

Product **Differentiation**, Attribute **Substitution** & Hedonic **Pricing**

■ S.BISALIAH*

Abstract

Two powerful concepts in Economic Theory could open up a treasure house for research in Management Sciences, especially in the area of marketing. First, the concept of product differentiation, articulating that products are similar but not identical. Second, the concept of attribute substitution, emphasizing that goods are a bunch of attributes, and consumers substitute attributes and not products as such. This has led to the concept of implicit or hedonic pricing. The paper is an attempt to examine the relationship between product differentiation and attributes based pricing. It also attempts to derive Attribute – Induced Innovation of product Development, by eliminating undesirable attributes in the product and by grafting desirable attributes into the product through R&D efforts.

* Former Vice Chancellor, University of Agricultural Sciences, Bangalore and Professor Emeritus, MP Birla Institute of Management - Associate Bharatiya Vidya Bhavan, Bangalore

1.0 THE THEME:

Consumer theory has been the product of long process of refinement from the nineteenth century theorists though the Marshallian Utility theory (introspective cardinal approach, Majumdar, 1961), the Hicksian indifference – preference theory (introspective ordinal approach, Hicks 1959 and 1972), Samuelson's revealed preference analysis (Behaviourist ordinal approach, Samuelson 1970, Majumdar 1961, and Baumol 1968), the Neuman-Morgenstern Utility index (Behaviourist Cardinal approach, Majumdar, 1961), and Armstrong's Marginal preference theory (introspective cardinal-revival approach, Armstrong 1948 and Manmohan Singh 1963). One of the basic propositions under-pinning all these approaches has been that:

"Goods are goods, and goods are the direct objects of Utility".

The theme of this paper is to discuss an alternative approach to consumer behaviour, and to indicate how this alternative approach could be a treasure house for research in Management Sciences.

2.0 Two Conceptual Building Blocks of Alternative Approach:

To explore an alternative approach crucial for R&D in product and factor marketing and for opening up a treasure house for research in Management Sciences (especially in marketing), two conceptual building blocks viz., product differentiation and attribute substitution (and hence hedonic pricing) pilot the way.

2.1 The concept of product differentiation is a major theoretical construct in Chamberlin's (1956) path breaking work viz., Theory of Monopolistic Competition. Product differentiation and selling cost (other

than the cost of production) would form two of the crucial dimensions of corporate marketing "culture". Four propositions are derived from this approach. First, products are similar, but not identical. Hence products are not remote substitutes, and there is not one homogeneous type of automobile, soap, television sets, business schools etc. Second, the companies producing these products "enjoy" some degree of market power. These companies have "ability" to raise their product prices without losing all their customers. Third, higher the value of cross price elasticity, smaller the market power, and vice-versa.

Fourth, demand curve (Average Revenue curve) facing these companies is downward sloping, and Marginal Revenue Curve is below Average Revenue Curve. Each company tries to differentiate its product so as to make it unique. This could be done by differences in technical properties of the product, services offered by the sellers, quality of inputs, exclusive patented features, design, colour, style and so on. This is called "real" product differentiation. The concept of "fancied product differentiation" is created by advertisement, and differences in salesmanship packaging, location etc. Selling costs are incurred on advertisement, salesman's salaries, window display and other expenses of sales department. These selling costs are incurred to alter the position or shape of demand curve for a company's product. In view of the above, two major policy variables of the company are product differentiation through R&D and selling activities. The shape of selling cost curve is an empirical question, amenable for research to sort out net effects of various components of selling costs.

2.2 The new theory of consumer behaviour (Lancaster, April 1966, May 1966 and 1975), emphasizing product attributes, rests on the following propositions:

- The good (service) per se does not provide utility to the consumer; the good possesses characteristics (attributes) and these characteristics give rise to utility. Hence goods/services could be defined as a bunch of attributes, and consumers demand is for attributes of goods/services. Utility derived from the good/service can be decomposed among several attributes. For example, refrigerators are generally judged by size, freezer capacity, attractiveness, durability and energy efficiency. Biological capital (say work bullocks) could be defined as composition of attributes such as age, breed, colour and auspicious/inauspicious marks. Rice could be defined as a bunch of attributes such as grain size, colour, aroma, cooking quality, keeping quality, and so on. A Business School could be catalogued based on its physical and intellectual landscape, and performance in placement etc. Demand for land is derived from attributes such as distance to land from village/town, distance to main road, quality of land, distance to water-harvesting structures and so on. Choice of housing is related to number of rooms, extra bathrooms, exterior design, interior decoration, quality of different fixtures, types of floor, air-conditioning and location, in addition to rent. Choice of occupations could also be explained in terms of hours of work, responsibilities and challenges in the job, availability amenities (like health care, canteen, conveyance etc). Hence, choice of housing and

occupation implies selection among a variety of attributes.

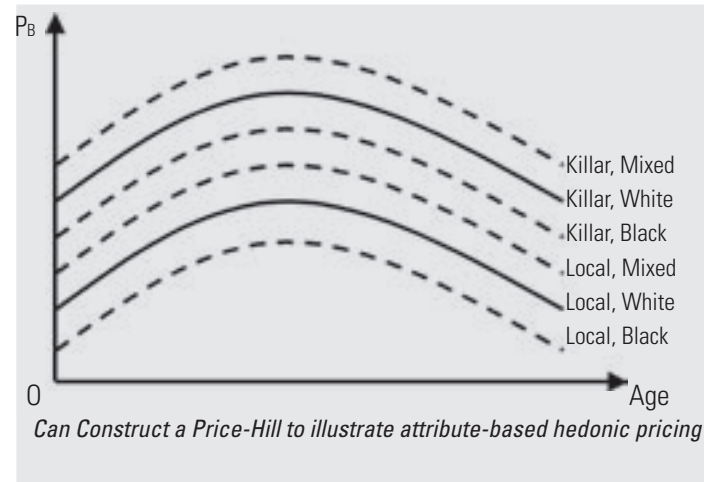
- In general, a particular good/service possesses more than one characteristics, and many characteristics are shared by more than one good/service.
- Goods/services in combination may possess characteristics different from those pertaining to the goods/services separately.

Lancaster's approach is a landmark in the theory of demand. This attribute approach to the consumer demand emphasizes the rate of attribute substitution instead of rate of commodity substitution. This implies that consumer seeks to choose that combination of attributes that maximizes his satisfaction. This approach "bridges" the gap between economic theory of consumer behaviour and marketing analysis of the same phenomenon. Then the prices of different brands and models of goods can be explained by estimating hedonic (implicit) prices for attributes. The basic premise of hedonic pricing model is that consumers ultimately derive satisfaction (utility) from attributes of goods/services, and hence prices paid for marketed goods/services (also inputs) are related to attributes. Hence, this model is a versatile technique to relate values (prices) to attributes. This approach gives a better explanation of how a new product is successfully introduced in the market, the concept of product differentiation, the notion of implicit prices, and the concept of substitutes and complements in addition to establishing the law of consumer behaviour.

3.0 Empirical constructs:

The relationship between product differentiation and attribute-based

Table 1.



hedonic pricing could be illustrated as below:

3.1 Attribute-Based pricing of Biological capital:

Using the concepts of product differentiation and choice of attributes reflected in hedonic pricing, the study by Rathod, S.Bisaliah and K.C.Hiremath (1978) has illustrated the mechanics of hedonic pricing. The model postulates that price variation of work bullocks is related to age, colour (black, mixed, red and white), and breed (killar and local), among other things like season, year, horn shape, walking style, and auspicious/inauspicious marks. In this model age, colour and breed are considered. Price (dependent variable) and age (independent variable) are quantitative variables, but colour and breed are qualitative independent variables. The net effects of qualitative variables could be captured through an econometric device called dummy variable technique (Kontsoyiannis, 2001). Further, it is postulated that age of the work bullocks and their price could be explained in terms of a quadratic equation, implying that price of the work bullock increases with age in the beginning, then

reaches maximum value at some age and declines as the work bullock gets older (Rathod and Bisaliah, 1982). In case of qualitative variables such as colour and breed, the nature of relationship (positive or negative) with price, has been treated as an empirical question. The model specified in the study is as follows:

$$PB = a + b_1 x_1 + b_2 x_1^2 + b_3 x_2 + b_4 x_3 + b_5 x_4 + b_6 x_5 + b_7 x_6 + i$$

where:

PB = Unit price of bullock

a = Constant term

b_i's = Regression coefficients

x₁ = Age of the bullock, measured in years

X₂ = breed intercept dummy variable with a value of one for Killar and zero for local

X₃ = Colour intercept dummy variable with a value of one for red colour bullock and zero otherwise

X₄ = Colour intercept dummy variable with a value of one for black colour and zero otherwise



X5 = Colour intercept dummy variable with a value of one for mixed colour and zero otherwise

I = Random error independently distributed with zero mean and finite variance

In this model, white colour is treated as the base in the dummy variable set up. Further, slope dummy variables could have been used for qualitative variables, in addition to intercept dummy variables. It is also postulated, rightly so, that negative regression coefficient would imply a price discount for “undesirable” attribute of the animal, and positive coefficient would imply a price premium for a “desirable” attribute. This empirical study has led to the inference that:

- Khillar breed commands a price premium against local breed. The buyer would place a price discount on red and black colour animals; and mixed colour would command a price premium over other colours.

In other words, while the local white colour bullocks fetches average prices, Khillar breed fetches price premium. When the local white colour bullock fetches average prices, the red and black colour depress the prices below average, and the mixed colour brings price premium. The mechanics of these relationships are illustrated in the following diagram, relating the effects of breed and colour on price. See Table 1.

These inferences have “messages” not merely for scientists in animal breeding, but also for the corporate sector where consumer preference structure for product/service attributes would also set the trend for R&D efforts to eliminate “undesirable”

attributes and to graft “desirable” attributes.

3.2 Attributes-Based pricing in Rice Market:

Rice market, for that matter market for any product (including service), could be examined for attribute-based pricing. Consumer preferences for different rice varieties depend on very many factors such as price, grain size, colour, cooking quality (ex. time taken), aroma, keeping quality (including shelf-life), and protein content. Price (dependent variable) of a given variety of rice and protein content (with the analysis for bio-chemists) are mainly quantitative variables, and all other independent variables are qualitative in nature. Hence price variation across different varieties of rice (similarly different brands of a given product/service) could be explained in terms of one/ some quantitative variables and other qualitative variables, using dummy variable techniques.

In fact, both the dependent and independent variables could also be qualitative variables. A priori, it is possible to postulate the relationship between price (dependent variable) and other independent variables. For example, it could be postulated that price and size of the grain are negatively related, price and protein content positively related, and price and keeping quality are positively related. Accordingly, a consumer places price premium on a “desirable” attribute and price discount on an “undesirable attribute”. It is recalled that whether the attribute is “desirable” or “undesirable” could be read from the sign of the regression coefficient. Hence, consumer preference structure could set the ex-ante basis for product development (S.Bisaliah, 1997-98) in the corporate sector through R&D efforts.

3.3 The models stated under the preceding sections are meant to illustrate how powerful the two concepts viz., product differentiation and attribute-based pricing of goods/services are in conducting empirical studies. With corporate sector rising to the fore across the globe, relevant research studies by management scientists would provide practical insights into policy and programme making at the company level. There are research areas like price variation in different brands of a product, variation in salary package offered to MBA graduates of different Business Schools (of course accounting for variation in salary package to suggest "desirable" and "undesirable" attribute of Business Schools) with both inter-school and intra-school analysis. Salary package offered to faculty (perhaps similar to the pricing of biological capital), variation in rental value of housing, and even attribute-based pricing (dowry, even though not legal) in marriage market are a few examples of possible research areas using the concepts of product-differentiation and attribute-preference structure and the dummy variable technique. These empirical studies would be suggestive of "corrective" measures required through appropriate interventions like R&D investment and expenditure on selling costs.

4.0 Concluding Observations:

The theme of this paper has been to examine alternative approaches to consumer behavior, and to drive the message that the concepts of product differentiation and attribute-based pricing could provide conceptual frame work for many research studies in Management Sciences. Further, the operational mechanics of these two concepts has been illustrated through the empirical studies/models.

It is also possible to relate the messages of this paper to Induced Innovations (Binswanger and Ruttan, 1977) in technology, institutions and development. One of the basic propositions of Induced Innovations in technology is that technology needs to be developed to facilitate the substitution of relatively abundant (hence cheap) factors of production for relatively scarce (hence expensive) factors in the economy.

Analogues to Induced Innovation Model is what could be called Induced Innovation Model of Product Development (IIMPD, Bisalialah, 1997-98). It is possible to hypothesize that product development path in terms of "attributes" depends on price premium and price discounts.

Advances in product development represent a necessary condition for releasing the quality dictated market imposed restrictions on the purchase of new product. Product development needs to take place so as to facilitate the substitution of desirable (hence commanding price premium) attribute for undesirable (having facing price discount) attribute.

For capturing the market, modified/new brand must be acceptable to consumers apart from its functional utility. Decision by consumers to buy the modified / new product / brand, their continued use or otherwise depends on the relative strengths of the price premium / discount and the 'desirable and undesirable' attributes respectively, as perceived by them.

REFERENCES

1. Armstrong, W.E.: "Uncertainty and the Utility Function". *The Economic Journal*, March 1948.
2. Baunol, W.J.: "Economic Theory and Operations Analysis", Prentice Hall of India Private Ltd., 1968.

3. Binswanger, H.P. and V.W.Ruttan: "Induced Innovation in Technology, Institutions and Development". *John Hopkins University Press Baltimore*, 1977.
4. Bisalialah, S.: "Monitoring and Evaluation of Agricultural Research System" *Journal of IAUA 9-10 : 1997-98*
5. Chamberlin, H: "Theory of Monopolistic Competition" *Harvard University Press*, 1956.
6. Hicks, J.R.: "A Revision of Demand Theory", *Oxford*, London 1959.
7. Hicks, J.R.: "Value & Capital", *Oxford University Press*, Second Edition, 1972.
8. Kontsoyiannis: "Theory of Econometrics Ch.12.Palgrave Publishers, New York 2001.
9. Lancaster, K.J.: "A New Approach to Consumer Theory". *Journal of Political Economy*. Vol.74 April, 1966.
10. Lancaster, K.J.: "Change and Innovation in the Technology of Consumption". *Am.E Review* May 1966.
11. Lancaster, K.J.: "Operationally Relevant Characteristics in the Theory of Consumer Behaviour". In *Essays in Honour of Lord Robbins*, Preston, Maurice and Corry, Bernard (Eds.) *Weidenfeld E and Nicolson*, London 1975.
12. Majumdar, T.N.: "The Measurement of Utility". *Macmillan & Co., Ltd.*, London, 1961.
13. Manmohan Singh, H.K.: "Demand Theory and Economic Calculations in a Mixed Economy". *George Allen and Unwin Ltd.*, London, 1963.
14. Rathod, S.G., S.Bisalialah and K.C.Hiremath : "An Econometric Analysis of Price Variation in Cattle Market". *Ind. J. of Ag. Econ.* Vol.33 No.3 July-Sept., 1978.
15. Rathod, S.G., S.Bisalialah and K.C.Hiremath : "An Econometric Analysis of Price – Age Relations in Living Capital Assets" *Ind. J. of Economics* April 1982.
16. Samuelson, P.A.: "Consumption Theory in Terms of Revealed Preference. In Joseph, E. Stiglitz (Ed): *The collected Scientific Papers of Paul A. Samuelson*. Vol.1: *Oxford and IBH Publishing Co.*, New Delhi 1970.