zero ( $\delta_u^2 = 0$ ), indicating unobserved firm-specific effects do make a difference in the compound disturbance. These results indicated that the regression model used to explain the relationship between marketing efforts and sales in the analysis performed well in predicting sales revenue. However, the Hausman specification test showed the preference of the random effects model over fixed effects model.

**Table 4: Panel estimation of marketing efforts with log-sales as dependent variable**

Variables	Co-efficient	Stand. error	t-value
Constant	1.4424	0.26230	5.499
Advert.exp.	0.0007***	0.00026	2.770
Dis.exp.	0.0002***	4.54830e <sup>-05</sup>	3.348
Firm size	0.7133***	0.03648	19.55
Age	0.0270***	0.00635	4.251
Adjusted R <sup>2</sup>	0.69		
Wald test	248.82(0.000)		
BP-LM	201.79(0.000)		
Hausman test (FE vs. RE)	11.158(0.248)		
Number of observations	640		

\*\*\* indicate significance of value at P=0.1

The regression results as expected, the co-efficient of the advertising expenditure was positive and significantly influenced the sales revenue with t-value = 2.270, p-value < 0.05. This result is consistent with our proposition and supported the hypothesis (H<sub>1</sub>). The co-efficient of advertising expenditure may be interpreted as an elasticity measuring the percentage change in sales associated with 1 per cent change in advertising expenditure. From the result, it was observed in sales-marketing model, the advertising elasticity co-efficient was 0.0007 which means that 1 per cent increase in advertising expenditure would lead to increase in sales revenue of Indian agri-inputs firms by 0.0007 per cent over the study period. This figure indicated that the volume of sales was slightly elastic with respect to advertising efforts. However, the weak co-efficient of advertising expenditure

(0.0007) may not be surprising since the advertising spending has a time lag before creating an impact on the sales revenue.

Moreover, a positive and statistically significant intercept value with high co-efficient (1.4424) of intercept term reveals that even if the advertising/distribution expenditure becomes zero, there will be some amount of sales. This means that factors other than advertising which determine the sales revenue like distribution factor, company size, corporate age, the reputation of the company, brand name, product quality, etc. become operative. This finding is consistent with the results of previous studies (Kamber, 2002). So, we can say that the result of this model supports the previous studies which exhibited a positive relationship between advertising expenditure and sales.

With respect to the effect of distribution expenditure, the hypothesis ( $H_2$ ) proposing a positive and significant impact of distribution expenses on market performance. It was seen that the distribution expenditure was positive and significantly influenced the sales with t-value = 3.348, p-value < 0.005. This result is well consistent with the hypothesis ( $H_2$ ). Further, the elasticity co-efficient of distribution expenses as marketing variable was 0.0002 which means that 1 per cent increase in the distribution expenditure would lead to increase in sales of agri-input firms by 0.0002 per cent. The finding of this model was consistent with the previous studies (Stewart, 1965; Rhea and Schrock, 1987 a and b; Baidya and Basu, 2008 and Obaji, 2011). From these findings, it is concluded that the marketing efforts in terms of distribution expenditure has a positive and significant impact on sales revenue of agri-input firms of India.

### Conclusion and implication:

This study showed an improvement in the sales of agri-input firms of India as a result of marketing efforts namely, advertising and distribution expenditure. No doubt advertisement and distribution expenditures are part of the various factors, even crucial, which determine sales of any firm through increasing popularity of products/services among customers. So, the firms need to take care of these factors, while formulating their strategies relating to the spending on marketing efforts. Their influential role may be suppressed by the operation of other factors which also seek equal attention at the time of framing of any sales promotion policy.

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