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Letters to the Editor

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LETTERS TO THE EDITOR

Dear Sir:

There are two points arising out of Professor W. Prager's paper "On the Caterer Problem", *Management Science 3* (1956), pp. 15–23, which seem of interest.

One is that the whole Caterer Problem can be regarded as a Transportation Problem, even if the number of napkins to be bought is not regarded as known, if one introduces a large number of napkins originally (i.e. at least as many as the largest sum of p successive daily requirements) but regards the cost of transporting a new napkin to the final inventory as zero—this meaning that the napkin is not really bought at all.

The other point is that if the total number of napkins is given, and there are only two types of laundry involved, the solution can be written down straight away as follows:

Consider the requirement at each "destination" in turn, and satisfy it according to the following rules.

1. Always use new napkins until the stock of new napkins is exhausted.
2. If there are not enough new napkins available, arrange as far as possible to supply napkins last used p or more days earlier through the slow laundry.
3. Use the fast laundry to satisfy any additional demand that cannot be met by these two means. This is Prager's solution when $p - q = 1$. But there is an important proviso when $p - q > 1$. When using the fast laundry, napkins that were last used most recently should be selected. Thus one should prefer to have napkins last used q days ago, rather than napkins last used $q + 1$ days ago, and these in turn should be preferred to napkins last used $q + 2$ days ago (as long as $q + 2 < p$), and so on. The point of this proviso is that if napkin A was last used q days ago, it could not be recovered from the slow laundry for another $p - q$ days; while napkin B which was last used $q + 1$ days ago could be made available from the slow laundry after another $p - q - 1$ days. If there happens to be a heavy demand for napkins $p - q - 1$ days later, then if napkin A is used now, napkin B can be recovered in time from the slow laundry. But if napkin B is used now, napkin A cannot be recovered in time from the slow laundry.

It is a straightforward matter to prove that the above scheme necessarily produces an optimal solution if one exists, though there may well be other equally cheap solutions.

Yours faithfully,

E. M. L. Beale
Admiralty Research Laboratory
Teddington, Middlesex
England

Dear Sir:

The artifice suggested in the second paragraph of Dr. Beale's letter neatly avoids any difficulty that could arise from the fact that the total number of napkins to be bought is not known beforehand. As this ingenious way of reducing the Caterer Problem to a conventional Transportation Problem did not occur to me, I recently studied a generalized Transportation Problem, in which quantities are prescribed at some origins and destinations and "prices" at the others ("A Generalization of Hitchcock's Transportation Problem", to appear in the Journal of Mathematics and Physics). In the Caterer Problem, the prices at the store and final inventory are prescribed to be a and 0, respectively, while the quantities are given at all other origins and destinations. It seems that this type of Transportation Problem with "mixed boundary conditions" is of considerable interest; the Warehousing Problem, for instance, falls into this class. In general, a problem of this type cannot be reduced to a conventional Transportation Problem by the artifice indicated by Dr. Beale.

The problem discussed in the remainder of Dr. Beale's letter is similar to the Caterer Problem discussed in my paper but not identical with it. This is seen from the fact that the price levels at the store and the laundries do not exert any influence on the solution.

Sincerely,

WILLIAM PRAGER
Brown University
Providence 12, R. I.

Dear Sir:

I have just read the interesting paper by Cyert and Trueblood in *Management Science*, Volume 3, No. 2, January 1957. I was surprised by the cost function assumed, since it seems to ignore the cost of "aging" an account selected for the sample. It would appear that, if these costs had been included, the coefficient of mn would be considerably larger. The optimum value for the number of accounts m to be selected per sample tray would then decrease.

I wonder whether the authors considered a plan of selecting compact segments of the tray, such as quarters or tenths, rather than the selection of a random or systematic sample of accounts within each tray. The selection of such compact segments, i.e., dividing each selected tray arbitrarily into specified segments and then selecting one at random, is extremely inexpensive and in a situation such as that described is likely to produce as small a variance as an unrestricted random sample.

Sincerely,

BENJAMIN J. TEPPING
National Analysts, Inc.
1015 Chestnut Street
Philadelphia 7, Pa.

Dear Sir:

Dr. Tepping's letter raises two very interesting questions, both of which should perhaps have received more attention in our original article.

With respect to the first point raised, namely the question of the cost of aging an individual account, Dr. Tepping's inference is quite right—that the cost is not included in our particular cost function. The reason is that this aspect of the work in this particular case is infinitesimal. Because of the procedures for aging accounts in this particular case, the time for aging an individual account was so trivial that it was not included in the cost function. However, in several other cases where the aging procedure is somewhat different, this element of cost has played a more significant role.

The second point raised was considered by us. One of the difficulties, however, is in the actual selection of accounts from fractions of trays. Our feeling on the matter was that we could not go below a half a tray and expect any consistency in the manner in which the samples would be selected. We have since conducted some experiments in other stores and there seems to be evidence that the half-tray is perhaps the optimum sampling unit. We are hesitant to make this a general proposition, however, because of the tremendous variation in the nature of the receivables from store to store. A good deal of work is continuing on this part of the problem.

Sincerely,

R. M. Cyert
Carnegie Institute of Technology
Pittsburgh 13, Pa.

Dear Sir:

I found enjoyment in Professor Weinwurm's objective approach to some debunking of the "scientific method" which appeared in the April, 1957 issue of *Management Science*. It made me think of the presidential address delivered by Mr. Gifford H. Symonds which was printed in the January issue. In it he quoted Merrill Flood as recognizing that "one group, the managers and management engineers, concentrates on perpetuating techniques used by managers who are judged to be the most successful. The other, grounded in the disciplines of mathematics and the natural sciences, concentrates on the development of new managerial tools from advances in technology and the basic sciences." With this suggested line of demarcation I strongly disagree. I know many men grounded in scientific disciplines who lack the capacity of reaching for new horizons. On the other hand, I know many managers whose long suit is reaching for new horizons.

As I see it, the natural line of demarcation is that between conformists and non-conformists and, thus, the objective of The Institute of Management Sciences is to encourage non-conformism and search for new ways of doing things in the field of management. The discovery of new tools could well come from men who have no particular background in mathematics or natural sciences.

Sincerely yours,

JOHN E. KUSIK
Vice President of Finance
The Chesapeake & Ohio Railway Company
Terminal Tower
Cleveland 1, Ohio