***Truly maximize* the ROI of Sales’ and Marketing’s Expenditures**

**With Demand-Driven Planning**

Reimagining an ***Optimized Income Statement (OIS)*** as Demand-Driven

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Abstract: 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: Reimagining the Enterprise Master Plan.” (See onlinelibrary.wiley/journal/10.1002/ (ISSN)1007-0053 for a copy). In it the author observed that is possible to think of the Optimized Income Statement (***OIS*)** from a demand stand point-- as an optimized demand-driven plan (ODDP). This article will elaborate 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 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 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.

The article is divided into four sections: 1) Origins of demand- driven planning; 2) The current status of two demand-driven planning applications, A. marketing-mix modeling (MMM) and B. demand-driven forecasting (DDF); 3) MMM’s and DDF’s limitations and how an ***OIS*** addresses these limitations and;

 4) Conclusions.

**1. 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 which creates an ***OIS***. It was in an article by John D. Little, “Models and Managers: The concept of Decision Calculus, Sloan School of Management.” The article describes an on-line 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. (See Reference 1 for link to article.)

In Little’s article, he describes the data required for generating the “sales response to advertising function” and its shape; Exhibit 1, below. Interestingly, the mathematical expression in this model below remains the most common one 35 years later…

Exhibit 1: Sales Response to Advertising Function

Several people then went on to extend the work of Little for other promotional elements 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.” (See Reference 2 for link to article.)

**2. Current Status of Two Demand-Driven Planning Applications: Marketing-Mix Modeling and Demand-Driven Forecasting**

A. Marketing-Mix Modeling (MMM)

Since their original formulation, Little’s “Sales Response to Advertising Functions” have 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. (See reference 3 for details.)

These decision calculus applications are now broadly referred to as marketing-mix modeling (MMM). Quoting 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.”

 Practitioners include 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”. See Reference 4 for the brochure. 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.” See reference 5 for the article

B.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 a book; *Bricks Matter*, Wiley, 2013 by Cecere, Lora M and Chase, Jr, Charles W.

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, below, for a description of the DDF process. (See Reference 7 for the source of Exhibit 2.)

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. Quoting from Cecere and Chase, ibid, 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 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 unconstrained demand in the future and matching that demand with an efficient supply response.” The demand shaping functions are referred toby 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.”

Exhibit 2: Demand-Driven Forecasting Process

**3. 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)***
2. ***the associated forecast those expenditures drive and***
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; i.e., 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; i.e., 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, above.

***OIS*’s solver is prescriptive**

* **A non-analytic 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***](http://demanddrivenplanning.com/roi/wp-content/uploads/2015/02/Enterprise-response-functions-elaboration-combined.pdf)***: 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 sub-optimal “What will happen if we do X where X = any forecast proposed by forecasting?”***
		- **Traditional management practices which have limited Demand-Driven Forecasting’s Acceptance**. The quotes are from Cecere and Chase, ibid:
			* + 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.***

* + - * “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…”

***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 which 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: simply add an ***OIS*** to the existing annual planning process.  See exhibit 3, below.

Exhibit 3: Demand-Driven Application Comparison: MMM, DDF and ***OIS***

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 COGS and SG&A resources and their allocation from the ***OIS*** to the other annual planning application (e.g., S&OP, 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 intra-day time horizons.  The OIS is, in effect, acting as Finance’s enterprise “master 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 Reference 10.
* ***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 who do not want to install the software on their IT systems.
		- * The enterprise response functions which make an ***OIS*** demand-driven are available as a SaaS offering. This obviates the need for the firm itself to assemble the necessary data and analytics which can be daunting. See Reference 8 for the details.
			* The MILP supply chain network design functionality of ***OIS*** can also be implemented as a 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, ibid

In support of Mr. Chase’s concerns, it is hoped the author has demonstrated 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 EBIT as % of revenue and 2) high SG&A as % of revenue. Fortunately, Professor Aswath Damodaran of the NYU Stern School of Business develops just such data for 96 industries in the US, annually. See Reference 9 for the details which were published 1/1/15

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

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.

Exhibit 4: 44 Industries which had a % SG&A > 25% and/or a % EBIT < 7%

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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