# Draft: Marketing Science Practitioners' Schema

## *Math programming applications*

| ***Parameters*** | **Rev Mgmt and Pricing** | **Rev Mgmt and Pricing** | **Sales force structure, territory design and call planning** | **Sales force size and allocation** | **Contact optimization** |
|---|---|---|---|---|---|
| Practitioner(s) | Many including Veritec Solutions, PROS, Response Analytics, Revenue Analytics Inc, JDA (Manugistics), SAS, Nomis | SAP (KhiMetric), SAS, Oracle (retek) DemandTec, Zilliant | ZS Assoc, NPV Marketing, IMS Health | ZS Assoc, NPV Marketing, IMS Health | SAS, Experian, Fair Issac |
| Math programming solver(s) used | Linear, integer and dynamic programming | Linear, integer and dynamic programming | Linear, integer and dynamic programming | Integer, nonlinear and dynamic programming | Integer programming |
| Which of 4 mrkting Ps is modeled | Price and product | Price | Promotion | Promotion | Product |
| Inventory: perishable? | yes | no | n/a | n/a | n/a |
| SIC codes | Airlines, rental cars, hotels/resorts, cruise lines, events | retail | Health care products | Health care products | Financial svcs, Telecom, Catalog retail |
| Action time horizon | Seconds to months | Days - months | 1 year | 3 years | seconds |
| Cost of incremental Unit of demand | Very small | Small | Very small | Very small | Very small |
| Software | Proprietary | Proprietary | Proprietary | Proprietary | Proprietary |
| Object function | Contribution Margin | Contribution Margin | Contribution Margin | Contribution Margin | Contribution Margin |
| Forecast (in a given model at a point in time) | fixed | fixed | variable | variable | fixed |

The schema, in its admittedly draft form, appears to support three conclusions:

1. The object function employed is contribution margin; that is revenue minus variable costs.
2. The industries supported by individual offerings are limited.
3. There were no applications found of mixed integer and linear programming. The conclusion apropos MILP is supported by a literature search, below.

 

# Marketing Sciences' MLP Literature Search

1. Gary L. Lilian and Philip Kotler, *Marketing Decision Making, A Model-Building Approach*, (Harper & Row, Publishers, 1983), pages 163- 165. Four problems are presented.
    a. Either-or constraints. The example cited is only one of two warehouses can be employed.
    b. k of k constraints. This is explained as an extension of (a).
    c. Functions with K possible values. The example cited is production capacity.
    d. Fixed-charge. The example cited is a fixed charge for a production facility as well as a variable charge

    In the conclusion to the section, reference is made to the use of integer programming techniques to solve sales force determination problems.

2. Gary L. Lilian, Philip Kotler and K. Sridhar Moorthy, *Marketing Models*, (Prentice-Hall, 1993), pages 624-626. Exactly the same four problems are presented while a reference was added to another text, see (3) below. This book was republished in October, 2007.

3. G.L Nemhauser, A.H.G. Rinnooy Kan and M.J. Todd, editors, *Handbooks in Operations Research and Management Sciences, Volume 1, Optimization* (North-Holland, 1989). This author could find no academic let alone any practitioner references to MILP formulations. Quoting: "This book includes chapters on unconstrained optimization, linear programming, constrained nonlinear programming, integer programming, nondifferentiable optimization, stochastic programming, global optimization and multicriterion optimization."

4. Eliashberg, J., Lilien, Gary L. editors, (1993), *Handbooks in OR & MS, Vol.5*, Elsevier Science Publishers. While there are numerous references in Chapter 14, "Salesforce Operations," Vandenbosch and Weinberg to the use of dynamic and integer programming techniques to solve response curve problems, there is no application of MILP techniques. Elsewhere, there is only reference to mixed-integer-programming (page 844) in a chapter entitled "Marketing-Production Joint Decision-Making" in which the demand is fixed.

5. Wierenga, B., editor, *Handbook of Marketing Decision Models*, (2008), Springer. While there are scattered references to linear programming in the subject index, there are none for MILP. Quoting from Chapter 6, Albers and Mantrala, "Models for Sales Management Decisions," Section 6.4.5.2, "Integrated Sizing and Allocation Models" "...Lodish (1980) ...proposed a decision calculus model for sales force sizing that utilized more aggregate product-by-market (customer) segment sales response functions and simultaneously optimized product-by-market segment allocations and total sales force size...Lodish (2001) reported that Syntex credited this model with increasing their profits by over 20%...Over 2000 successful applications of similar sales force sizing and resource allocation models have also been claimed by Sinha and Zoltners. According to them, typically, the models applied were non-linear programming models that utilize product-market segmented sales-effort response functions and maximize 3-5 years profitability for alternative sales force sizes and product and market allocations. Unfortunately, no more details of these models have been described or published..."

 