# The interplay between sales and marketing expenditures: an econometric approach in the B2B market

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## Abstract

**Purpose** – Managers engage in marketing efforts to boost sales and in setting marketing budgets based on current or historical sales. Past studies have overlooked the reciprocal relationship between marketing spending and sales. This study aims to examine the nature of the relationship between sales and marketing expenses in the B2B market.

**Design/methodology/approach** – Five hypotheses on the relationship between sales and marketing expenditures were framed. A total of 30 of India's dyeing firms provided data on revenues, sales (in units) and marketing expenditures over time. The structural vector auto-regressive model and the vector error correction model were fitted to the data.

**Findings** – The results show that marketing expenses and sales are related bidirectionally in a sequential way. Furthermore, sales drive the long-term equilibrium relationship to a greater extent than marketing expenditures.

**Practical implications** – The findings of this study should assist managers in predicting sales and marketing budgets simultaneously and devising precise marketing strategies and tactics.

**Originality/value** – Using econometric models in data-driven research is not a frequent practice in marketing. This study adds value to the body of marketing literature by advancing the theory of the relationship between sales and marketing spending using real-world data and econometric models in the B2B sector.

**Keywords** Sales, Marketing spending, Dynamic, Relationship, Cointegration, B2B, Marketing expenditures

**Paper type** Research paper

## 1. Introduction

*IBM incurred huge marketing costs by selling its mainframe computers to corporations. Hence, there might be some link between sales and marketing spending given IBM's dominance in the mainframe computer market. In the past, few studies have attempted to capture the dynamic interrelationship between sales and marketing spending, even though the amount of marketing expenditure is a great concern to managers in the B2B sector* (Darrat *et al.*, 2016).

From the same angle, the issue of the nature of the relationship is paramount to managers dealing with marketing expenditures and sales in the B2B sector, as mentioned in a different study by Hillebrand *et al.* (2015). In the same vein, in a 2016 paper, Hanssens and Pauwels posed the question, "Do marketing spending and sales interact? How and why? How can marketing spending and sales be forecast simultaneously?" These are strategic questions and need to be studied scientifically because marketing spending and sales may have cyclical cause-and-effect relationships over time (Edeling and

Fischer, 2016; Fine *et al.*, 2017; Mittal *et al.*, 2021; Porto and Foxall, 2020).

However, despite its acknowledged managerial implications, whether marketing spending affects sales, sales impact marketing spending or sales and marketing spending periodically influence one another has received little attention in the past, especially in the B2B market (Büyükdağ *et al.*, 2019; Srinivasan and Ramani, 2019). Furthermore, how and why the "marketing-sales" system exists as well as works is still confusing to managers and researchers (McAlister *et al.*, 2016). Consequently, in this work, we attempted to identify the nature of the interplay between sales and marketing expenditures, implying an econometric approach (Darrat *et al.*, 2016; Katsikeas *et al.*, 2018).

The literature suggests that the marketing budget has been determined as a fixed percentage of sales to date (Kolsarici *et al.*, 2020). This approach is overly simple and judgmental and disregards the dynamic connection between sales and marketing expenditures (van Everdingen *et al.*, 2019). Earlier studies did not consider the nature of the relationship between sales and marketing spending in suggesting how to set a marketing budget (Srivastava and Dorsch, 2020). However,

managers need empirical evidence concerning the direction and size of the reciprocal effects of sales on marketing spending and marketing expenditures on sales while setting the marketing budget (Chakrabarti and Makhija, 2021).

According to Borkovsky et al. (2017) and Sydney-Hilton and Vila-Lopez (2019), a dynamic connection exists between sales and marketing expenditures. This implies that marketing spending drives sales in one period, sales drive marketing expenses in the following period, and so on and so forth (Guenther and Guenther, 2022; Wang et al., 2020). To understand the complex relationship between sales and marketing spending, *we reviewed pertinent papers, even though most studies have focused on the simple relationship between sales and advertising in the past* (Sahni et al., 2019).

As per the literature, a sizable number of recent studies have investigated the relationship between sales and marketing spending using the simple causality principle (Reid et al., 2017; Yang et al., 2020). Furthermore, Assael et al. (2021) tested the causality between sales and advertising expenditures under the same heading. The authors' findings revealed that there is a unidirectional causal relationship between advertising expenditures and sales that goes from the former to the latter. Moreover, Anderson et al. (2020) and Gallego et al. (2019) concluded that sales are causally related to advertising expenditures over the long run in their respective studies.

In addition, to gain rich insights into the causal relationship between sales and marketing spending, the aspect of a dynamic interplay between them is paramount (Dawes et al., 2018). Kolsarici et al. (2020) put this idea into practice by using the information on sales and advertising costs. The authors showed that there is a causal relationship between sales and advertising that is unidirectional and starts with sales. In the same vein, Fischer et al. (2016) tried to capture the sales volatility of the change in marketing spending in a different study and discovered that marketing expenditures have a significant impact on sales.

Furthermore, a substantial volume of research has attempted to explain the relationship between sales and advertising expenses using the principle of Granger causality (Laurie and Mortimer, 2019). Using the cointegration tenet, Li et al. (2021) observed that the direction of causation between sales and advertising is bidirectional. Moreover, Borkovsky et al. (2017) aimed to find out whether sales and advertising have a long-run equilibrium relationship between markets. This study reported that the strength of the relationship between advertising and sales declined in the long run and varies from market to market.

Along the same lines, Larson et al. (2015) analyzed sales and advertising spending data using the cointegration framework. The authors acknowledged that causality goes from sales to advertising expenditures. Moreover, using the same approach, Dabrowski (2019) investigated a distinctive data set concerning sales and advertising expenditures. Sales and advertising spending, according to the authors, have no relationship at all.

In the same vein, a few more studies have used the cointegration framework to estimate the relationship between sales and marketing spending (Darrat et al., 2016; Kolsarici et al., 2020; Story et al., 2015). In a huge study, Darrat et al. (2016) reported that advertising expenditures and sales are causally unrelated in the long run, and the direction of causation runs from the latter to the former. In contrast,

Rahman et al. (2021) discovered that the direction of causation goes both ways: from sales to advertising and from advertising to sales. Moreover, through conceptual research, Chakrabarti and Makhija (2021) suggested that sales and marketing spending are supposed to be causally related.

Along the same route, Harz and Hohenberg (2022) initiated a test to see whether sales and advertising were cointegrated by fitting the vector auto-regressive (VAR) model to the data on advertising expenditures and sales. They found that there is unidirectional causality between sales and advertising spending instead of bidirectional. Moreover, Spotts et al. (2020) fitted a vector error correction (VEC) model to the data on profit and marketing costs. The authors concluded that the two variables are bidirectionally connected rather than cointegrated.

In a different vein, short-interval data have been used to shed light on the relationship between marketing expenditures and sales in many past studies (de Haan et al., 2016; Ramani and Srinivasan, 2019). For example, Jayson et al. (2018) fitted a VAR model to the data and discovered that marketing expenditures have a long-term impact on sales. Furthermore, using a longitudinal approach, Rosengren et al. (2015) captured the effect of advertising on sales and found no evidence of advertising influencing sales or sales impacting advertising expenses.

*On another path, in the B2B market, promotional spending has a larger share of the marketing budget and impacts sales both in the short and long run* (Homburg et al., 2021; Santini et al., 2016). Elberg et al. (2019) tested this proposition by collecting data on promotional spending and sales at the category level. They discovered that price promotions expand category sales. In an extensive study, Nicholas et al. (2020) observed that market share moves with evolving sales when sales are cointegrated with promotional expenditures. Moreover, Collins and Butler (2015) attempted to measure the impact of marketing efforts on sales in stationary markets. The authors suggested that sales and marketing spending are strongly correlated.

Subsequently, we grouped the findings of previous studies on the relationship between sales and marketing spending into two groups:

1 studies covering methods, tools, and procedures to deal with a simple causality; and
2 studies focused on persistence and causation.

By doing so, we observed that a higher percentage of these studies addressed the simple causal relationship between sales and marketing spending in the B2C sector instead of the B2B sector (Jensen, 2021). *In addition, few studies have tackled the complex relationship between the two in general and in the B2B sector in particular* (Dekimpe and Hanssens, 2018). *So, more research on the complex relationship between sales and marketing spending in the B2B sector is required to fill the void in the existing literature.*

Furthermore, the extensive literature review helps us to conclude that regardless of study type, a sizable number of studies have found that marketing spending causes sales in the short and long term. Others observed that sales act as a point of reference and play a crucial role empirically in setting marketing budgets. The rest of the studies reported that there is no causal relationship between sales and marketing spending (Rezvani and Fathollahzadeh, 2020). Thus, the findings of

these previous studies are inconclusive, and there is no consensus about the nature and type of relationship between sales and marketing spending in any sector, be it B2C or B2B (Howard *et al.*, 2022).

*In addition, few studies have taken into consideration the sequential and dynamic relationship between sales and marketing spending to date, especially in the B2B sector* (Varadarajan, 2016; Viio and Nordin, 2017). *Moreover, most of the past studies do not have a thorough investigation of the "Granger causality" and its direction between sales and marketing expenditures, except for a few studies in the B2B context, notably* Darrat *et al.* (2016) *and* Kolsarici *et al.* (2020). Therefore, more research needs to be commissioned to shed light on the dynamic and sequential interplay between sales and marketing spending in the B2B market (Sridhar *et al.*, 2016).

Against the above backdrop, in this work, our primary goal was to empirically capture the specific, pertinent, and implementable managerial issues concerning the dynamic and sequential relationship between marketing spending and sales in the B2B sector. Consequently, to realize this goal, we proceed with the following two research questions:

*RQ1.* Are sales and marketing spending sequentially and dynamically related? If yes, what is the direction of causality, degree of causality and degree of reciprocity between sales and marketing spending?

*RQ2.* To what extent do sales and marketing spending adjust to one another to maintain a long-term equilibrium relationship?

### 1.1 Motivation

We were inspired to answer the above two questions, as scientific insights into the relationship between sales and marketing spending are paramount for the formation of managerial strategies and the advancement of marketing theories.

The expected findings of this study should be useful to managers in four different ways (Dew and Ansari, 2020; Srinivasan *et al.*, 2016). First, objectively determining if marketing spending and sales are changing over time will be necessary for marketing planning. Next, the findings may support and clarify the relationship between sales and marketing spending, which is essential for developing an effective marketing strategy. In addition, tentative results might subsequently apply to the forecast of sales and marketing spending simultaneously when both are moving in the same direction. Finally, with the expected results of this study, managers may eventually be able to increase the value of their companies for their shareholders.

On the other hand, the tentative findings may show that the dynamic interplay between these two variables is more important than the individual actions of these two variables in devising marketing strategy (Hanssens and Pauwels, 2016; Howard *et al.*, 2022). Moreover, the findings on the dynamic interplay between marketing budget and sales may also have some theoretical applications in industrial marketing (Varadarajan, 2016). Next, understanding "marketing-sales" links can also help us grasp how this system works better. Finally, the insights of this study may also offer a thorough

theoretical defense of the reciprocal causality between marketing expenditures and sales.

We structured the rest of the document as follows. Section 2 shows the theoretical framework and hypotheses. Then, we discuss the econometric models, the data collection process and the data analysis techniques in Section 3. Next, the results are given in Section 4. Subsequently, we discuss the results in Section 5, and their implications and potential directions for further research are given in Section 6. Finally, a conclusion is presented in Section 7.

## 2. Theoretical framework

The extensive literature review helped us conceptualize that the relationship between sales and marketing expenses depends on time. Furthermore, we comprehend that sales and marketing expenditures have no immediate impact on one another but will have a significant impact in the time that follows (Hanssens and Pauwels, 2016). Moreover, while sales or marketing expenditures may initially have a significant influence on one another, the degree of intensity decreases over time (Cain, 2022).

We also got the idea that the effects of marketing expenditures on sales and sales on marketing expenditures do not always disappear (Assael *et al.*, 2021). In the literature, the time-series econometric technique was used to examine the short- and long-term effects of sales on marketing spending and vice versa. Furthermore, there is a degree of adjustment between sales and marketing spending to maintain their relationship in the long run (Frosen *et al.*, 2016; Ptok *et al.*, 2018).

The concept of a "sales-marketing" system is crucial to generating insights into the relationship between sales and marketing budgets. This system, if it exists, provides some intellectual and practical justification for the connection between sales and marketing expenditures (Homburg *et al.*, 2021). On a practical level, an effect should have one or more lagging or direct causes in establishing the "marketing-sales" system (Dew and Ansari, 2020). However, at the conceptual level, focusing on the dynamic interplay between effect and cause, it may benefit from having a thorough understanding of the "sales-marketing" system (Luffarelli *et al.*, 2019). Furthermore, the "marketing-sales" approach clarifies that neither a cause nor an effect happens at the same time in the system (Srinivasan *et al.*, 2016).

We relied heavily on the work of Becker *et al.* (2019), Goldfarb *et al.* (2022), Hanssens and Pauwels (2016), Jaisingham *et al.* (2020), Katsikeas *et al.* (2016) and Kolsarici *et al.* (2020) to grasp the related aspects of the "marketing-sales" system. Overall, these studies produced several insights, such as the fact that there is a dynamic and cointegrated relationship between *sales* and marketing expenses. Furthermore, there may be five additional possibilities for dynamic interaction in the "marketing-sales" system. The possible outcomes are as follows:

1 marketing spending affects sales over time;
2 sales impact marketing spending over time;
3 bidirectional causality;
4 short-term causation; and
5 long-term causation (Yi-Sheng, 2018).

Furthermore, the "marketing-sales" system has a few longitudinal characteristics, such as historical actions that may impact present actions (Kawahara, 2022). These longitudinal

characteristics could be of great help in establishing the causal relationship over time between sales and marketing expenditures (van Berlo *et al.*, 2023). Moreover, historical data on sales and marketing spending may be used to uncover the relationship between them, which can be used to predict sales and determine marketing budgets simultaneously (Fine *et al.*, 2017). *This means that time is a crucial element and should be taken into consideration in comprehending and estimating the causal link between marketing spending and sales if any study tries to assess "Granger causality" between them instead of "simple causality" as in past studies* (Kawahara, 2022).

*Subsequently, we identified a theoretical gap in the existing literature on the B2B market. Specifically, the present theories do not adequately account for the dynamic and sequential interplay between sales and marketing spending in the "marketing-sales" system. Furthermore, we recognize that earlier studies have neglected the reality that the effect of marketing spending on sales and sales on marketing budgets is not immediate or disappears quickly in the B2B context* (Cheah, 2021; Frosen and Stewart, 2023).

### 2.1 Hypotheses

When implementing a "marketing-sales" system, it makes theoretical sense that managers must incur marketing costs first, and sales will follow (Yajuan *et al.*, 2019). In an empirical study, marketing spending is the main driver of sales, as claimed by Currim *et al.* (2018). Moreover, Kimber *et al.* (2022) asserted in their study that marketing initiatives almost always increase sales. Furthermore, marketing spending activates the "marketing-sales" system, which is a lagging driver of sales (Wood and Poltarck, 2015). In addition, sales might therefore be the system's first effect, while marketing expenses could be its initial cause (Sahni *et al.*, 2019). In light of this theoretical underpinning, we framed our first hypothesis:

*H1.* Historical marketing spending is causally related to current sales in the presence of historical sales.

Managers frequently use a few techniques to determine how much money they should allocate to marketing (Peers *et al.*, 2017; Rutkowski, 2021). In this context, as the literature suggests, two strategies are typically used:
1  historical sales volume is used for current products; and
2  predicted or future sales volume is used for new products in the B2B sector (Spotts *et al.*, 2020).

The B2B industry frequently focuses its marketing investments on sales volume (Kogan *et al.*, 2020). The effect of this cause, which is the volume of sales, is the amount that would be spent on marketing (Nahm *et al.*, 2022). Thus, it is necessary to test this fundamental presumption of historical sales impact when setting the current marketing budget. Thus, we formed the following hypothesis:

*H2.* Historical sales are causally related to current marketing spending in the presence of historical marketing expenditures.

Literature suggests that marketing spending first spurs sales, and then sales spur more marketing spending (Liu *et al.*, 2018). In a different study, van Helden and Alsem (2016) discovered a sequential relationship between sales and marketing expenses.

In other work, Porto and Foxall (2020) suggested that marketing expenses and sales may follow a sequential feedback system. Causality would work both ways between sales and marketing spending if the sequential feedback pattern dominated the system (Terui and Li, 2019). In this backdrop, we put out the following statement on the feedback mechanism between sales and marketing spending:

*H3.* There is a sequential reciprocal relationship between sales and marketing spending.

As per Terui and Li (2019), there is a tenuous relationship between sales and marketing spending. Prior research has shown that the buying cycle exhausts the impact of marketing investment on sales and sales on marketing spending (Kohler *et al.*, 2017). This means that the impacts of marketing spending on sales and sales on marketing spending are decreasing and will not persist into the following cycle (Rutkowski, 2021). In other words, beyond the buying cycle, the system's feedback mechanism has no impact on the relationship between marketing spending and sales (Cain, 2022). This knowledge is the basis for the development of our fourth hypothesis:

*H4.* There is a short-term reciprocal relationship between marketing spending and sales.

According to a thorough analysis by Kawahara (2022), marketing spending is crucial for generating sales. Managers frequently base the amount of marketing spending on actual or predicted sales (Campbell, 2022). To improve sales, a marketing budget is determined, and it works in a cyclical pattern, considering both expected and actual sales (Abedi *et al.*, 2022; Cain, 2022). This cycle suggests that outside of the buying cycle, marketing expenses and sales may adjust to one another (Kohler *et al.*, 2017). With the aid of this theme, we came up with the following hypothesis:

*H5.* There is a long-term reciprocal relationship between marketing spending and sales.

## 3. Research design

*Testing the above five hypotheses on the relationship between sales and marketing spending was the prime task of our investigation. To accomplish this task, we needed econometric models and longitudinal data. First, we described the two time-series econometric models. Next, we discussed the sample size, the source of the data, the period of the data, the data and the methods for the purification of the data in this section.*

### 3.1 Econometric models

In this work, we were particularly interested in using time-series econometric models to test the hypotheses discussed above. To do this, we leaned on two suppositions to select models:
1  both the sales ($y_t$) series and marketing expenditures ($x_t$) series are cointegrated; and
2  both series show joint dynamic behavior (Ding *et al.*, 2020; Stipp, 2018).

First, we wanted to understand the structural relationship between $y_t$ and $x_t$ series. As a result, the structural VAR (SVAR)

model was chosen (Ding *et al.*, 2020) and the model has the following mathematical form:

$$\ln(y_t) = \beta_{y0} + \sum_{p=1}^{p} \beta_{yyp}\ln(y_{t-p}) + \sum_{p=1}^{p} \beta_{yxp}ln(x_{t-p}) + v_t^{y_t} \tag{1.1}$$

$$\ln(x_t) = \beta_{x0} + \sum_{p=1}^{p} \beta_{xyp}\ln(y_{t-p}) + \sum_{p=1}^{p} \beta_{xxp}\ln(x_{t-p}) + v_t^{x_t} \tag{1.2}$$

where $y_t$ = Sales at period $t$; $y_{t-p}$ = $p$-period lagged sales; $x_t$ = Marketing expenditures at period $t$; $x_{t-p}$ = $p$-period lagged marketing expenditures; $(\beta_{y0}, \beta_{yyp}, \beta_{yxp}, \beta_{x0}, \beta_{xyp}$ and $\beta_{xxp})$ = Unknown parameters; and $(v_t^{y_t}, v_t^{x_t})$ = Error terms.

The model mentioned above was used to examine the first three hypotheses, as mentioned above. However, to assess the other two hypotheses, it is necessary to first understand how and why $y_t$ and $x_t$ series interact with one another in the system. According to the literature, both series respond to one another through an error-correction mechanism. Therefore, to capture this mechanism, we considered the VEC model as suggested by Stipp (2018). This model's mathematical form is:

$$\ln(\Delta y_t) = \beta_{y0} + \sum_{p=1}^{p} \beta_{yyp}\ln(\Delta y_{t-p}) + \sum_{p=1}^{p} \beta_{yxp}\ln(\Delta x_{t-p})$$
$$+ \lambda_y\ln(e_{t-1}) + v_t^{y_t} \tag{2.1}$$

$$\ln(\Delta x_t) = \beta_{x0} + \sum_{p=1}^{p} \beta_{xyp}\ln(\Delta y_{t-p}) + \sum_{p=1}^{p} \beta_{xxp}\ln(\Delta x_{t-p})$$
$$+ \lambda_x\ln(e_{t-1}) + v_t^{x_t} \tag{2.2}$$

where $\Delta y_t$ = First differenced sales at period $t$; $\Delta y_{t-p}$ = $p$-period lagged first differenced sales; $\Delta x_t$ = First differenced marketing exp. at period $t$; $\Delta x_{t-p}$ = $p$-period lagged first differenced marketing exp.; $e_{t-1} = (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1})$ = One period lagged error term; $(\beta_{y0}, \beta_{yyp}, \beta_{yxp}, \beta_{x0}, \beta_{xyp} \beta_{xxp} \lambda_x, \lambda_y)$ = The coefficients to be estimated; and $(v_t^{y_t}, v_t^{x_t})$ = As mentioned above.

### 3.2 Database

To calibrate the models and test the hypotheses in the B2B market, we needed time-series data on sales and marketing expenditures. First, we randomly chose 30 firms that produce dyes for the Indian textile sector. Next, we conducted in-depth interviews with the managers of these firms to learn about the several marketing actions they apply to boost sales. Managers of all 30 enterprises told us they use a variety of sales-promoting strategies, including product sampling, personal selling, trade promotion and advertising. Furthermore, managers of these firms admitted that they usually determine marketing budgets as a fixed percentage of past sales.

All firms provided quarterly data on nominal sales, units sold (in liters), and expenditures on various marketing actions from January 1, 2010, to December 31, 2019. We created a data file with 1,200 observations. Next, we defined the variables of sales and marketing spending. We operationalized sales as actual revenues. Then, we summed the costs for advertising, cold calling, promotional items, personal selling, product sampling and trade promotion and divided the total by the number of

units sold in terms of 1,000 liters. As a result, we operationalized marketing spending as the total amount spent on marketing actions per 1,000 liters.

The data file contained 3,600 (10 years × 4 quarters × 30 firms × 3 data series) records. In terms of nominal revenues, the sizes of all the enterprises were not comparable. Therefore, we divided each firm's volume of sales (in rupees) and marketing expenditures (in rupees) by the number of units sold (as defined above) for each company to eliminate the size's effect on the relationship between sales and marketing expenses. Consequently, there were 2,400 data points in the file.

To clean up the data, we used a variety of techniques. First, we conducted a seasonality test and found that both series had a significant seasonal pattern that was eliminated using the X-11 technique. Next, we used the wholesale price index to adjust the data for inflation. Furthermore, we deleted 120 observations that had large standard deviations.

Finally, there were 2,360 data points in the amended file (1,180 observations × 2 data series). The characteristics of the data set are unpublished, original and refined, which distinguishes our data set from earlier studies. As we aggregated data to hide the identity of each firm, this research tried to explain the relationship between sales and marketing expenses at the category level. Notably, the target audience of this research is primarily managers in the B2B sector concerning the five regional economies of Brazil, Russia, India, China and South Africa (BRICS), as our sample of businesses was from India, an emerging nation and BRICS member.

## 4. Analysis and results

We analyzed the data in several steps. The Augmented Dickey–Fuller (ADF) tests were first run to determine whether sales, marketing spending and error series were cointegrated. The findings showed that $y_t$ (the sales-series) and $x_t$ (the marketing expenditures-series) were cointegrated and had joint dynamic behavior (Table 1).

Additionally, the values of the AIC and SBIC series showed a decreasing tendency from Lag 0 to Lag 1, and an upward trend from Lag 1 to Lag 4. (Table 2). As a result, both the AIC and SBIC curves have a kink point at Lag 1, hence, $p$ is equal to 1. Then, by setting $p = 1$, we reframed both the general SVAR [i.e. equations (1.1) and (1.2)] and VEC [i.e. equations (2.1) and (2.2)] models. Both models' updated versions are as follows:

$$\ln(y_t) = \beta_{y0} + \beta_{yy1}\ln(y_{t-1}) + \beta_{yx1}ln(x_{t-1}) + v_t^{y_t} \tag{3.1}$$

**Table 1** Results of the stationarity tests

| Series | ADF-statistic | ADF-critical value at | | |
| | | $p < 0.01$ | $p < 0.05$ | $p < 0.10$ |
| :--- | :--- | :--- | :--- | :--- |
| $y_t$ | −2.20 | −3.49 | −2.88 | −2.57 |
| $x_t$ | −2.27 | | | |
| $e_t$ | −4.34 | | | |

**Notes:** $y_t$ = sales-series, $x_t$ = marketing-series, $e_t$ = error-series, ADF = Augmented Dickey–Fuller
**Source:** Authors' own work

**Table 2** AIC-series and SBIC-series trends

| At lag | AIC | SBIC |
|---|---|---|
| 0 | 14.25 | 14.55 |
| 1 | 12.15* | 13.22* |
| 2 | 12.45 | 13.72 |
| 3 | 13.21 | 13.85 |
| 4 | 13.95 | 14.11 |

**Notes:** AIC = Akaike information criterion, SBIC = Schwartz–Bayesian information criterion
**Source:** Authors' own work

$$\ln(x_t) = \beta_{x0} + \beta_{xy1}\ln(y_{t-1}) + \beta_{xx1}\ln(x_{t-1}) + v_t^{x_t} \quad (3.2)$$

$$\ln(\Delta y_t) = \beta_{y0} + \beta_{yy1}\ln(\Delta y_{t-1}) + \beta_{yx1}\ln(\Delta x_{t-1}) + \lambda_y\ln(e_{t-1}) + v_t^{y_t} \quad (4.1)$$

$$\ln(\Delta x_t) = \beta_{x0} + \beta_{xy1}\ln(\Delta y_{t-1}) + \beta_{xx1}\ln(\Delta x_{t-1}) + \lambda_x\ln(e_{t-1}) + v_t^{x_t} \quad (4.2)$$

The above SVAR model [equations (3.1) and (3.2)] was fitted to the data on one-period lag sales and one-period lag marketing expenditures. We presented the results in Tables 3 and 4, respectively.

The R-squares are quite high (Table 3), so the SVAR model gave a good fit for the data. Furthermore, all eigenvalues are less than 1, hence all the roots were within the circle, ensuring the stability of the SVAR system. Moreover, the "Lagrange multiplier" test proved that the two-error series were not connected.

H1 deals with the "Granger causality" instead of "simple causality" between current sales and historical marketing expenditures. Therefore, to assess this hypothesis, we needed

both the coefficients of $\ln(y_{t-1})$ and $ln(x_{t-1})$ in equation (3.1). In the presence of the significant coefficient of $\ln(y_{t-1})$, we observed that the coefficient of $ln(x_{t-1})$ is significant at $p < 0.05$ or better (Table 4). Therefore, H1 was confirmed.

The primary concern in evaluating H2 is to ascertain whether the "Granger causality" runs from historical sales to current marketing expenditures. Hence, again we looked at both the coefficients of $\ln(y_{t-1})$ and $ln(x_{t-1})$ in equation (3.2). The results suggested that the coefficients of $\ln(y_{t-1})$ is significant at $p < 0.01$ or better in the presence of the significant coefficient of $ln(x_{t-1})$ (Table 4). Consequently, H2 was approved.

Periodic bidirectional causality between sales and marketing spending was the theme of H3. Subsequently, we rephrased the statement of this hypothesis as "sales and marketing spending Granger causes one another sequentially." The results revealed that the coefficients of $ln(x_{t-1})$ in equation (3.1) and $\ln(y_{t-1})$ in equation (3.2) are significant at $p < 0.05$ or better (Table 4). Therefore, H3 was confirmed.

Next, we fitted the VEC model to the data on the sales series, marketing expenditures series, and error series [equations (4.1) and (4.2)] and presented the results in Tables 5 and 6. The R-squares are high; that is, the VEC provided a good fit for the data. Additionally, the Durbin–Watson (DW) statistics are within the prescribed range (1.86–2.34); thus, there was no autocorrelation in the error series.

The short-term simultaneous effects of sales on marketing spending as well as marketing spending on sales are the subject of the fourth assertion. In other words, the duration of their influence on one another is exhausted within the data interval. Thus, we revised the formulation of this hypothesis as "The impact of marketing spending on sales and sales on marketing spending wore off within the data interval." H4 was confirmed since the magnitudes of both $\beta_{yx1}$ & $\beta_{xy1}$ [in equation (4.1) and equation (4.2)] are significant at $p < 0.05$ or better (Table 6).

**Table 3** VAR model's validation statistics

| Variable | $R^2$ | F | $p$ | EV | LM 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| $ln(y_t)$ | 0.77 | 97.45* | <0.01 | 0.77 | 5.6 | 4.7 | 5.9 | 8.2 |
| $ln(x_t)$ | 0.82 | 101.17* | <0.01 | 0.61 | | | | |

**Notes:** *$p < 0.01$; EV = eigenvalue, LM = lagrange multiplier
**Source:** Authors' own work

**Table 4** Estimates of the VAR model

| Criterion | Predictor | Coefficient (SE) | t | p |
|---|---|---|---|---|
| $ln(y_t)$ | $ln(y_{t-1})$ | 0.45* (0.09) | 5.00 | <0.01 |
| | $ln(x_{t-1})$ | 0.22** (0.09) | 2.44 | <0.05 |
| | Constant | 3.21* (0.48) | 6.68 | <0.01 |
| $ln(x_t)$ | $ln(y_{t-1})$ | 0.35* (0.11) | 3.18 | <0.01 |
| | $ln(x_{t-1})$ | 0.41* (0.08) | 5.12 | <0.01 |
| | Constant | 2.12* (0.41) | 5.17 | <0.01 |

**Notes:** *$p < 0.01$; **$p < 0.05$; SE = standard error
**Source:** Authors' own work

**Table 5** VEC model's validation statistics

| Model | $R^2$ | F | P | DW |
|---|---|---|---|---|
| $ln(\Delta y_t)$ | 0.92 | 120.42* | <0.01 | 1.98 |
| $ln(\Delta x_t)$ | 0.85 | 94.55* | <0.01 | 2.13 |

**Notes:** *$p < 0.01$; DW = Durbin Watson statistics
**Source:** Authors' own work

**Table 6** Estimates of the VEC model

| Criterion | Predictor | Coefficient (SE) | t | p |
|---|---|---|---|---|
| $ln(\Delta y_t)$ | $ln(\Delta y_{t-1})$ | 1.29* (0.16) | 8.06 | <0.01 |
| | $ln(\Delta x_{t-1})$ | 0.33** (0.12) | 2.75 | <0.05 |
| | $\lambda_y$ | −0.16** (0.07) | −2.28 | <0.05 |
| | Constant | −0.73*** (0.42) | −1.73 | <0.10 |
| $ln(\Delta x_t)$ | $ln(\Delta y_{t-1})$ | 1.12** (0.65) | 1.70 | <0.05 |
| | $ln(\Delta x_{t-1})$ | 0.14* (0.03) | 4.66 | <0.01 |
| | $\lambda_x$ | −0.28** (0.11) | −2.54 | <0.05 |
| | Constant | −0.90*** (0.51) | −1.73 | <0.10 |

**Notes:** *$p < 0.01$; **$p < 0.05$; ***$p < 0.10$; SE = standard error
**Source:** Authors' own work

Coming to *H5*, the focus is on the long-term effects of marketing expenditures on sales and sales on marketing expenditures. Alternatively, the reciprocal influence on one another extends beyond the data interval. Therefore, we updated the statement to "Marketing expenditures impact on sales and sales impact on marketing expenditures beyond the data interval." For verification of *H5*, the signs and the magnitudes of $\lambda_y$ & $\lambda_x$ [in equation (4.1) and equation (4.2)] were used. We found that both signs are negative, and both magnitudes are significant at $p < 0.05$ or better (Table 6). Hence, *H5* was validated.

## 5. Discussion

This work produced three major findings:

1  there was a "Granger causal" relationship between sales and marketing spending;
2  the direction of causality was bidirectional; and
3  both sales and marketing spending provided adjustments to the deviation for the long-term sustainability of the system.

The findings showed that sales and marketing spending had different degrees of causation. The impact of historical sales on current marketing expenditures was stronger than that of historical marketing expenditures on current sales. *For instance, the magnitude of the coefficient of historical sales is 0.45, and current marketing spending is 0.22. This means that with a 1% change in the shock of historical sales and a 1% change in the shock of current marketing spending, current sales were supposed to increase by 0.67 percentage points overall.* Moreover, the findings suggested that there was a 10-percentage-point discrepancy between the two effects – sales on marketing spending and marketing spending on sales. In their respective studies, Darrat *et al.* (2016) and Laurie and Mortimer (2019) described comparable results.

*There were two direct effects and two crossover effects in the "marketing–sales" system, as our findings suggested. The magnitude of the direct effect of previous sales on current sales is 0.45; the direct effect of historical marketing expenditures on current spending is 0.41; the crossover effect of past marketing expenses on current sales is 0.22; and the crossover effect of past sales on current marketing expenditures is 0.35. These magnitudes revealed that for a 1% change in the shock of past marketing expenditures and a 1% change in the shock of current sales, the current marketing spending was supposed to be changed by 0.76% in total.* Thus, the direct effects were bigger than the crossover effects for both marketing spending and sales. Moreover, past marketing spending had a higher impact on the current marketing budget than its impact on current sales, and vice versa. Consequently, we concluded that for both variables, the direct effects were stronger than the crossover effects. Frennea *et al.* (2019) and Dekimpe and Hanssens (2018) reported related findings in the literature.

Furthermore, the findings of this study revealed that there was a "bidirectional relationship" between marketing budget and sales through a cause-and-effect chain in the system. To be exact, marketing spending and sales periodically served as both a cause and an effect in the system. Moreover, the findings show that both sales and marketing spending were predictors of one another. In this context, we found sales had marginally higher predictive power than marketing spending in the system. Our discovery of "bidirectional causality'" between sales and marketing spending confirmed the conclusions drawn in past studies (Kolsarici *et al.*, 2020; Rahman *et al.*, 2021).

In addition, this study provided solid evidence for the immediate causal relationship between marketing spending and sales. This immediate causal relationship resulted in some short-run dynamism in the "marketing-sales" system. We perceived that the sales series' immediate causality coefficient was larger than that of the marketing expenditure series. Thus, the findings suggested that the contribution of the sales series was higher to the system's short-run dynamism than the marketing spending series. In their works, Kawahara (2022) and Jayson *et al.* (2018) observed equivalent findings as reported here.

The research findings showed that the coefficients of the two error-correction terms had played a crucial role in the "marketing-sales" system. *The magnitudes are $-0.16$ and $-0.28$ for the error coefficients of the sales series and the marketing spending series, respectively. These magnitudes indicated that both series did not respond to the deviation in the same fashion. The sales series was less sensitive to deviations compared to the marketing expenditures series. We observed that the marketing expenditures series was 12% quicker to respond to the deviation than the sales series.* Kolsarici *et al.* (2020) and Spotts *et al.* (2020) *found analogous findings in their respective works.*

The magnitude and signs of these two coefficients suggested that there was a persistent relationship between sales and marketing expenses. Moreover, these findings helped us infer that both series had reacted to perturbations in the equilibrium line to a significant degree. Furthermore, both series adjusted to one another to maintain a long-run equilibrium relationship through the error-correction mechanism. In their studies, Eisend and Tarrahi (2016) and van Berlo *et al.* (2023) presented parallel findings, as shown in this work.

Finally, our findings conveyed that the temporal gap explains the role of the error correction mechanism in the "sales-marketing" system. Furthermore, this gap serves as a catalyst and regulates the causal connection between sales and marketing expenditures. This mechanism prevented marketing expenditures and sales from deviating from the equilibrium line. But occasionally, they might deviate; if they keep going, this mechanism pulls them back on course. Nambiar *et al.* (2021) shared related findings regarding the error-correction mechanism in the literature.

## 6. Implications

This section presented a few potential avenues for the implications of the findings of this research, especially in the areas of managerial practices and research.

### 6.1 Managerial implications

Managers must know whether marketing spending and sales are cointegrated. Predicting sales, marketing expenses, or both, without taking this issue into account, could lead to unreliable results. This research addressed this issue in model building and provided some useful guidelines, such as why sales and marketing spending should move together. Therefore, the findings of this study should aid managers in projecting either sales or marketing expenses or both simultaneously.

While dealing with the "marketing-sales" system, managers need to pay attention to the pattern of co-movement between sales and marketing spending. The results generated insight into the strength and direction of the causal relationship between marketing spending and sales. Moreover, the study exposed the co-movement pattern between sales and marketing spending empirically and revealed who is the lag indicator and who is the lead indicator each time. Consequently, the findings of this study should help managers balance marketing expenses and sales.

Managers frequently assume that the relationship between sales and marketing spending is linear and straightforward. However, the relationship between sales and marketing expenses is thorny and nonlinear. Hence, this research dealt with this issue by measuring "Granger causality" instead of "simple causality." Therefore, managers may find this research's conclusions on "Granger causality" highly helpful in dealing with the "marketing-sales" system strategically.

*Managers should comprehend how marketing spending influences sales immediately and persistently in advance before investing in marketing actions.* This insight is paramount, as the effect of marketing spending on sales might spread beyond the purchase cycle. Consequently, this study tackled this aspect in the estimation of parameters using the "Granger causality" principle. Thus, the findings of "Granger causation" might assist managers in precisely allocating funds to short-term tactics and long-term strategies.

Managers' available options for evaluating the effectiveness of marketing spending throughout the buying cycle or later fall short to date. Therefore, this study attempted to estimate the feedback mechanism between marketing spending and sales through an econometric approach. Subsequently, the findings of this research on the feedback effects between marketing expenditures and sales yield pertinent insights. Therefore, managers should find the insights gained from this feedback mechanism quite useful in determining the marketing budgets for each purchase cycle.

One of the best strategies to increase the productivity of marketing expenditures in the B2B industry is to segment clients. Traditionally, managers have segmented their clientele based on a variety of firmographics, which ignore the behavior of the clients. This work attempted to capture the response, in terms of sales, of the clients to marketing efforts. Thus, the results provided valuable insight into how buyers react to marketing initiatives. Consequently, the findings of this study should help managers segment their clientele into distinct groups based on the intensity of individual clients' responses to marketing actions.

Finally, through an econometric analysis using real-world data, the study derived a few inferences concerning the "marketing-sales" system. Hence, this study provided a more detailed explanation of the relationship between sales and marketing expenses. Furthermore, the results supported the notion that sales and marketing expenditures interact as an integrated system. Therefore, the findings of this research should be of great value to managers in managing the "marketing-sales" system precisely.

## 6.2 Research implications

The "marketing-sales" system may comprise several elements, such as sales and marketing spending, brand, reputation, data,

marketing capabilities, price, product and distribution channels. However, this research defined a "marketing-sales" system using two elements: sales and marketing expenses. In two dimensions, a system cannot be robust. Thus, to produce a robust "marketing-sales" system, more elements need to be taken into the loop. Even though this study only used two dimensions, it yielded substantial findings and provided a precise methodology. This will help researchers shed more light on the "marketing-sales" system using an eclectic approach to validate the findings of this research.

In addition, this study broadens the concept of the "marketing-sales" system using a straightforward and constrained method. As it brings new perspectives to the topic, this theoretical contribution should also serve as a starting point for subsequent research on the "marketing-sales" system. Researchers ought to use the same approach and, at the very least, consider price as an additional element of the "marketing-sales" system. When price is considered, sales (in units) should be taken into consideration instead of nominal sales. Furthermore, to add new dimensions, researchers need to follow the strategy, procedure and method of this work. By doing so, they will probably develop a comprehensive "marketing-sales-price" system based on the methodologies and findings of this study.

## 6.3 Limitations and further research

This research possesses a few limitations too. We described them one by one, along with avenues for further research, in this section.

First, we did not consider additional endogenous variables (such as price, R&D expenditures and market orientation) because the purpose of this study was to investigate the link between marketing spending and sales parsimoniously. Knowledge of the relationship between marketing expenses and sales could increase by including these endogenous variables as moderators in the system. Therefore, we advise researchers to investigate how these mediators shape the relationship between sales and marketing expenses in the future.

Second, we aim not to see how various marketing efforts, such as sales force, advertising, promotion and commission, affect sales or how sales influence each of them. Therefore, investigating the reciprocal causal relationship between sales and individual marketing actions is paramount. This topic merits special attention, as it paves the way for how marketing funds need to be allocated to various actions. Hence, we recommend researchers dive deeper into ongoing research in this area.

Third, the level of business rivalry may change the industry's long-term equilibrium relationship between sales and marketing spending. However, this was not the study's main point of interest. Consequently, it is helpful to include such a concern when determining the direction of causality between sales and marketing expenses at the sectoral level. Thus, we strongly recommend that this issue be investigated right away in the future.

Fourth, this work analyzed data from businesses in the same industry and from one nation – India. However, data needs to be gathered from various businesses and nations to provide insights that can be generalized. As a result, there may be some

limits to generalizing this research's conclusions to other sectors or regions. Therefore, we invite scholars to consider other industries and geographies to extend this research in the future.

Finally, it is paramount to comprehend how and to what extent sales and marketing spending interact and complement one another in the system. This aspect needs to be taken into consideration in the loop to capture the essence of the "marketing-sales" system. However, by including an interaction term in the models, this work could shed insight into this vital issue. Thus, we urge further research into this matter.

## 7. Conclusions

The main goal of this research was to investigate whether sales and marketing spending move jointly in the "marketing-sales" system. We analyzed data from 30 firms in the dyeing industry using 2 econometric models. Consequently, there were a few interesting and insightful findings, such as the fact that there was a reciprocal causal relationship between marketing expenses and sales. Furthermore, the findings suggested that sales and marketing spending were "Granger causally" related. *This means that a shock in historical sales impacted current marketing expenditures in the presence of its own effect. Moreover, a shock in historical marketing expenditures impacted current sales in the presence of its own effect. These unique findings are generalizable to some extent in the B2B sector since we derived them from a large sample of firms, thus filling the gap in the literature on industrial marketing.*

*Furthermore, our findings answered both the questions of how and why the "marketing-sales" system operates and exists. We found that sequentially, sales and marketing spending influenced one another, which may be the answer to the question of how the system operates. Another noteworthy finding was that sales and marketing spending adjusted deviations, which might be the answer to the question of why this system exists. Moreover, the findings of this research discovered that the "marketing-sales" system operates through an error correction mechanism, which is paramount to implementing a system approach in dealing with sales and marketing spending simultaneously. As a result, this study's contribution includes a confirmation that the "marketing-sales" system exists, an invisible error component exists between sales and marketing expenditures, and an extension of the theory concerning the dynamic relationship between sales and marketing spending in the B2B market.*

*There have been innumerable studies conducted in the past on the relationship between sales and marketing spending in the B2C sector. However, as far as our limited knowledge is concerned, there have been few reports in the B2B sector about "the reciprocity in the relationship" between sales and marketing spending to date. Furthermore, few studies have attempted to examine the "Granger causality" issue concerning the relationship between sales and marketing spending at the industry level in the past. As a result, our research fills a large gap in the corpus of knowledge regarding the "marketing-sales" system in the B2B context.*

## References

Abedi, V.S., Berman, O., Feinberg, F.M. and Krass, D. (2022), "Strategic new product media planning under emergent channel substitution and synergy", *Production and Operations Management*, Vol. 31 No. 5, pp. 2143-2166.

Anderson, R.E., Cohen, A.H., Christ, P.F., Mehta, R. and Dubinsky, A.J. (2020), "Provenance, evolution, and transition of personal selling and sales management to strategic marketing channel management", *Journal of Marketing Channels*, Vol. 26 No. 1, pp. 28-42.

Assael, H., Ishihara, M. and Jung, K.B. (2021), "Accounting for causality when increasing sales lift from television advertising: television campaigns are shown to be more effective for lighter brand users", *Journal of Advertising Research*, Vol. 61 No. 1, pp. 3-11.

Becker, M., Wiegand, N. and Reinartz, W.J. (2019), "Does it pay to be real? Understanding authenticity in TV advertising", *Journal of Marketing*, Vol. 83 No. 1, pp. 24-50.

Borkovsky, R.N., Goldfarb, A., Haviv, A.M. and Moorthy, S. (2017), "Measuring and understanding brand value in a dynamic model of brand management", *Marketing Science*, Vol. 36 No. 4, pp. 471-499.

Büyükdağ, N., Kaya, A. and Kitapci, O. (2019), "The effect of marketing expenditures on business performance: time series analysis on causality", *Journal of Applied Economics & Business Research*, Vol. 9 No. 4, pp. 197-211.

Cain, P.M. (2022), "Modelling short-and long-term marketing effects in the consumer purchase journey", *International Journal of Research in Marketing*, Vol. 39 No. 1, pp. 96-116.

Campbell, C. (2022), "Where to next? Honoring my predecessor's work and a plan for continued improvements", *Journal of Advertising Research*, Vol. 62 No. 4, pp. 298-300.

Chakrabarti, S. and Makhija, M. (2021), "Exploratory study on variables impacting display advertising spend of leading advertisers in the USA", *Journal of Marketing Communications*, Vol. 27 No. 2, pp. 176-206.

Cheah, C.W. (2021), "Why firms exploit the dual marketing strategy? A network-institutional perspective", *Journal of Business & Industrial Marketing*, Vol. 36 No. 12, pp. 2150-2164.

Collins, N. and Butler, P. (2015), "A marketing perspective on the rise of China: monopoly, politics, and value", *Journal of Marketing Management*, Vol. 31 Nos 3/4, pp. 269-288.

Currim, I.S., Lim, J. and Zhang, Y. (2018), "Effects of analysts' earning pressure on marketing spending and stock market performance", *Journal of the Academy of Marketing Science*, Vol. 46 No. 3, pp. 431-452.

Dabrowski, D. (2019), "Market knowledge and new product performance: the mediating effects of new product creativity", *Journal of Business Economics and Management*, Vol. 20 No. 6, pp. 1168-1188.

Darrat, M.A., Wilcox, G.B., Funches, V. and Darrat, M.A. (2016), "Toward an understanding of causality between advertising and sales: new evidence from multivariate cointegration system", *Journal of Advertising*, Vol. 45 No. 1, pp. 62-71.

Dawes, J., Kennedy, R., Green, V. and Sharp, B. (2018), "Forecasting advertising and media effects on sales: econometric and alternatives", *International Journal of Market Research*, Vol. 60 No. 6, pp. 611-620.

de Haan, H., Wiesel, T. and Pauwells, K. (2016), "The effectiveness of different forms of online advertising for purchase conversion in a multiple-channel attribution

framework", *International Journal of Research in Marketing*, Vol. 33 No. 3, pp. 491-507.

Dekimpe, M.G. and Hanssens, D.M. (2018), "Time-series models of short-run and long-run marketing impact", in Mizik, N. and Hanssens, D.M. (Eds), *Handbook of Marketing Analytics: Methods and Applications in Marketing Management, Public Policy, and Litigation Support*, Edwar Elgar, Northampton, MA, pp. 79-106.

Dew, R. and Ansari, A. (2020), "Modeling dynamic heterogeneity using Gaussian processes", *Journal of Marketing Research*, Vol. 57 No. 1, pp. 55-77.

Ding, Y., DeSarbo, W.S., Hanssens, D.M., Jedidi, K., Lynch, J.G. and Lehmann, D.R. (2020), "The past, present, and future of measurement and methods in marketing analysis", *Marketing Letters*, Vol. 31 Nos 2/3, pp. 175-186.

Edeling, A. and Fischer, M. (2016), "Marketing's impact on firm value: generalization from a meta-analysis", *Journal of Marketing Research*, Vol. 53 No. 4, pp. 515-534.

Eisend, M. and Tarrahi, F. (2016), "The effectiveness of advertising: a meta-meta-analysis of advertising inputs and outcomes", *Journal of Advertising*, Vol. 45 No. 4, pp. 519-531.

Elberg, A., Gardete, P.M., Macera, R. and Noton, C. (2019), "Dynamic effects of price promotions: field evidence, consumer search, and supply-side implications", *Quantitative Marketing and Economics*, Vol. 17 No. 1, pp. 1-58.

Fine, M.B., Gleason, K. and Muller, M. (2017), "Marketing spending aftermarket performance of IPO firms", *Marketing Intelligence & Planning*, Vol. 35 No. 4, pp. 560-576.

Fischer, M., Shin, H.S. and Hanssens, D.M. (2016), "Brand performance volatility from marketing spending", *Management Science*, Vol. 62 No. 1, pp. 197-215.

Frennea, C., Han, K. and Mittal, V. (2019), "Value appropriation and firm shareholder value: role of advertising and receivables management", *Journal of Marketing Research*, Vol. 56 No. 2, pp. 291-309.

Frosen, J. and Stewart, D.W. (2023), "Marketing through the eyes of senior management: insights from fortune 500 reporting", *Journal of Marketing Theory and Practice*, Vol. 31 No. 1, pp. 75-96.

Frosen, J., Luoma, J., Jaakkola, M., Tikkanen, H. and Aspara, J. (2016), "What counts versus what can be counted: the complex interplay of market orientation and marketing performance measurement", *Journal of Marketing*, Vol. 80 No. 3, pp. 60-78.

Gallego, V., Gómez-Ullate, D., Suárez-García, P. and Angulo, P. (2019), "Assessing the effect of advertising expenditures upon sales: a Bayesian structural time series model", *Applied Stochastic Models in Business and Industry*, Vol. 35 No. 3, pp. 479-491.

Goldfarb, A., Tucker, C. and Wang, Y. (2022), "Conducting research in marketing with quasi-experiments", *Journal of Marketing*, Vol. 86 No. 3, pp. 1-20.

Guenther, P. and Guenther, M. (2022), "Can B2B firms benefit from competitors' advertising? A dynamic business environment perspective on an emerging communication form", *Industrial Marketing Management*, Vol. 102, pp. 252-265.

Hanssens, D.M. and Pauwels, K.H. (2016), "Demonstrating the value of marketing", *Journal of Marketing*, Vol. 80 No. 6, pp. 173-190.

Harz, N. and Hohenberg, S. (2022), "Virtual reality in new product development: insights from pre-launch sales forecasting for durables", *Journal of Marketing*, Vol. 86 No. 3, pp. 157-179.

Hillebrand, B., Driessen, P.H. and Koll, O. (2015), "Stakeholder marketing: theoretical foundations and required capabilities", *Journal of the Academy of Marketing Science*, Vol. 43 No. 4, pp. 411-428.

Homburg, C., Morguet, T.R. and Hohenberg, S. (2021), "Incentivizing of inside sales units-the interplay of incentive types and unit structures", *Journal of Personal Selling & Sales Management*, Vol. 41 No. 3, pp. 181-199.

Howard, R.C.C., Hardisty, D.J., Sussman, A.B. and Lukas, M. F. (2022), "Understanding and neutralizing the expense prediction bias: the role of accessibility, typicality and skewness", *Journal of Marketing Research*, Vol. 59 No. 2, pp. 435-452.

Jaisingham, D., Kaur, H., Goyal, J. and Joshi, M. (2020), "Marketing intensity and firm performance: empirical evidence from Indonesia", *International Journal of Productivity and Performance Management*, Vol. 69 No. 6, pp. 1109-1127.

Jayson, R., Block, M.P. and Chen, Y. (2018), "How synergy effects of paid and digitally owned media influence brand sales", *Journal of Advertising Research*, Vol. 58 No. 1, pp. 77-89.

Jensen, J.A. (2021), "Are firms like fair-weathered fans? Examining decision-making in B2B relationships", *The Journal of Business & Industrial Marketing*, Vol. 36 No. 2, pp. 281-291.

Katsikeas, C.S., Auh, S., Spyropoulou, S. and Menguc, B. (2018), "Unpacking the relationship between sales control and salesperson performance: a regulatory fit perspective", *Journal of Marketing*, Vol. 82 No. 3, pp. 45-69.

Katsikeas, C.S., Neil, A., Leonidou, L.C. and Hult, G.T.M. (2016), "Assessing performance outcomes in marketing", *Journal of Marketing*, Vol. 80 No. 2, pp. 1-20.

Kawahara, T. (2022), "Modeling the differential effect of brand strength on the sales effect of advertising", *Journal of Marketing Theory and Practice*, Vol. 30 No. 3, pp. 342-360.

Kimber, D., Guesalaga, R. and Dickmann, M. (2022), "Are your international salespeople culturally intelligent? The influence of cultural intelligence on adaptive selling behavior with B2B customers", *The Journal of Business & Industrial Marketing*, Vol. 37 No. 4, pp. 734-747.

Kogan, K., Herbon, A. and Venturi, B. (2020), "Direct marketing of an event under hazards of customer satisfaction and forgetting", *Annals of Operations Research*, Vol. 295 No. 1, pp. 207-227.

Kohler, C., Mantrala, M.K., Albers, S. and Kanuri, V.K. (2017), "A meta-analysis of marketing communication carryover effects", *Journal of Marketing Research*, Vol. 54 No. 6, pp. 990-1017.

Kolsarici, C., Vakratsas, D. and Naik, P.A. (2020), "The anatomy of the advertising budget decision: how analytics and heuristics drive sales performance", *Journal of Marketing Research*, Vol. 57 No. 3, pp. 468-488.

Larson, C.R., Turcic, D., Klein, G. and Fuqiang, Z. (2015), "An empirical investigation of dynamic ordering policies", *Management Science*, Vol. 61 No. 9, pp. 2118-2138.

Laurie, S. and Mortimer, K. (2019), "How to achieve true integration: the impact of integrated marketing communication on the client/agency relationship", *Journal of Marketing Management*, Vol. 35 Nos 3/4, pp. 231-252.

Li, Y., Li, G., Zhang, Y. and Xu, J. (2021), "Can firm innovativeness affect performance? The role of external involvement", *International Journal of Market Research*, Vol. 63 No. 4, pp. 514-534.

Liu, L., Zhang, J. and Keh, H.T. (2018), "Event-marketing and advertising expenditures: the differential effects on brand value and company revenue", *Journal of Advertising Research*, Vol. 58 No. 4, pp. 464-475.

Luffarelli, J., Mukesh, M. and Mahmood, A. (2019), "Let the logo do the talking: the influence of logo descriptiveness on brand equity", *Journal of Marketing Research*, Vol. 56 No. 5, pp. 862-878.

McAlister, L., Srinivasan, R., Jindal, N. and Cannella, A.A. (2016), "Advertising effectiveness: the moderating effect of firm strategy", *Journal of Marketing Research*, Vol. 53 No. 2, pp. 207-224.

Mittal, V., Han, K., Lee, J.Y. and Sridhar, S. (2021), "Improving business-to-business customer satisfaction programs: assessment of asymmetry, heterogeneity, and financial impact", *Journal of Marketing Research*, Vol. 58 No. 4, pp. 615-643.

Nahm, I.Y., Ahearne, M.J., Lee, N. and Tirunillai, S. (2022), "Managing positive and negative trends in sales call outcomes: the role of momentum", *Journal of Marketing Research*, Vol. 59 No. 6, pp. 1120-1140.

Nambiar, M., Simchi-Levi, D. and Wang, H. (2021), "Dynamic inventory allocation with demand learning for seasonal goods", *Production and Operations Management*, Vol. 30 No. 3, pp. 750-765.

Nicholas, D.C., Michael, E. and Ali, T. (2020), "The impact of advertising on market share: controlling for clutter, familiarity, and goodwill decay", *Journal of Advertising Research*, Vol. 60 No. 1, pp. 87-103.

Peers, Y., van Heerde, H.J. and Dekimpe, M.G. (2017), "Marketing budget allocation across countries: the role of international business cycle", *Marketing Science*, Vol. 36 No. 5, pp. 792-809.

Porto, R.B. and Foxall, G.R. (2020), "Marketing firm performance: when does marketing lead to financial gains?", *Managerial and Decision Economics*, Vol. 41 No. 2, pp. 191-202.

Ptok, A., Jindal, R.P. and Reinartz, W.J. (2018), "Selling, general, and administrative expenses (SGA)-based metrics in marketing: conceptual and measurement challenges", *Journal of the Academy of Marketing Science*, Vol. 46 No. 6, pp. 987-1011.

Rahman, M., Rodríguez-Serrano, M.Á. and Hughes, M. (2021), "Does advertising productivity affect organizational performance? Impact of market conditions", *British Journal of Management*, Vol. 32 No. 4, pp. 1359-1383.

Ramani, N. and Srinivasan, R. (2019), "Effects of liberalization on incumbent firms' marketing-mix responses and performance: evidence from a quasi-experiment", *Journal of Marketing*, Vol. 83 No. 5, pp. 97-114.

Reid, D.A., Plank, R.E., Peterson, R.M. and Rich, G.A. (2017), "Examining the use of sales force management practices", *The Journal of Business & Industrial Marketing*, Vol. 32 No. 7, pp. 974-986.

Rezvani, M. and Fathollahzadeh, Z. (2020), "The impact of entrepreneurial marketing on innovative marketing performance in small- and medium-sized companies", *Journal of Strategic Marketing*, Vol. 28 No. 2, pp. 136-148.

Rosengren, S., Erik, M. and Micael, D. (2015), "The value of ambient communication from a consumer perspective", *Journal of Marketing Communications*, Vol. 21 No. 1, pp. 20-32.

Rutkowski, I.P. (2021), "Competence measurement of production enterprises in product innovations for technological and marketing strategies", *Journal of Economics and Management*, Vol. 43 No. 1, pp. 110-130.

Sahni, N.S., Narayanan, S. and Kalyanam, K. (2019), "An experimental investigation of the effects of retargeted advertising: the role of frequency and timing", *Journal of Marketing Research*, Vol. 56 No. 3, pp. 401-418.

Santini, F., Vieira, V.A., Sampaio, C. and Perin, M.G. (2016), "Meta-analysis of the long-and short-term effects of sales promotion on consumer behavior", *Journal of Promotion Management*, Vol. 22 No. 3, pp. 425-442.

Spotts, H.E., Weinberger, M.G. and Weinberger, M.F. (2020), "Advertising and promotional effects on consumer service firm sales: media ad spend and quality matter for driving restaurant sales", *Journal of Advertising Research*, Vol. 60 No. 1, pp. 104-116.

Sridhar, S., Germann, F., Kang, C. and Grewal, R. (2016), "Relating online, regional, and national advertising to firm value", *Journal of Marketing*, Vol. 80 No. 4, pp. 39-55.

Srinivasan, R. and Ramani, N. (2019), "With power comes responsibility: how powerful marketing departments can help prevent myopic management", *Journal of Marketing*, Vol. 83 No. 3, pp. 108-125.

Srinivasan, S., Rutz, O.J. and Pauwels, K. (2016), "Paths to and off purchase: quantifying the impact of traditional marketing and online consumer activity", *Journal of the Academy of Marketing Science*, Vol. 44 No. 4, pp. 440-453.

Srivastava, R.K. and Dorsch, M.J. (2020), "Understanding the viability of three types of approach of advertising in emerging markets", *Journal of Marketing Communications*, Vol. 26 No. 8, pp. 799-812.

Stipp, H. (2018), "How context can make advertising more effective", *Journal of Advertising Research*, Vol. 58 No. 2, pp. 636-643.

Story, V.M., Bosco, N. and Cadogan, J.W. (2015), "The form of relationship between firm-level product innovativeness and new product performance in developed and emerging markets", *Journal of Product Innovation Management*, Vol. 32 No. 1, pp. 45-64.

Sydney-Hilton, E. and Vila-Lopez, N. (2019), "Are marketing strategies correlated with financial outputs? A longitudinal study", *The Journal of Business & Industrial Marketing*, Vol. 34 No. 7, pp. 1533-1546.

Terui, N. and Li, Y. (2019), "Measuring large-scale market responses and forecasting aggregated sales: regression for sparse high-dimensional data", *Journal of Forecasting*, Vol. 38 No. 5, pp. 440-458.

van Berlo, Z.M.C., Meijers, M.H.C., Eelen, J., Voorveld, H.A.M. and Eisend, M. (2023), "When the medium is the

message: a meta-analysis of creative media advertising effects", *Journal of Advertising*, Vol. 52 No. 2, pp. 1-18.

van Everdingen, Y., Hariharan, V.G. and Stremersch, S. (2019), "Gear manufacturers as contestants in sports competitions: breeding and branding returns", *Journal of Marketing*, Vol. 83 No. 3, pp. 126-144.

van Helden, J. and Alsem, K.J. (2016), "The delicate interface between management accounting and marketing management", *Journal of Accounting & Marketing*, Vol. 5 No. 3, pp. 1-15.

Varadarajan, R. (2016), "Theoretical underpinning of research in strategic marketing: a commentary", *Journal of the Academy of Marketing Science*, Vol. 47 No. 1, pp. 30-36.

Viio, P. and Nordin, F. (2017), "Double-loop sales adaptation: a conceptual model and empirical investigation", *Journal of Business-to-Business Marketing*, Vol. 24 No. 2, pp. 123-137.

Wang, N., Zhang, T., Fan, X. and Zhu, X. (2020), "Game theoretic analysis for advertising models in dual-channel supply chains", *International Journal of Production Research*, Vol. 58 No. 1, pp. 256-270.

Wood, L. and Poltarck, D.F. (2015), "Measuring the long-term effects of television advertising", *Journal of Advertising Research*, Vol. 55 No. 2, pp. 123-131.

Yajuan, L., Macro, A.D., Charles, R.H., Hayk, K. and Oral, C. Jr. (2019), "Measuring the effects of advertising on green industry sales: a generalized propensity score approach", *Applied Economics*, Vol. 51 No. 3, pp. 1-16.

Yang, Z., Wu, Y., Lu, C. and Tu, Y. (2020), "Effects of paid search advertising on product sales: a Chinese semantic perspective", *Journal of Marketing Management*, Vol. 36 Nos 15/16, pp. 1481-1504.

Yi-Sheng, W. (2018), "Buyer-seller relationships of the dental devices industry in Taiwan: perspective of relationship", *Journal of Business-to-Business Marketing*, Vol. 25 No. 3, pp. 169-186.

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