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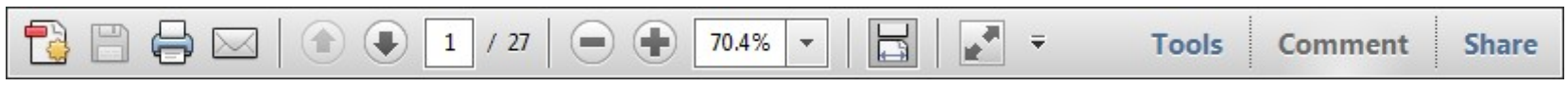

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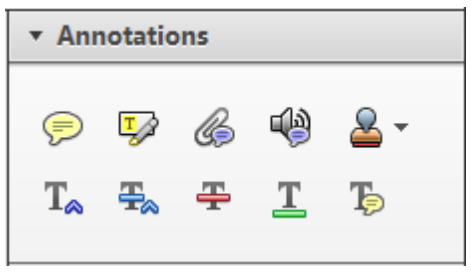

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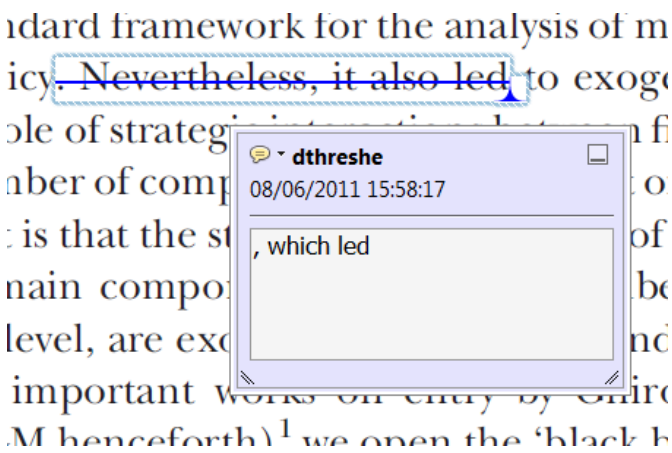

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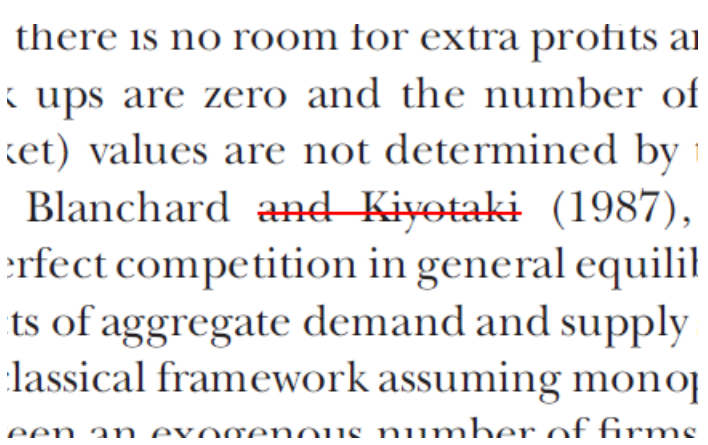

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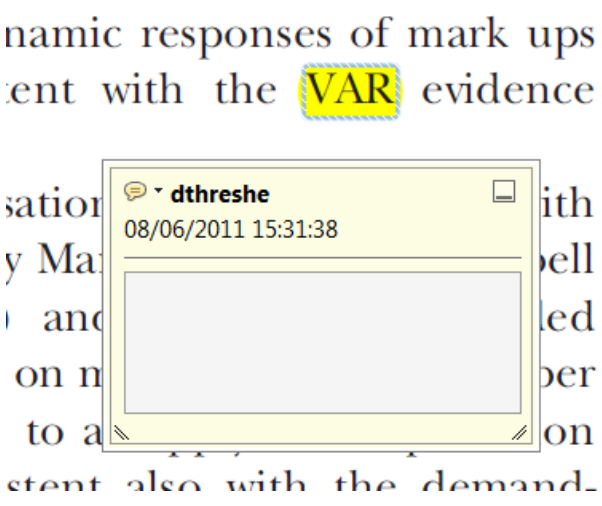

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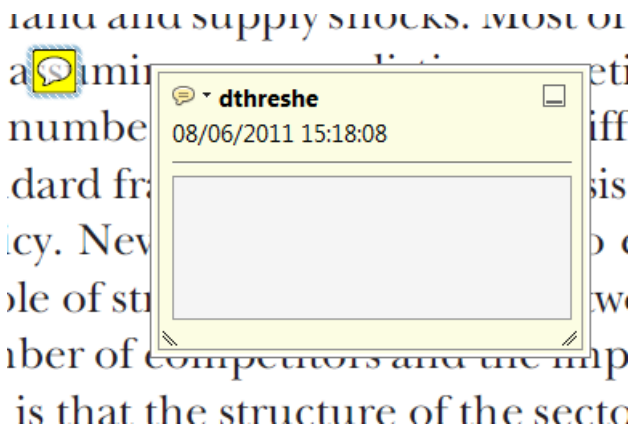

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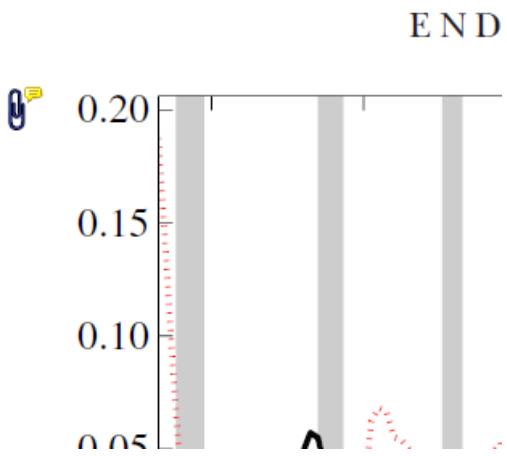

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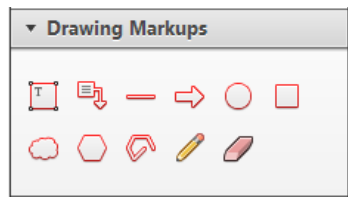

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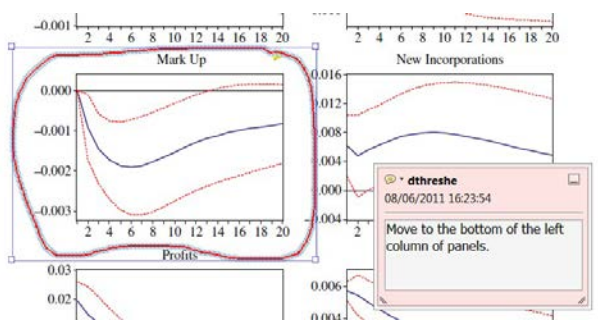

Truly Maximize the ROI of Sales' and Marketing's Expenditures With Demand-Driven Planning: Reimaging an Optimized Income Statement (OIS) as Demand-Driven

Alan Dybvig

This is a follow-on article to the author's JCAF *September/October 2015 article titled "Optimizing the Income Statement With Advanced Analytics to Truly Maximize Profit … and More: Reimaging the Enterprise Master Plan." (See http://onlinelibrary.wiley.com/doi/10.1002/jcaf.22082/abstract for a copy.) In it, the author observed that is possible to think of the optimized income Statement (OIS) from a demand standpoint—as an optimized demand-driven plan (ODDP). This article elaborates on this premise, including: (1) how sales and marketing activities drive demand/forecast as a* dependent variable; *(2) how an OIS not only truly maximizes profit but also truly maximizes the return on investment (ROI) of sales and marketing expenditures. (As described in the previous article, the OIS proof-of-concept model improved ROI between 28% and 158%), (3) how an OIS aligns the entire organization's annual planning effort by driving much closer cross-functional planning collaboration, particularly between the chief financial officer (CFO) and sales and marketing. This collaboration will take the firm, under the CFO's leadership, to the "next generation" of annual planning, that is, for the first time ever,* truly *optimized.*

This article is divided into four sections: (1) Origins of Demand-Driven Planning; (2) Current Status of Two Demand-Driven Planning Applications: Marketing-Mix Modeling and Demand-Driven Forecasting; (3) MMM's and DDF's Limitations and How an OIS Addresses Them; and (4) Conclusions.

ORIGINS OF DEMAND-DRIVEN PLANNING

Traditionally, demand is the critical *independent variable* in the planning process; it is demand as expressed in the forecast that drives the process. However, the essence of demand-driven planning is the opposite, where demand is treated as a *dependent variable* driven by sales and marketing expenditures.

The author first encountered the demand-driven concept more than 10 years ago while doing research for what has become the product that creates an optimized income statement

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(OIS). It was in a working paper for the Sloan School of Management by John D. Little, "Models and Managers: The Concept of Decision Calculus." The article describes an online model for use by product managers on advertising budget questions. The objective was to size and allocate advertising expenditures, and the model was appropriately called ADBUDG.[1]

In Little's paper, he describes the data required for generating the "sales response to advertising function" and its shape (Exhibit 1). Interestingly, the mathematical expression in this model remains the most common one 35 years later.

Several people then went on to extend the work of Little for promotional elements other than advertising. For example, Lodish et al. extend it to the sales force in an article titled "Sales Force Sizing and Deployment Using a Decision Calculus Model at Syntex Laboratories."[2]

CURRENT STATUS OF TWO DEMAND-DRIVEN PLANNING APPLICATIONS: MARKETING-MIX MODELING AND DEMAND-DRIVEN FORECASTING

Marketing-Mix Modeling (MMM)

Since its original formulation, Little's "Sales Response to Advertising Functions" has become increasingly more powerful and more sophisticated. Now referred to as response functions, the key drivers are:

1. Availability of more accurate and complete data on sales (e.g., scanner data at checkout provided by firms like IRI and Nielsen) and tracking of activities (e.g., digital promotions).
2. Vastly improved computing power.
3. Individual promotional elements of total sales and marketing expenditures extended to include more than one element (e.g., print, TV, digital, sales force).
4. The individual sales and marketing elements extended to include econometric ones (e.g., weather/environment, economic, industry trends, and competition).
5. Qualitatively developed response functions now largely replaced by quantitatively developed ones (Dekimpe, Franses, Hanssens, & Naik, 2008; Hanssens, Parsons, & Schultz, 2001).

These decision calculus applications are now broadly referred to as marketing-mix modeling (MMM). According to Wikipedia, "Marketing mix modeling is a term of art for the use of statistical analysis such as multivariate regressions on sales and marketing time series data to estimate the impact of various marketing tactics on sales and then forecast the impact of future sets of tactics. It is often used to optimize advertising mix and promotional tactics with respect to sales revenue or profit."[3]

Practitioners include the Hudson River Group, Marketing Management Analytics, MarketShare, Analytic Partners, and ZS Associates. Details on the current state of marketing-mix modeling efforts are found in IRI's brochure: "Success and Failures in Marketing-Mix Modeling."[4] Details on the use of marketing-mix modeling techniques, focused exclusively on the sales force, are available in the article "Sales-Force Decision Models: Insights from 25 years of Implementation."[5]

Demand-Driven Forecasting (DDF)

Another effort to popularize planning where demand is treated as a dependent variable came to this author's attention with the publication of the book *Bricks Matter* (Cecere & Chase, 2013). Unlike MMM's use of decision calculus response functions to size and allocate sales and/or marketing expenditures, DDF's use was to forecast. See Exhibit 2 for a description of the DDF process.

Though the concepts are the same, Cecere and Chase introduced a different demand-driven planning vocabulary than the one that had been developed by sales and marketing for MMM. According to Cecere and Chase (2013), their new terms include:

- *Demand sensing*: "Shortening the time to sense true market data to understand market shifts in the demand response. This is in contrast to the use of order or shipment data. … Demand sensing utilizes downstream data to communicate what products and services have been sold, who is buying the products and services, and the impact of sales and marketing activities on influencing consumer demand. …
  It is the responsibility of sales and marketing to capture insights in regard to what sales promotions and marketing activities have

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Exhibit 1

Sales Response to Advertising Function

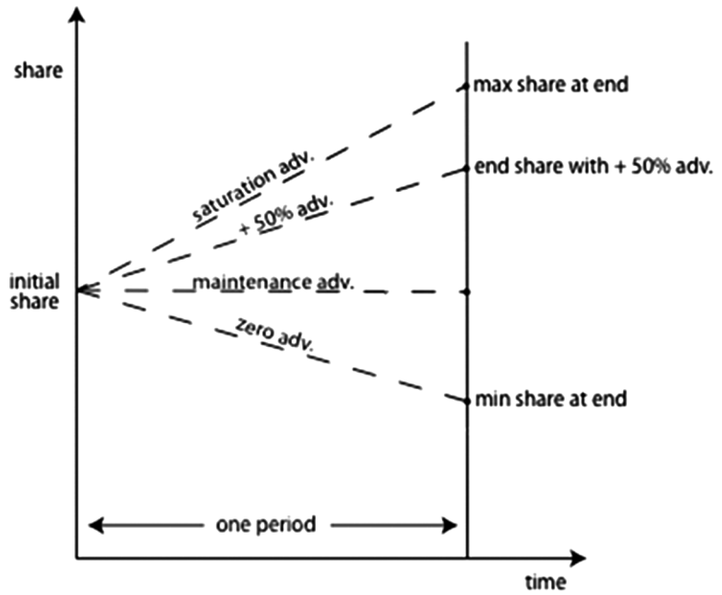

Figure 1. Input data for fitting a sales response to advertising function

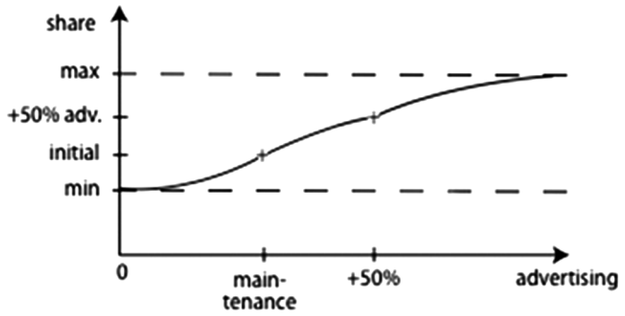

Figure 2. A smooth curve of share vs. advertising put through the data of form shown in Figure 1

AQ1

influenced consumers to purchase their products." Predictably, these data are the same as those used to create MMM response functions.

- *Demand shaping*: "The use of techniques to stimulate market demand. The most common are new product launch, price management, assortment, merchandising, product placement, sales incentives and marketing programs. … Key to demand shaping is cross-functional collaboration between sales and marketing and among members of the supply chain (e.g., finance and operations planning). True demand shaping is the process of using what-if analysis to influence

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Exhibit 2

Demand-Driven Forecasting Process

Demand sensing: *Uncover market opportunities and key business drivers (sales and marketing) by sensing demand signals related to the marketplace by market, channel, category and product.*

Demand shaping: *Using what-if scenarios, demand planners shape future demand based on sales/marketing plans* (Sales and marketing)

a) Optimize sales and marketing tactics and strategies (sales and marketing)

b) Assess financial impact (finance)

c) Finalize unconstrained demand forecast (sales and marketing)

Demand shifting: *Collaboration sales, marketing, and operations planning to match unconstrained demand to supply*

a) Consensus planning meeting (sales, marketing, finance and operations)

b) Rough-cut capacity planning review (operations)

Demand response: *Constrained demand response used to develop a final supply response (plan)*

a) Revised demand response (sales and marketing)

b) Create supply response (operations planning)

Source: http://optimizedincomestatement.com/roi/wp-content/uploads/2015/02/Developing-Enterprise-Response-Functions-latest-version.pdf

unconstrained demand in the future and matching that demand with an efficient supply response." The demand shaping functions are referred to by MMM applications as response functions.

- *Demand shifting*: **"**The shifting of demand from one period to another. This includes advanced shipments and moving product into the channel without actually stimulating sales."

MMM's and DDF's Limitations and How an OIS Addresses Them

Current marketing-mix modeling and demand-driven forecasting applications are not without their limitations, which are listed below. They include both analytic limitations and other, related limitations. For each of these limitations, the way in which an OIS addresses them follows in bold italics.

Analytic Limitations to Both Marketing-Mix Modeling and Demand-Driven Forecasting

- The objective function (that which is being maximized) has historically been contribution margin: revenue minus variable costs and not true profit. Thus, the full profit opportunity is not realized by either application, and profit is left "on the table."

OIS's objective function is true profit, not a proxy like contribution margin. No profit is left on the table.

- Similarly, the ROI of sales' and marketing's expenditures is not maximized.

OIS's sales and marketing ROI is mathematically optimal, given the assumptions explicit in the OIS model. The prescriptive math programming technique employed by OIS, mixed integer and linear programming (MILP), uniquely identifies the following three planning elements that maximize profit (MaxP):

1. ***The specific sales and marketing expenditures (S)***.

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2. ***The associated forecast those expenditures drive***.
3. ***The costs required to make and fulfill the associated forecast (cost)***.

The ROI of the sales and marketing expenditures, S, is defined as MaxP/S. This is maximized because:

1. ***If reducing S would increase MaxP, the MILP program will choose to do so***.
2. ***Similarly, if increasing S would increase MaxP, the MILP will choose to do so***.

Thus, MaxP/S is as good as it can possibly be; that is, it is maximized—there is no better ROI possible.

An Analytic Limitation Unique to Marketing-Mix Modeling

- MMM provides no quantitatively rigorous way to assure the results are feasible, that is, that the new forecast can be procured, manufactured, and delivered.
  OIS's results include the optimally feasible supply chain required to procure, manufacture, and deliver the new, maximally profitable, forecast.

An Analytic Limitation Unique to Demand-Driven Forecasting

- Demand-driven forecasting's solution technique is descriptive (i.e., what will happen if we do "X"? In the trade press, descriptive is more frequently referred to as "scenario analysis" or "what-if analysis") and not prescriptive (i.e., what is the best "X"?) and so is not optimal. See Exhibit 2.
  OIS's solver is prescriptive.

A NonAnalytic Limitation Unique to Demand-Driven Forecasting

- "Demand-driven concepts are not well understood or accepted (e.g., demand sensing, demand shaping)."
  With an OIS, there are only three concepts that need to be understood and ALL of them are in widespread commercial use today.
  - ***Response functions: As integrated into OIS, they relax the assumption of a fixed enterprise forecast by making the forecast a dependent variable of sales and marketing expenditures***.
  - ***Supply chain network design: As integrated into an OIS, it relaxes the assumption of a fixed supply chain in the projected income statement***.
  - ***A prescriptive solver: It allows an OIS to answer the question, "What is the best X where X = maximally profitable forecast?" A descriptive solver answers a different question, which is necessarily suboptimal, "What will happen if we do X where X = any forecast proposed by forecasting?"***
- Traditional management practices that have limited demand-driven forecasting's acceptance. The quotes are from Cecere and Chase (2013):
  - Sales and marketing are not profit-driven: "Typically, sales is incented for volume sold into the channel(s) … and marketing for market share."
    In addition to developing the maximally profitable forecast, OIS also develops, at an aggregated, level the associated sales and marketing expenditures sized and allocated by product, customer and channel required to attain the maximally profitable forecast.
    It should be noted this aspect of an OIS implementation will bring some management change issues involving, as it does, a different decision-making process for sales and marketing activities. This is particularly true for firms that have not already implemented an MMM application.
  - There is too much management focus on functions/silos and not enough on cross-functional activities. "Companies need to build strong vertical silos to deliver operational excellence, but at some point in their maturity, they must "break the glass" and shift their focus to build horizontal excellence."
    An OIS is focused on "horizontal excellence." Specifically, the OIS owes no mathematical or organizational allegiance to any silo. The result is optimally profitable "horizontal excellence" cross the entire organization as embodied in the income statement. AQ4
  - "Today's supply chains still respond to demand. They simply do not sense demand. As a result, the supply chain is slow, and out-of-step with the market. …"

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As described above, the entire income statement including the supply chain is driven by the response functions integrated into the OIS model. These response functions are created from "sensed" demand data that is used to create the response functions that shape the demand.

- "The financial department tends to support sales and marketing programs that unwittingly drive unprofitable short-term demand." ***Unprofitable demand is impossible in an OIS because the objective function is profit; the prescriptive OIS solver mathematically disallows any unprofitable demand.***

CONCLUSIONS

There is a simple solution to all these traditional demand-driven planning limitations: Add an OIS to the existing annual planning process. See Exhibit 3.

Adding an OIS to the firm's annual planning applications has additional advantages, including:

- Since an OIS's granularity is months within a year, finance must, necessarily, pass the forecast and the cost of goods sold (COGS) and sales, general and administrative (SG&A) resources and their allocation from the OIS to the other annual planning application (e.g., sales and operations planning [S&OP], financial planning and analysis (FP&A), marketing-mix modeling, budgeting) since they will continue to perform the firm's nearer term tactical planning and execution activities at the weekly, daily, and intraday time horizons. The OIS is, in effect, acting as finance's enterprise "master

Exhibit 3

Demand-Driven Application Comparison: MMM, DDF and OIS

Points of Comparison	*MMM*	*DDF*	*OIS*
Objective	Size and allocate a portion of sales' and/or marketing's expenditures	Developing Product(s) Forecast(s)	1. Given a forecast as traditionally developed, derive firm's ***truly maximally profitable forecast*** 2. Develop ***optimally feasible supply chain*** required to make and fulfill the new forecast.
Functional focus	Sales/marketing and finance	Operations, sales/marketing, and finance	**Entire income statement**
Objective function	Product contribution margin (revenue minus product variable costs)	Product contribution margin (revenue minus product variable costs)	**Profit**
Solver	**Prescriptive**	Descriptive	**Prescriptive**
Solution **financially optimal**	No	No	**YES**
Solution **operationally optimal**	No	No	**YES**

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Exhibit 4

44 Industries That Had a % SG&A > 25% and/or a % EBIT < 7%

Industry	*# of Firms in Industry*	*SG&A % > 25%* *Note: Exceptions have been when % EBIT <11.29% (market average)*	*% EBIT % < 8%* *Note: Exceptions have been made when % SG&A > 20%*
Total Market		15%	11%
Apparel	64	36%	
Auto (truck)	22		2%
Auto (parts)	75		7%
Bank (money center)	**13**	**52%**	**0% (See Note, below)**
Bank (regional)	**676**	**51%**	**0% (See Note, below)**
Beverage (alcoholic)	22	26%	2%
Beverage (soft)	46	36%	
Brokerage/Investment bank	**46**	**39%**	**0% (See Note, below)**
Building material	39		7%
Business and consumer services	**177**	**19%**	**9%**
Coal and related energy	42		2%
Drugs (biotech)	400	27%	
Drugs (pharm)	151	29%	
Education (for profit)	**42**	**38%**	**7%**
Electronics (consumer and office)		21%	7%
Engineering/construction	56		4%
Farming/agriculture	37		5%
Financial Services (nonbanking/ insurance)	**288**	**29%**	**7%**
Food wholesalers	14		3%
Furniture/home furnishings	27		8%
Health care support services	138		4%
Health care information and technology	127	28%	
Household products	135	33%	

(Continues)

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Exhibit 4

44 Industries That Had a % SG&A > 25% and/or a % EBIT < 7% *(Continued)*

Industry	*# of Firms in Industry*	*SG&A % > 25%* *Note: Exceptions have been when % EBIT <11.29% (market average)*	*% EBIT % < 8%* *Note: Exceptions have been made when % SG&A > 20%*
Investments and asset management	148	31%	
Office equipment and services	**25**	**25%**	**9%**
Oil/gas distribution	85		7%
Oil field services/equipment	161		6%
Paper/forest products	22		8%
Precious metals	147		7%
Publishing and Newspaper	**43**	**21%**	**9%**
Real Estate (operations and services)	**52**	**36%**	**10%**
Retail (automotive)	30		6%
Retail (building supply)	**5**	**22%**	**11%**
Retail (general)	**23**	**20%**	**5%**
Retail (grocery and food)	21		3%
Retail (online)	**46**	**25%**	**4%**
Retail (special lines)	**128**	**22%**	**7%**
Rubber and tires	4		8%
Shoe	13	32%	
Software (entertainment)	20	27%	
Software (internet)	327	28%	
Software (systems & applications)	259	27%	
Steel	40		5%
Telecom (wireless)	**77**	**30%**	**3%**

Note: When asked about 0% EBIT, Professor Damodaran commented in an e-mail "Because EBIT is a statistic that is almost impossible to compute for a bank, as is revenue."

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plan" with these annual planning applications now executing the maximally profitable forecast with the optimally feasible and sustainable supply chain. (For more details on OIS's role as an enterprise "master plan," see onlinelibrary.wiley/journal/10.1002/(ISSN)1007-0053).

- OIS does not introduce any new application interfaces to the firm's end users as it operates in the background.
- OIS can be implemented as SaaS (Software as a Service) for those firms that do not want to install the software on their IT systems.
- The enterprise response functions that make an OIS demand-driven are available as an SaaS offering. This obviates the need for the firm itself to assemble the necessary data and analytics, which can be daunting (Chase, 2014).
- The MILP supply chain network design functionality of OIS can also be implemented as an SaaS offering. In a recent blog, titled "Clouds: A Beautiful Thing for Sure!" (March, 29, 2015), Ms. Cecere concluded, "I like the clouds. In my opinion, they offer real promise for the supply chain."

"So, does this mean we have to give up on demand-driven concepts? The answer is emphatically no. It is the right concept, but it will take more time and investment in process, analytics and technology." (Chase, 2014)

In support of Mr. Chase's concerns, it is hoped the author has demonstrated that an OIS can materially assist in the effort to make demand-driven concepts more understandable and, in turn, to accelerate demand-driven planning's deployment.

Finally, it may be of interest to the reader to consider which industries would benefit the most from an OIS. In the author's view, two factors are particularly important: (1) low earnings before interest and taxes (EBIT) as a percentage of revenue and (2) high SG&A as a percentage of revenue. Fortunately, Professor Aswath Damodaran of the NYU Stern School of Business develops just such data for 96 industries in the United States annually.[6]

Narrowing the focus by including only those industries with an EBIT percentage of 7% or lower and/or those with SG&A of 25% or higher reduces the number of industries to 44. See Exhibit 4.

Similarly, the corporate culture that is most supportive of a successful OIS implementation is a collaborative, cross-functionally focused one. This is the "horizontal excellence" mentioned above.

Readers interested in more details about this article should contact Jeff Karrenbauer, Glenn Sabin, or Alan Dybvig (see contact information below).

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Also, Glenn Sabin, managing principal of ZS Associates' office in Princeton, NJ. ZS Associates is a leading sales and marketing consulting firm. He can be reached at glenn.sabin@zsassociates.com, 609-419-3849.

NOTES

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6. http://optimizedincomestatement.com/roi/wp-content/uploads/2015/06/uValuedata2.pdf

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