ATTITUDE DISTRIBUTION CHANGE AS A MARKETING APPROACH TO ACTION/SALES MAXIMIZATION

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Abstract. In finance and economics, maximization strategies commonly proceed by selecting outcome distribution. In contrast, marketing strategies attempt to change distributions in some optimal manner. A model is presented for such a strategy—maximizing the chances of achieving some uncertain action such as purchasing a particular product or voting for a particular candidate. The probability that a member of some population will perform this action is maximized by changing the distribution of the attitude toward the action. The model is constructed using the framework of classical economic production theory. The expected probability of the action is maximized under a promotional budget constraint. The decision variables considered are the moments of the attitude distribution and an attitude/action threshold.

Keywords. Marketing; product positioning; attitude change; risk taking.

INTRODUCTION


However, in this paper we replace goodwill with attitude as the considered intervening variable linking promotion with sales. Goodwill summarizing the effect of current and post-advertising outlays on demand, has an economic dimension. In contrast the attitude construct provides an overall measure of affect toward the product—based on the perception of the product attributes and their importance is more naturally considered an intervening variable in marketing in particular and in social psychology in general.

There is, however, conflicting evidence concerning the usefulness of the attitude construct as a predictor of behavior. Katona (1960, 1975), Achenbaum (1966), Day (1970a, 1970b), Ginter (1974) all obtained positive empirical results relating attitude to sales. On the other hand Tittle and Hill (1967), Wicker (1969), Sheth and Hochman (1975) have observed that other intervening variables (e.g. intentions, situational effects, budgetary restrictions) may cause the attitude/behavior relationship to be unstable.

Clarifying further the attitude/behavior relationship Ajzen and Fishbein (1977) have identified necessary conditions for attitude to be a successful predictor of behavior. The attitudinal and behavioral entities must agree or converge on the elements of action, target, context and time. Fishbein and Ajzen (1974) also concluded that whenever a single act is the direct result mostly of an evaluation as is the case in voting, the attitude measure should be a good predictor of behavior. Day and Deutscher (1982) have identified contexts in which attitude is a stable predictor of sales, for example when companies with a full line brand mix support their national brands. In this paper we take into account the effect of the contextual restrictions and the effect of other intervening socioeconomic variables by assuming an attitudinal threshold level. Once the consumers attitude level is higher than the threshold level he translates his attitude into behavioral action.

The probability of an action is thus assumed to depend on the threshold level (which can be segment specific) and on the attitude distribution. In this expository stage it is convenient to follow Thurstone (1927) and assume the attitude to be normally distributed. Affecting the mean and standard deviation of the attitude distribution the marketer changes the probability of passing the attitude/behavior threshold level and thus the probability of action.

Due to space limitations we present here only one basic theorem concerning the marketer’s optimal strategy for the case of a Bernoulli sales function, and only a sketch of its proof is provided. Further details and extensive development of the subject are provided in Hibshoosh (1985).

MODEL AND ANALYSIS

To increase expected sales the marketer tries to alter the mean \(\mu\) and standard deviation \(\sigma\) of the normal distribution of the consumer attitude. The initial levels of \(u\) and \(a\) at the beginning of the marketing period are denoted as \(u_0\) and \(a_0\) respectively and the planned terminal values of \(\mu\) and \(\sigma\) are denoted \(\mu_T\) and \(\sigma_T\) respectively.

To simplify the treatment, we introduce several assumptions: (a) The consumer performs the same exact behavioral act \(S\) (say, purchases exactly the same number of units of the product) once his attitude is above the threshold level \(a\), regardless of the attitude level. For any given attitude distribution and threshold level the probability of exceeding \(a\) is fixed. Hence \(S\) has the structure of a Bernoulli trial and we refer to \(S\) as a Bernoulli sales function. (b) The attitudinal threshold level \(a\) is assumed unaltered or equivalently the changes considered by the marketer are in \(u-a\). (c) The consumer bases sales purchasing decisions on the terminal values \(u_T\), \(\sigma_T\). (d) On the budget constraint we assume
(i) $P, (P_i)$ the unit cost for changing $(\mu, \sigma)$ is fixed and (ii) the unit cost of increasing or decreasing $\mu (\sigma)$ is identical, regardless of the direction of the change. Assuming that the marketer possesses a budget size $B$, we can express the marketer expected sales maximization problem:

$$\text{Max } F(S/A(\mu, \sigma), a)$$

s.t. $A \sim N(\mu, \sigma)$

$$B \geq P. b - b_0 + P_0 |a - a_0|$$

For space limitation we provide below only a single theorem and a sketch of its proof illustrating the rationale and style of the analysis in the extensive paper Hibshoosh (1985).

**Theorem 1.** Given:

(a) $S$, a Bernoulli sales function which depends on the consumer attitude level $A$ and a fixed threshold level $a$, $a \in A$.

(b) The attitude measure is normally distributed $A \sim N(\mu, \sigma)$ and the initial parameter values are $u_0, \sigma_0$.

(c) A budget $B$ for changing the levels of $\mu$ and $\sigma$, and $P, P_0$ are the unit costs of such changes. Then:

i) The optimal strategy for expected sales maximization will almost everywhere consist of a corner solution, i.e., manipulation of either $\mu$ or $\sigma$, but not a mixture of both.

ii) The optimal strategy:

a) Maximize $\sigma$ for

$$0 > \frac{\sigma - \sigma_0 + \frac{B}{\mu_0 - a}}{\mu_0 - a} > \frac{P_0}{\sigma}$$

b) Maximize $\mu$ for

$$0 > \frac{\sigma - \sigma_0 + \frac{P}{\sigma}}{\mu_0 - a} < \frac{P_0}{\sigma}$$

c) Maximize $\mu$ for

$$\frac{\sigma - \sigma_0}{\mu_0 + \frac{P}{\sigma}} > \frac{P}{\mu}$$

d) For

$$0 < \frac{\sigma_0}{\mu_0 + \frac{P}{\sigma}} < \frac{P}{\mu}$$

(i) If $\mu_0 < a$, increase $\mu$ to $\mu = a^*$ and minimize $\sigma$ to $\sigma = 0$.

(ii) For $\mu_0 > a$ minimize $\sigma$ to $\sigma = 0$.

**Sketch of Proof**

A. Since the attitude distribution is normal, the iso expected sales curves are linear rays originating at $(a, 0)$ and ordered counterclockwise according to expected sales level. We also could establish the relevant budget constraint segments as piecewise linear. It is convenient to establish a new rectangular coordinate system parallel to $\mu, \sigma$ in the regular $\mu, \sigma$ plane, with an origin in $(a, 0)$. From now on we will refer to the first (I) and second (II) quadrant in this coordinate system (the third and fourth quadrants are clearly irrelevant as $\sigma > 0$ by definition). Let $\varepsilon(z')$ be the ray through $(a, 0)$ with slope $- \frac{P}{\mu}$.

**Case a.**

Assume the case where the budget line is located below and parallel to $\varepsilon$. In this case clearly:

$$\frac{\sigma_0}{\mu_0 + \frac{P}{\sigma}} > \frac{P}{\mu}$$

Pass a ray $z'(z')$ from $(a, 0)$ through $(\mu, \sigma)$. $z'(z')$ is located in the II (I) quadrant. See Fig. 1.

B. Assume that both $\mu_0, \sigma_0$ and $(\mu, \sigma)$ are located in the quadrant II. In this event only strategies of increasing $\mu, \sigma$, or both would result in the increased probability for $A > a$ and should be considered. The relevant budget line is a segment with end points:

$$(\mu_0, \sigma_0) = (\mu_0, \sigma_0 + \frac{B}{\mu_0}), (\mu, \sigma_0) = (\mu_0 + \frac{B}{\mu_0}, \sigma_0).$$

This budget line segment has a negative slope of $- \frac{P}{\mu}$ and thus parallels the ray $\varepsilon$.

**Theorem 2**

**Case a.**

Assume the case where the budget line is located below and parallel to $\varepsilon$. In this case clearly:

$$\frac{\sigma_0}{\mu_0 + \frac{P}{\sigma}} < \frac{P}{\mu}$$

Pass a ray $z'(z')$ from $(a, 0)$ through $(\mu, \sigma)$. $z'(z')$ is located in the II (I) quadrant. See Fig. 1. $z'(z')$ corresponds to the highest isosales curve achievable with the given budget under mean (variance) maximization. Since the end points of the budget segment are on $z$ and $z'$, the interior of the segment is located between $z'$ and $z'$.
The slope of $\mu$ is smaller in absolute value than $\frac{B}{\sigma}$ as it lies below $\epsilon$. Having a slope smaller in absolute value than that of the budget line and passing through the end point of the budget line $(\sigma_0, \mu_0)$, $\mu$ will intersect line $\mu = \mu_v$ at $(\mu_v, \sigma')$, where $(\mu_v, \sigma')$ is below $(\sigma_0, \sigma_1)$. Ray $\mu$ passes through $(\mu_0, \sigma_1)$ and like $\sigma_1$ it originates at $(a, 0)$. Therefore $\sigma_1$ lies above $\mu$ and the interior of the budget segment. Hence $\sigma_1$ represents the highest level of expected sales achievable in this case and the corresponding optimal strategy is based only on attitude variance maximization.

Case b.

Assume the case where the budget line is located in the second quadrant above and parallel to $\epsilon$. In this case clearly

$$\frac{\sigma_0 - \sigma_1}{\mu_0 - a} > \frac{B}{\sigma} > \frac{\sigma_0 - \sigma_1}{\mu_0 - a}$$

(7)

By passing rays from $(a, 0)$ through the end points of the budget segment and using arguments similar to case a, case b is established.

Case c.

Assume the case where the budget line is located in the second quadrant and parallel to $\epsilon$. In this case it is easy to establish as in Case d(i) above, that $\sigma$ should be minimized without altering $\mu$. If the budget is sufficiently large

$$\sigma_0 > \frac{B}{\sigma}$$

then the marketer will bring his $\sigma$ to be $\sigma = 0$. Using only part of the budget, he is able to bring his ES to 1. Of course, if he wishes he can utilize the result of the budget to further increase $\mu$, but that will not yield him higher expected sales.

INFERENCE OF REVEALED PROMOTIONAL STRATEGIES

The results obtained in Theorem 1 demonstrate often observed aspects of the promotional life-cycle. Consider an example taken from the political arena. Two candidates are running for political office. One of the candidates is a well-known incumbent while the other is an unknown challenger. Initially the incumbent often has a tremendous advantage. His image (the population's average attitude toward him) is more favorable than that of his opponent. His personal qualities and positions are known to the public and he is often less controversial than the challenger. What is then the optimal strategy for the unknown challenger? Initially, it is usually difficult to significantly increase his inferior public image. It is less difficult to gain voters by appearing to espouse controversial positions. This strategy will annoy many voters and increase their dislike for him but at the same time will increase support among the extremists who will now prefer him to the incumbent. Assuming no shift in his image and symmetrical distribution of attitude, the greater the controversy the greater the number of voters who will switch to the challenger's camp. However there is a diminishing return of switched votes with increasing controversy. In order to gain an election one must gain a majority vote. Therefore the challenger will stop emphasizing his controversial image and will focus instead on improving the public attitude toward him. In this state, higher gains in switched votes will result from image improvement (compared with increased controversy). If attitude is normally distributed, once the expected attitude toward the challenger surpasses that of his opponent he will gain a majority vote.

If the candidate's next goal is to increase his majority margin, he will only be able to do so if he can win those voters repelled by his initial controversial appeal. This move is likely to annoy his most loyal backers, many of whom will be somewhat disappointed, but will vote for him anyhow. On the other hand, many of his previous opponents will join his camp. Illustrations of this process abound in many political elections, and similarly in the promotional life cycles of other new and old products.

CONCLUDING REMARKS

The stochastic nature of most marketing problems differs from that of finance or economics. A distinctive feature of the marketing approach is its focus on change of distributions while finance and economics focus on selection of distributions. The model presented here sought to capture this
distinguishing characteristic of the marketing approach in its handling of risk.

Our results indicate that in many contexts of marketing the optimal strategy of the marketer would be to emphasize changing the central tendency of the attitude distribution or its spread but not both, and that in different stages in the diffusion cycle the marketer would have to switch strategies. We can also infer that on and off strategies based on gradual allocation of resources to promotional campaigns are inefficient, as they may lead to conflicting efforts (increasing and reducing the distribution spread) during the duration of the campaign.

REFERENCES

Achenbaum, A.A. (1966). Knowledge is a thing called measurement. In Lee Adler and Irving Crispi (Eds.), Attitude research at sea (pp. 112-114). American Marketing Association.


