

A Focus on the External Analysis of Strategic Market Management: A Statistical Perspective

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ABSTRACT

The paper entails the statistical correlation of the investigations carried out for opportunity and threat of the sales and profit prediction and analysis. In case of strategic uncertainty, there exists an essence of proper investigation of trend. In this context, the paper points out statistical based approaches towards the identification of trend in context to external analysis of strategic market management.

Keywords: Statistical correlation, opportunity, threat, strategic uncertainty, trend

INTRODUCTION

Strategic development or review (Aaker, 2005) deals with an analysis of the factors external to a business that affect strategy. The analysis has to be carried out in an efficient manner for achieving better throughput in terms of profit. Any business is associated with both opportunity and threat. Proper estimation of opportunity and threat will facilitate in the understanding of the status of sales and profit in the present state. Statistical forecasting of trend of gain estimate also plays a pivotal role. Another output is the identification of strategic uncertainty regarding a business.

DISCOVERED FACTS TOWARDS STATISTICAL ANALYSIS OF OPPORTUNITY AND THREAT

An opportunity or a threat results in a significant change in pattern of the sales and profit of a business. Marketing Myopia (Levitt, 1960) indicates the essence of investigations of both opportunity and threat.

Based on the statistical analysis, the discovered facts are cited as below:

Claim 1 – The output of external analysis in strategic market management, in context to identification and understanding of opportunity and threat, can be represented as a Bernoulli random variable.

Illustration of Claim 1:

An opportunity is basically a trend that leads to a significant upward change in sales and profit patterns while a threat leads to a significant downward change.

In the light of strategic uncertainty, observation of the current sales and profit pattern with respect to that of the past can be viewed as a discrete random variable.

Let X and Y be the variables denoted for opportunity and threat respectively. Furthermore, X and Y are two mutually exclusive events at any specific timing instant of the observation period.

Therefore, R , the Bernoulli random variable (Olofsson,2005) for the external analysis of business strategy in this situation, can be viewed as –

$R = 1$ if X occurs, else

$= 0$ if Y occurs.

R is a statistical indicator of X or Y .

Let p_o be the probability of occurrence of opportunity and p_t be that of threat.

The probability mass function (pmf) of R is given as follows -

$p(m) = p_o$ for $R=1$

and $p(m) = p_t = (1-p_o)$ for $R=0$.

Hence the quantified expected value and related variance corresponding to the prediction of opportunity in strategic uncertainty situation is mathematically represented as –

$$E[R] = p_o$$

and $\text{Var}[R] = p_o \cdot (1-p_o) = p_o p_t$

Similarly the quantified expected value and related variance corresponding to the prediction of threat in strategic uncertainty situation is mathematically represented as –

$$E[R] = p_t$$

and $\text{Var}[R] = p_t \cdot (1-p_t) = p_t p_o$

Claim 2– Investigation of statistical estimation of threat in strategic market management can be governed by the basis statistical feature of failure rate function.

Illustration of Claim 2:

In case of a significant downward change in sales and profit, quantification of threat estimation is a measure of how likely failure is at a timing instant t of a brand-new product that is already t time units old. Hence it is basically a conditional measure of failure.

Let t_x be the timing instant of arrival of a new product in the market

and t_y be the maximum expected lifespan of the new product.

Now the probability mass function $p(t_y)$ is quite low as it is unlikely that the product will expire exactly at the age of t_y .

On the other hand, the failure rate $f(t_y)$ is the conditional probability that the product will expire immediately after t_y time units and that is much higher.

Hence, the statistical feature of failure rate function assuming T as the lifespan leads to the following:

$$p(t_y) = P (T = t_y) ;$$

$$f(t_y) = P (T = t_y | T \geq t_y)$$

The above mathematical equations reveal the fact that as the maximum expected lifespan of the new product increases, according the probability mass function $p(t_y)$ will tend towards 0 while the failure rate $f(t_y)$ tends towards 1.

Claim 3– In case of the occurrence of the event threat, confidence interval based statistical interference facilitates the enhancement of probability of occurrence of opportunity in future.

Illustration of Claim 3:

Threat signifies degrade in profit. Critical estimation with error bounds suffices an idea of the reasons behind the occurrence of the event.

In this context, we propose investigation of business gain in certain time-intervals so that the actual failure rate can be observed and sensed accurately. It is preferable to keep the confidence interval as short as possible in order to get high accuracy in the gain estimate. This is a very significant step in case of external analysis of business strategy.

The main objective is to find out the unknown parameters that contribute significantly towards the occurrence of downward change in sales and profit.

Suppose the gain estimates of a brand-new product within the timing interval $[T_1, T_n]$ be $G_{T_1}, G_{T_2}, \dots, G_{T_n}$.

Let α and β be the predicted unknown parameters related to each G_{T_i} .

Therefore, $T_1 \leq \alpha \leq T_k$ (a)

and $T_1 \leq \beta \leq T_k$ (b)

where $[T_1, T_k]$ be the confidence interval ($k \leq n$),

a be the confidence level for α

and b be the confidence level for β .

Let us assume further that $P(\alpha)$ be the probability of the contribution of α for the occurrence of the occurrence of threat and $P(\beta)$ be the probability of the contribution of β for same.

In this situation, any one of the following cases will exist –

Case 1 - $P(\alpha) > P(\beta)$

E is an error bound determined such that $P(\alpha' - E \leq \alpha \leq \alpha' + E) = a$

where α' is an estimator of α . Hence the parameter α is now known and based upon this an estimate for achieving opportunity in future can be worked out.

Case 2 - $P(\beta) > P(\alpha)$

E is an error bound determined such that $P(\beta' - E \leq \beta \leq \beta' + E) = b$

where β' is an estimator of β .

Case 3- $P(\alpha) = P(\beta)$

$P(\alpha' - E \leq \alpha \leq \alpha' + E) = P(\beta' - E \leq \beta \leq \beta' + E)$

Hence, the confidence level of both the unknown parameters are identical.

On the basis of the aforesaid statistical illustration and cases, we can state that the confidence interval based statistical interference facilitates the enhancement of probability of occurrence of opportunity in future.

DISCOVERED FACTS TOWARDS STATISTICAL ANALYSIS OF TREND

An external analysis contributes to business strategy by identifying significant trend of gain estimate. The trend based on the already incident samples plays a pivotal role towards taking effective decision in external analysis. Some of the decisions include investment amount, probability of market penetration, growth direction, etc. In this section, we propose the trend

analysis in the light of chi-square distribution (Giri and Banerjee ,1999) and Laplace’s rule of succession (Olofsson,2005).

Claim 4– The chi-square distribution based trend investigation plays a pivotal role in case of external analysis of strategic market management.

Illustration of Claim 4:

An external analysis can contribute to strategy indirectly by observing the trend of gain estimate. In any business scenario, estimation of the sales and profit is essential for analyzing the current status with respect to the present market need.

Symbolically we propose a trivalent state such that

-1 indicates loss in sales and profit of a business,

0 indicates no change

+1 indicates gain.

Furthermore, the aforesaid states are mutually exclusive and exhaustive in nature.

Let the sales and profit status of the business be observed on the basis of n past sampled values ,

X_i denotes the number of observations that fall in category i for $i = 1,2,3$ as trivalent state has been assumed.

and $p(i)$ be the probability of occurrence of each state.

Hence, $\sum_{i=0}^3 (X_i - n \cdot p(i))^2 / n \cdot p(i)$ denotes the basic chi-square distribution.

Claim 5– Statistical modeling of the trend in context to one of the outputs of the external analysis of strategic market management can be governed by Laplace’s Rule of Succession.

Illustration of Claim 5:

In certain cases, due to unknown reason, any unexpected event related to sales and profit may appear stochastically.

Let x be the number of occasions of an event (gain or loss) with unknown probability p.

Assume that S be the set of information after observing the events in a prior time interval . Hence it gives an idea regarding the status of sales and profit.

Since, $p \approx \text{unif}[0,1]$, $f(p) = 1$.

In Bayesian form, $P(S | p) = p^x \dots\dots\dots(1)$

and $P(S) = 1 / (x+1) \dots\dots\dots(2)$

From Eq(1) and Eq(2) , in posterior distribution form we get

$$f(p | S) = (P(S | p) \cdot f(p)) / P(S) = (x+1)p^x , (0 \leq p \leq 1).$$

The posterior means is represented by $E [p | S] = \int_0^1 p f(p | S) dp = (x+1) \int_0^1 p^{x+1} dp$

$$\text{or, } E [p | S] = (x+1) / (x+2) \dots\dots\dots(3)$$

Eq(3) signifies that stochastic arrival of any random event (gain or loss) in business sales and profit follows Laplace’s Rule of Succession.

CONCLUSION

The paper indicates the following discovered facts :

1. The output of external analysis in strategic market management, in context to identification and understanding of opportunity and threat ,can be represented as a Bernoulli random variable.
2. Investigation of statistical estimation of threat in strategic market management can be governed by the basis statistical feature of failure rate function.
3. In case of the occurrence of the event threat, confidence interval based statistical interference facilitates the enhancement of probability of occurrence of opportunity in future.
4. The chi-square distribution based trend investigation plays a pivotal role in case of external analysis of strategic market management.
5. Statistical modeling of the trend in context to one of the outputs of the external analysis of strategic market management can be governed by Laplace's Rule of Succession.

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Prof. Prasant Kumar Sahoo, M.Com., FDP, Ph.D. is educated at Utkal University and the Indian Institute of Management, Ahmedabad. Before joining as Professor of Management in Utkal University in 1991, he was also a Professor of Management in Berhampur University from 1987 to 1991 and was a faculty member of the P.G. Department of Commerce, Utkal University from 1976 to 1987. He was the Head of the Department of Business Administration in Utkal University from 1995 to 1997 and from 1990 to 1991 in Berhampur University. He was the Programme Director of MBA (Executive) Programme of Utkal University for two years (1995-1997). He has a large number of research papers published in various journals to his credit and is the author of four text-books. In addition, thirty two scholars have successfully completed their doctoral research under his supervision in the areas of Accounting and Finance. Three scholars working under his guidance have earned D.Litt. Prof. P.K. Sahoo is a core member of the AICTE expert Committee, a member of Editorial Board of Bima Quest, Journal of National Insurance Academy, Pune and was the Managing Editor of Sankalpa Journal for Management Development and Application for two years. He was also the Director, Directorate of Distance and Continuing Education, Utkal University in addition to his normal duties in the Department. Prof. Sahoo was also Head of the Department of Business Administration, Utkal University and the Warden of P.G. Hostels in the same University in 2006-2007. He was the Coordinator of the 5 Year Integrated MBA Programme, Chairman, P.G. Council and a member of the Syndicate of Utkal University. At present, Prof. Sahoo is the Vice-Chancellor, Utkal University. His current research interest is the investigation of the practical application and utility of Accounting and Finance theories in the Indian context.