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Market Analysis in Strategic Management- A Fuzzy Logic and Statistical Perspective

Prasun Chakrabarti[1], Prasant Kumar Sahoo[2]
[1]Sir Padampat Singhania University,Udaiipur – 313601, India
Email: prasun9999@rediffmail.com
[2]Utkal University, Bhubaneswar –751004 , India.
Email: prasantsahoo12@yahoo.co.in

Abstract- *This paper entails the fuzzy logic and statistical based investigations on the dimensions of market and submarket analysis. In this perspective , certain discovered facts have been claimed in the light of emerging submarket analysis and submarket growth.*

General Terms- *Fuzzy Logic, Statistics , Market and Submarket Analysis*

Keywords- *Fuzzy Logic; Emerging Submarket Analysis; Submarket Growth*

1. INTRODUCTION

The dimensions of market analysis [1] deals with emerging submarkets, market size, market growth, market profitability , trends ,etc. The analysis has to be carried out in an efficient manner for achieving better throughput in terms of profit. Statistical based computations play a pivotal role in this context. Marketing Myopia [2] also indicates the essence of the investigation of profit in case of market analysis.

2. DISCOVERED FACTS RELATED TO EMERGING SUBMARKET ANALYSIS

2.1. Claim 1

Fuzzy estimate of augmentation or expansion of a product or service towards achieving new dimension and bias estimate for a common product can be related mathematically as $x.€ = 1 - y.£$, where € and £ are fuzzy estimates of new product and common product respectively, x be support factor of € towards optimum expansion while y be the probabilistic support factor of £ reflecting the necessity of augmentation . Furthermore , augmentation is a necessary and mandatory pre-requisite for product validation.

Illustration: The emerging submarket deals with observation towards launching a novel product. The expansion of features in an existing product based upon supervised learning strategy leads to fuzzy logic based computation and the support factor for each parameter.

We propose $x.€ = 1 - y.£$, where € and £ are fuzzy estimates of new product and common product respectively , x be support factor of € towards optimum expansion while y be the probabilistic support factor of £ reflecting the necessity of augmentation

If € = 0, then £ = 1/y. Now, if y is in lower fuzzy range in that case as per the proposed mathematical relation , £ has to be in frequent fuzzy range. This indicates that the product is highly acceptable in the market and at the moment there is no significant change is needed. Also, y ≠ 0 as in that case £ will be undefined which is absurd. Hence, augmentation is a necessary and mandatory pre-requisite for product validation. Similarly the more x.€ tends towards 1, it indicates that the augmentation leads to evolution of a new product with a predictive acceptable market response.

2.2. Claim 2

The augmentation or expansion of features of an existing product can be quantified and realized based on Markov property based state transition.

Illustration: The augmentation or expansion of features of an existing product can be quantified based on the following relationship

$$Q_{s,t} = \frac{|t_p - t_a|}{t_a}$$

where t_p be the predicted estimation of viability of the augmented product at future timing instant t ,

t_a be the predicted estimation of viability of the existing product at timing instant t based on trend analysis

and $Q_{s,t}$ be the measure of feature deviation.

After n successive stages of sensing predicted estimation of viability of the augmented product, the effective feature deviation is represented as follows

$$£_e = \frac{\max(t_{p_1}, t_{p_2}, t_{p_3}, \dots t_{p_n}) - t_a}{t_a}$$

Therefore , the mean deviation of t_{p_i} about t_a is given by

[1] Aaker, D. A. (2005). *Strategic Market Management.* John Wiley & Sons , Inc.
[2] Levitt, T. (1960) "Marketing Myopia" *Harvard Business Review.* July-August , pp. 45-56

$$£_{t_a} = \frac{1}{n} \times \sum_{i=1}^{n} |t_{p_i} - t_a|$$

Let $S = (S_1, S_2, S_3 \dots S_n)$ denotes a sequence of states of prediction estimates of viability of the augmented product,

f_i be the frequency of state transition over a specific period of observation

and $w_{s_i > s_{i+1}}$ be the weight of state transition from i^{th} state to $(i+1)^{th}$ state

In this perspective, the model resembles that of Markov property [3] and the weight computations are stated as below-

$$w_{s_1 > s_2} = \frac{f_1^* \times |t_{p_1} - t_a|}{|t_{p_1} - t_a| + |t_{p_2} - t_a| + \cdots |t_{p_n} - t_a|}$$

In generalized version,

$$w_{s_i > s_{i+1}} = \frac{f_i^* \times |t_{p_{i+1}} - t_{p_i}|}{|t_{p_1} - t_a| + |t_{p_2} - t_a| + \cdots |t_{p_n} - t_a|}$$

Hence, it is justified to state that the augmentation or expansion of features of an existing product can be quantified and realized based on Markov property based state transition.

3. DISCOVERED FACTS RELATED TO SUBMARKET GROWTH

3.1. Claim 3

If moment estimation of submarket growth rate is related exponentially with timing instant , then futuristic values can be predicted based upon mid-interval of equidistant timing domain.

Illustration: Let the predicted quantified estimate of submarket growth has been carried out at equidistant timing instants $t_1, t_2, t_3, \dots t_x$ and the moment estimator [4] be $£ = f(\mu_1, \mu_2 \mu_3 \dots \mu_x)$ for x number of moments.

As per our claim, $£_t^{\sim} = ae^t$, where a is the constant and t be the timing instant. For inspection of the claim, we concentrate on the timing interval [t_1 ,t_2] . Therefore,

$$£_{t_1}^{\sim} = ae^{t_1}; £_{t_2}^{\sim} = ae^{t_2}$$

Timing observation if noted in mid-interval ,then we get

$$£_{\frac{t_1+t_2}{2}}^{\sim} = ae^{\frac{t_1+t_2}{2}}$$
$$= [a^2 e^{t_1+t_2}]^{\frac{1}{2}}$$
$$= [ae^{t_1}.ae^{t_2}]^{\frac{1}{2}}$$
$$£_{\frac{t_1+t_2}{2}}^{\sim} = [£_{t_1}^{\sim} \times £_{t_2}^{\sim}]^{\frac{1}{2}}$$

In the view of above , the futuristic moment estimators can be predicted for the other mid-interval values.

3.2. Claim 4

In case of extreme strategic uncertainty , the realization of the quantified estimate of profit is governed by the property of Abelian group.

Illustration: In case of extreme strategic uncertainty towards prediction of market size, the predicted quantified estimate of submarket growth lacks proper co-ordination between present estimate with past one and present estimate with future event.

Let us assume $T_E(€_t)$ be the time-stamp of observing the present quantified estimate of submarket growth ,

$T_E(€_{t-1})$ be the measure of lagging time with respect to quantified estimate of submarket growth and

$T_E(€_{t+1})$ be the measure of leading time with respect to quantified estimate of submarket growth

The entire time-stamps of realizing the past ,present and future quantified estimate of submarket growth can be represented by Abelian Group (G,+)

Where $T_E(€_{t-1}, €_t, €_{t+}) = \{0, \pm 1, \pm 2, \dots \ , \pm\infty\}$,

the identity element '0' being $T_E(€_t)$.

The sets representing correlation of past and future quantified estimate of submarket growth with respect to present are

$$T_E(€_{t-1}, €_t) = \{(-1,0), (-2,0), \dots , (-\infty, 0)\}$$

and

$$T_E(€_t, €_{t+1}) = \{(1,0), (2,0), \dots , (\infty, 0)\}$$

In case of extreme strategic uncertainty, analyzing of event of timestamp $T_E(€_t)$ leads to false belief. Hence, realization of the quantified estimate of submarket growth representing correlation of both present with past as well as present with future has to be distorted.

3.3. Claim 5

The risk related to failure of the market to meet expectations can be realized based upon statistical modeling.

Illustration: The stochastic change in market growth often fails to meet expectations. In this perspective, forecasting demand seems to be a difficult task in dynamic market [1].The market impact of a brand new product in terms of sales and profit has to be investigated within a time period of observation.

Let T1 be the timing instant of launching the new product in the market ,

$T_1 + \Delta t$ be the lower boundary of the time period of observation of the market impact of the product

T_2 be the upper boundary of the aforesaid period

and α be the bias market impact based on prior experiment of previously new products in the same market scenario.

The statistical modeling of the above case study in case of dynamic market , where there is no occurrence of a single instance such that observed impact meets the bias α , is as follows :

Let $P(T_1 + \Delta t)$ be the probability of occurrence of a single instance such that observed impact meets α in timing instant $(T_1 + \Delta t)$ and $P(T_2)$ be the probability of occurrence of a single instance such that observed impact meets α in timing instant T_2.

Therefore, we can state that

Hence, $P(T_2) = P(T_1 + \Delta t)[1 - €x]$

[3] Olofsson, P. (2005). *Probability, Statistics, and StochasticProcesses.* John Wiley & Sons ,Inc.

[4] Giri, P. K. & Banerjee, J. (1999). *Introduction to Statistics.* Academic Publishers

[1] Aaker, D. A. (2005). *Strategic Market Management.* John Wiley & Sons , Inc.

Where $x = T_2 - (T_1 + \Delta t)$ and € is the constant of proportionality.

$$\lim_{x \to 0} \frac{P(T_2) - P(T_1 + \Delta t)}{x} = -€P(T_1 + \Delta t)$$

Or, $P(T_1 + \Delta t) = ae^{-€x}$,

where a is a constant of proportionality.

Hence the risk related to failure of the market to meet expectations can be realized based upon statistical modeling.

4. CONCLUSION

The paper has pointed out the following discovered facts related to emerging submarket analysis , submarket growth and trend –

1. Fuzzy estimate of augmentation or expansion of a product or service towards achieving new dimension and bias estimate for a common product can be related mathematically as $x.€ = 1 - y.£$, where € and £ are fuzzy estimates of new product and common product respectively , x be support factor of € towards optimum expansion while y be the probabilistic support factor of £ reflecting the necessity of augmentation**.** Furthermore, augmentation is a necessary and mandatory pre-requisite for product validation.
2. The augmentation or expansion of features of an existing product can be quantified and realized based on Markov property based state transition.
3. If moment estimation of submarket growth rate is related exponentially with timing instant , then futuristic values can be predicted based upon mid-interval of equidistant timing domain.
4. In case of extreme strategic uncertainty , the realization of the quantified estimate of profit is governed by the property of Abelian group.
5. The risk related to failure of the market to meet expectations can be realized based upon statistical modeling.

REFERENCES

[1] Aaker, D. A. (2005). *Strategic Market Management.* John Wiley & Sons , Inc.

[2] Levitt, T. (1960) "Marketing Myopia" *Harvard Business Review.* July-August , pp. 45-56

[3] Olofsson, P. (2005). *Probability, Statistics, and StochasticProcesses.* John Wiley & Sons ,Inc.

[4] Giri, P. K. & Banerjee, J. (1999). *Introduction to Statistics.* Academic Publishers

Authors' Biography

Dr. Prasun Chakrabarti is currently serving as Associate Professor and Head of the Department of Computer Science and Engineering of Sir Padampat Singhania University, Udaipur. He obtained Ph.D (Engg) degree from Jadavpur University in 2009, M.E. in Computer Science and Engineering in 2005 and B.Tech in Computer Engineering in 2003. He has about 101 papers in reputed national and international journals and conferences as well as 9 filed Indian patents in his credit . He has several visiting assignments at BHU Varanasi , IIT Indore et al. He visited Graduate School of IPS, Waseda University, Fukuoka, Japan Honorary Visiting Professor in May 2012 under INSA-CICS Travel Fellowship. He has been invited as Honorary Visiting Professor by Dr.H.Guo Associate Professor ,College of Management and Economics, China University of Geosciences, Wuhan China for delivering expert lectures on Application of Artificial Intelligence in Industrial Informatics in May 2014.

Prof. Prasant Kumar Sahoo, M.Com., FDPM, 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 19991 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.