

Requirements for an Efficient Value Pricing of Geoinformation

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SUMMARY

Value pricing is pricing according to the value the buyer attaches to the characteristics of the product. It is market based pricing that is generally independent of the production cost. In order to be able to apply value pricing the producer has to identify the characteristics of geoinformation that have an economic value for the buyer. Such analysis can be done with metric conjoint analysis which is concerned with quantitative descriptions of the buyer's preferences and his value trade-offs. Additional requirement for the implementation of the value pricing is product differentiation where the producer differentiates his products in such a way as to better satisfy the varieties of the buyer's needs. The problem with value pricing is price dispersion. Price dispersion is a variation in prices for the same good and, consequently, can create perceptions of unfairness among buyers if they are able to share information about prices.

KEYWORDS: value pricing, geoinformation, metric conjoint analysis, market segmentation, product differentiation

INTRODUCTION

We assume that the producer wants to sell geoinformation to the potential buyer. Many data producers and data producing companies do not handle pricing well. They make the following common mistakes: pricing is related to the cost of production and it is too cost-oriented; price is not revised often enough to capitalise on market changes; price is set independent of the rest of the marketing mix rather than as an intrinsic element of marketing positioning strategy; and price is not varied enough for different product items, market segments, distribution channels, and purchase occasions.

The demand for geoinformation is characterised by the varieties of information need and the varieties of willingness to pay for the information. This implies that different groups of users require and need different geoinformation and are willing to pay differentiated price for this information. The price for geoinformation should therefore be designed in such a way as to correspond to these varieties. We suggest value pricing as the appropriate pricing strategy that can satisfy varieties of different market segments.

Value pricing is a market-based pricing technique where the producer sets the price of the product according to the value the product has for the buyer. It enables the producers and sellers to deduce higher revenue serving new markets that would otherwise not be served. The economic value the buyer attaches to the product and its characteristics reflects his preferences and needs. The pre-requirements for an efficient implementation of value pricing are identification of the characteristics of the product that have an economic value for the buyer, segmentation of the potential buyers into groups with similar information needs and willingness to pay and design of such geoinformation products that can satisfy the requirements for varieties.

In this paper we review the concepts of value in economic theory, and the conditions that have to be fulfilled for a successful implementation of the value pricing of geoinformation. We propose the metric conjoint analysis method for analysing the potential buyer's decision-making process and preferences, sorting the users according to these preferences, and the design of differentiated geoinformation products. A special form of value pricing can be applied when the users cannot be segmented into groups with certain similarities and is based on the self-selection principle that we present in section 3 of this paper.

The disadvantage of value pricing is price dispersion which is a variation in prices that are charged for the same good. It could create perceptions of unfairness among potential buyers of geoinformation if they are able to share information about prices. We conclude the paper with a discussion on value pricing and our further work.

VALUE IN ECONOMIC THEORY

The concept of value has been in economic theory very controversial. The issues of value are complex and several groups of economists contributed to a better understanding of the concepts of value. Adam Smith ((Smith 1986), reprint) in his early work considered scarcity to be the source of value, and in his latter work he suggested the labour required in the production of a commodity to be the source of value. He has made an important distinction between the "value of use" and the "value of exchange". The value of use can be deduced by using the product and is based on the user's personal valuation of the product. The value of exchange is equal to the price of the product and usually determined by the seller or producer. The value of exchange or the price should always be lower or at least equal to the value of use in order to convince the potential buyer to purchase the product.

Standard neoclassical economy considers the concepts of value and value formulation irrelevant. The economic value of a product is defined to be the same as its price. The price is determined by the equilibrium of demand and supply for the products. Standard neoclassical economy provides rather theoretical models based on several unrealistic assumptions. According to these assumptions, the buyer's preferences are predefined and known, and the buyer is perfectly informed about the good that is a subject of trade. Neoclassical economists find it unnecessary to study how patterns of value are formed in the human mind or to analyse how buyer's cognitive architecture governs the perception of value and the judgement of prices.

One of the first critiques of neoclassical economy can be found in Veblen (Veblen 1898, Veblen 1953 (orig. 1898)). Neoclassical economics, according to Veblen, is abstracted from socio-cultural changes and it is preoccupied with static equilibrium. He argued that the focus of economics must be on the analysis of the different processes by which modern societies develop their valuation systems. An important contribution to value theory was made by some other institutionalists for example North and Eggertson (North 1990, Eggertsson 1990) who studied the impact of institutions and their formal and informal rules on the behaviour of individuals and formation of values and their impacts on economic activities, efficiency and transaction cost. Some researchers in cognitive science are concerned with a cognitive approach in the value theory. Woo (Woo 1992) studies consumer's decision-making process, the process of value formation, the buyer's value patterns, and the buyer's judgement of usability and utility of the product.

Among recent efforts in formulating a theory of value we should mention Porter (Porter 1985) who introduced the concept of a value chain as a tool for analysing the firm's competitive advantage. He defines value to be "the amount buyers are willing to pay for what a firm provides them (Porter 1985, p. 38)". It is measured by the total revenue that is a reflection of the price of a firm's product and the number of products that can be sold on the market.

In the 80s the concept of value moved the focus from the product or a firm to the customer. It is the customer or the potential buyer that chooses the product over others because it offers the greatest positive combination of benefits and price, which has the greatest 'value' for the customers (Fletcher and Russell-

Jones 1997). Hanan and Karp (1991) define the value as “the added competitive advantage” the seller brings to the customers. For example, if the product helps to reduce cost of the customer this adds to the competitive advantage of the customer as a low-cost supplier. Brandenburger and Nalebuff (1996) introduce the concept of “added value” in an economic situation that was considered as a game. Their approach uses game theory as a theoretical background and they quantify the added value with the contribution each player of the game brings to the game. Kotler (2003) suggests to consider the value of an economic good primarily as a combination of quality, service, and price (QSP) which he calls customer value triad. Customer value triad increases with quality and service and decreases with price. More specifically, he further defines the value to be the ratio between what the customer gets, his benefits, and what he gives, his costs.

THE CONCEPT OF VALUE PRICING

Value pricing is market-based pricing technique sometimes referred to as ‘smart’ pricing (Sinha 2000) and takes into account user’s valuations and preferences, differences in market segments, and reflects market changes. According to value pricing the producer sets the price of the product in relation to the value this product has for the potential buyer. The economic value the potential buyer attaches to the product reflects his preferences and valuation of the product’s characteristics. It is directly related to the buyer’s needs and willingness to pay for certain properties of the product.

Some recent economic literature distinguishes between perceived-value pricing and value pricing according to which the companies set a low price for a high-quality offering. We do not consider this distinction relevant for the purpose of the analysis presented in this paper.

An example of value pricing strategy can be found on Priceline.com where the potential buyer states the price he wants to pay for an airline ticket, hotel, or mortgage. Priceline checks whether the seller is willing to meet the buyer’s price or not. The goal is to avoid setting prices that are either too high for the buyers or lower than they would be willing to pay if they knew what kind of benefits they could get by using a product. Another example are buyers that are willing to pay more for a product that’s available where they need it. Camera film retailers are aware that we will pay more for a film at attractive points of interest such as the Eiffel Tower, or Niagara Falls. While the buyers might complain at first, they recognise the value added by not having to drive back into town or walk into a residential district which is worth the extra money paid for the film.

Value pricing is often suggested as the most economically beneficial pricing of geoinformation and information goods such as for example books, CDs (Shapiro and Varian 1999, Varian 1996). It can be successfully applied to information goods because of their characteristics determined, among others, also by the high fixed cost of production and low marginal cost of reproduction. The benefit of value pricing is that it enables price differentiation and with this serving the markets that would otherwise not be served those revealing revenue from several different market segments. Each variation in price and with this in product characteristics is also an attempt to avoid price competition, and foster non-price competition.

IMPLEMENTATION OF VALUE PRICING

Value pricing can be successfully implemented to geoinformation if the producer knows the preferences of the potential buyer and is able to segment them into different groups involving the buyers with similar geoinformation needs into a common group. In this section we present the necessary requirements that have to be fulfilled prior to implementation of value pricing of geoinformation.

We suggest to use metric conjoint analysis which can help to understand why consumers choose certain product. It is concerned with quantitative descriptions and methods, and can be used to identify the attributes of the product that have an economic value for the buyer, determine the contributions of certain attributes to consumer preferences and predict consumers’ behaviour. Other conditions for an efficient

implementation of value pricing include market segmentation and product differentiation. We discuss them within this section.

Metric Conjoint Analysis

Conjoint analysis is a generic term coined by Green (Green and Srinivasan 1971, Green and Tull 1978) and refers to a number of paradigms in different research areas that are concerned with the quantitative description of consumers' preferences or value trade-offs (Timmermans 1982). Metric conjoint methods are based on the assumption that the potential buyer can evaluate multi-attribute alternatives on a category rating scale (Louviere 1988). It involves the use of modelled choice situations to examine consumer behaviour, measure his preferences and predict his choices among several alternatives (Dijkstra and Timmermans 1997). Theoretic background for a metric conjoint analysis is given by Lancaster's characteristics approach (Lancaster 1966a, Lancaser 1971, Lancaster 1991) where he argues that a product consists of several attributes which he calls characteristics. These characteristics directly influence the buyer's decision whether to buy a product or not. It is the colour, the model, the material or the time of delivery that attracts the potential buyer and directly influences his decision-making process. His approach can be applied to geoinformation products as discussed in Krek (2002).

A metric conjoint analysis deals only with characteristics of the product that can be identified and measured. The researcher or the producer defines and selects the characteristics of the products that are assumed to have an impact on the buyer's valuation and his decision-making process. These characteristics are then classified into numerical categories and combined into product profiles. Each profile is a combination of characteristic levels for the selected characteristic. Different product profiles are presented to the consumer who expresses the degree of preference for these profiles or chooses between them. Figure 1 shows the relationship among levels, characteristics and a profile.

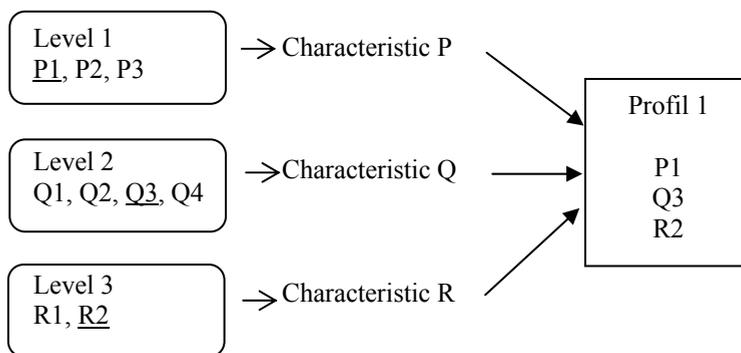


Figure 1. Characteristics, levels and a profile (adopted from (Dijkstra and Timmermans 1997))

In order to establish a valid model of buyer' judgements of the combination of characteristics coefficients the researcher estimates 'utilities' for the various characteristic levels. The analysis concentrates on a general approach of estimation of partial and joint evaluations. Partial or characteristic utility valuation is often called part-worth (Louviere 1988, Dijkstra and Timmermans 1997) and represents a numerical expression of the value that consumers place on each characteristic level. Joint evaluation is a profile evaluation that represents an overall utility of a product profile. Overall utility of a product is calculated by summing up all utilities of characteristic levels defined in that profile.

This approach is known as functional measurement because the partial measures of interest are those that "function" in models of human information processing (Louviere 1988) and is based on information integration theory, and a theory of human information processing. This method helps the researchers or product producers to examine the direct trade-offs among competing products or product varieties. It also

enables perceptual mapping, which assesses the benefits of different products that may not be direct substitutes for one another seeking to identify the benefits that no other product offers.

Metric conjoint analysis is usually based on experiments, statistical calculations and evaluations. Its advantage is that it is a metric computational method that enables a systematic approach in analysis of consumer behaviour in the marketplace. It has not been tested or applied for geoinformation products and represents a challenge for the geoinformation sector.

Market Segmentation

In order to price according to the value the producer segments the market into groups of users with similar set of wants. Such groups are called market segments. Market segmentation helps the producer to identify the users groups with similar geoinformation needs and to create a more fine-tuned geoinformation products. For example, the producer of a tourist application can differentiate between a city tourist interested in cultural heritage or a tourist interested in hiking in the mountains. Their needs for geoinformation, the technology that delivers this information, and their willingness to pay for the geoinformation differ substantially.

Economists distinguish between exogenous and endogenous market segmentation (Frank 2000, Mansfield 1993). Segmenting is exogenous if the potential users can be sorted according to some observable characteristics such as for example age, location, time or income. The producer can, for example, define driving tourists, city tourists, and hiking tourists as separate groups. Another market segmentation of a tourist user's groups could make a distinction among families, couples and individual tourists. The segmentation can also be based on time, for example, weekend tourists, summer tourists, and winter tourists. Every group has certain characteristics and needs for geoinformation.

Segmenting is endogenous where the potential users cannot be sorted by observable characteristics. In this case, the producer can produce varieties of a product, differentiate them according to some characteristics and price them according to the value these characteristics have for the buyer. The potential buyer can then "self-select" the product that satisfies his information needs and his willingness to pay. Self-selection principle is known in economic literature (Varian 1996, Norman 1999) and implied in situations where the buyer self-selects the product he is willing to pay. With his selection the buyer reveals the value the product has for him. In this case the potential buyer segments himself through his choice of the product.

An illustrative example of a self-selecting pricing is pricing in movie theatres. The visitor of a movie theatre can decide in which row he wants to sit which also reflects the price he is willing to pay for the characteristics of his choice. He has a choice of paying less and getting lower quality of the product in this example he would sit in the first two rows or paying more for a better product. Self-selecting principle naturally leads to value pricing where the buyer pays the price for the product according to the value he attaches to the characteristics of the product. In equilibrium and under assumption that all characteristics have equal value weights, the product with several valuable characteristics will be charged at a higher price than the compositions with fewer valuable characteristics.

Product Differentiation

Product differentiation is concerned with how the producer of geoinformation offers its products on a marketplace. The company differentiates itself and its products from its competitors when "it provides something unique that is valuable to buyers beyond simply offering a low price (Porter 1985)". What differentiates the products are the characteristics they possess and differentiated products are both; similar and different and these differences are grounded in the preferences of a buyer. Geoinformation products can be differentiated according to different characteristics such as the quality of the sources of geoinformation, completeness of the application, time, form, and format of geoinformation delivery, copyright, etc. The list of possibilities is endless and depends on the imagination of the producer, his business perspectives and the demand for geoinformation products.

Standard economic literature on product differentiation distinguishes between vertical and horizontal differentiation (Shaked and Sutton 1982, Norman 1983, Beath and Katsoulacos 1991, Haeckner 1993). These two approaches are sometimes called an address and non-address approach. Products are vertically differentiated if the consumers can rank them according to the quality index and they would all rank them in the same order. The buyers can objectively agree that the product A is better than the product B for a particular use. Products that cannot be objectively ranked by quality index are said to be horizontally differentiated. Quality is not “high” or “low” in objective sense and the buyers would differently rank the products according to the quality index. Examples of the products that are a subject of horizontal differentiation are in the markets for toothpaste, shampoos, soft-drinks, toothpaste, detergents, and others.

The existence of product differentiation may imply that firms retain some market power, especially because it might represent a barrier to enter a certain market. Differentiation enables a firm to isolate its own market to a certain degree. The advantage of product differentiation is that the differentiated products better match the buyer’s preferences and needs and the producers can serve new markets and therefore reach new potential buyers. Product differentiation is also a strategic approach that producers use to avoid destructive price competition which drives prices down and reduces the profit of the company.

PROBLEMS WITH VALUE PRICING: PRICE DISPERSION

Value pricing is often seen as a solution for pricing of information products in general. It results in a higher profit for the producers because they serve the markets that would otherwise not be served and brings advantages to the buyer. The buyer pays the price that he is willing to pay and can choose a product that satisfies his needs without paying for all additional characteristics that have no value for him. The only problem with value pricing represents price dispersion.

Price dispersion is a variation in prices for the same good and can be a consequence of value pricing. It may create perceptions of unfairness among consumers if they are able to share information about prices. Such comparisons can be easily done over the Internet. Price search engines often called ‘shopbots’ are sites that enable comparison of selected product offerings from multiple producers or sellers (Elbers, Barwise et al. 2002) and enable the buyer or potential buyer to directly compare the prices of equal or similar products. Clemons, Hann and Hitt (2002) found empirical evidence for wide price dispersion among online travel agents, with ticket prices varying by up to 28% for the same customer request, and up to 18% after accounting for ticket quality and route differences. Sinha (2000) claims that value pricing achieved through versioning or mechanisms like auctions can be extremely risky in long term. The producers of geoinformation have to seriously consider how to apply value pricing technique in the practice in order to avoid price dispersion and perceptions of unfairness among the buyers.

CONCLUSIONS AND FURTHER WORK

Value pricing has been recognised as an efficient pricing strategy for information products. One of the reasons for that is the cost structure of information products with a high fixed cost of production and a rather low marginal cost of reproduction. A high fixed cost is a sunk cost which means that it cannot be recovered if the production is altered. In order to be able to price according to the value the producers of geoinformation products should be able to identify which characteristics of the products have an economic value for the buyer, separate buyers in different categories and differentiate their products.

In this paper we looked at the concept of value in economic theory, and the requirements for an efficient implementation of value pricing. We listed the most important requirements that have to be satisfied in order to enable the producers of geoinformation products to efficiently implement value pricing. The producers should be able to analyse and define the characteristics of the product that have an economic value for the producers, segment the users into groups with similar information need and similar willingness to pay for this information and differentiate their products. We presented metric conjoint

methods that can enable the producers to examine consumer behaviour, measure their preferences and predict their choices among several alternatives. Their advantage is that they are metric computational methods that enable a systematic approach in analysis of consumer behaviour in the marketplace. Metric conjoint methods are based on the assumption that the potential buyer can evaluate multi-attribute alternatives on a category rating scale. Value pricing requires also product differentiation and segmentation of the market according to certain characteristics of the potential buyers. Product differentiation is involved in production of differentiated products that can satisfy different geoinformation needs. The problem of value pricing is that the same or very similar products can be offered to different buyers at different prices. It can create a perception of unfairness and result in a lower trade of the geoinformation products.

In our future work we will continue working on the issues of value pricing which is still rather a theoretical approach and has not been implemented by many geoinformation producers. The most promising metric method is a metric conjoint analysis that has to be further investigated. It would be necessary to improve our knowledge of such methods and perform some experiments with different geoinformation products. This would contribute to a better understanding of the potential buyers, their preferences and needs for geoinformation, and to design differentiated products that can satisfy the varieties of geoinformation need.

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REFERENCES

- Beath, J. and Y. Katsoulacos (1991). The economic theory of product differentiation, Cambridge University Press.
- Brandenburger, A. M. and B. J. Nalebuff (1996). Co-opetition. New York, Bantam Doubleday Dell Publishing Group, Inc.
- Clemons, E., I. Hann and Hitt L. (2002). Price Dispersion and Differentiation in Online Travel: An Empirical Investigation, *Management Science*, 48(4), 534-549
- Elbers, A., P. Barwise, et al. (2002). The Impact of the Internet on Horizontal and Vertical Competition: Market Efficiency and Value Chain Reconfiguration. The Economics of the Internet and E-commerce. M. R. Baye. Oxford, UK, Elsevier Science Ltd.
- Fletcher, T. and N. Russell-Jones (1997). Value Pricing. How to Maximize Profits Through Effective Pricing Policies. London, Kogan Page Limited.
- Frank, R. H. (2000). Microeconomics and Behaviour, The McGraw-Hill Companies, Inc.
- Green, P. E. and V. Srinivasan (1971). "Conjoint analysis in consumer research: issues and outlook." Journal of Marketing Research 8: 355-363.
- Green, P. E. and D. S. Tull (1978). Research for Marketing Decisions. NJ: Prentice-Hall, Engelwood Cliffs.
- Haeccker J.(1993). Price and Quality, Essays on product differentiation, The Industrial Institute for Economic and Social Research, Sweden
- Hanan, M. and P. Karp (1991). Competing on Value, AMACOM, American Management Association.
- Krek, A. (2002). An Agent-Based Model for Quantifying the Economic Value of Geographic Information. Institute for Geoinformation. Vienna, Technical University Vienna.
- Kotler, P. (2003). Marketing Management. Pearson Education LTD
- Lancaster, K. (1971). Consumer Demand: A New Approach. New York, Columbia University Press.
- Lancaster, K. (1991). Modern Consumer Theory, Edward Elgar Publishing Limited.
- Lancaster, K. J. (1966a). "A New Approach to Consumer Theory." Journal of Political Economy(74): 132-57.

- Louviere, J. J. (1988). Analysing Desision Making. Metric Conjoint Analysis, SAGE Publications, The International Professional Publishers.
- Mansfield, E. (1993). Managerial Economics, W.W. Norton&Company, Inc.
- Norman, G. (1999). The Economics of Price Discrimination, Edward Elgar Publishing Limited.
- North, D. C. (1990). Institutions, Institutional Change and Economic Performance. Cambridge University Press.
- Porter, M. E. (1985). Competitive Advantage, Creating, and Sustaining Superior Performance. New York, The Free Press.
- Shapiro, C. and H. R. Varian (1999). Information rules, A Strategic Guide to the Network Economy, Harvard Busines School Press
- Sinha, I. (2000). "Cost Transparency: The Net's Real Threat to Prices and Brands." Harvard Business Review(March/April): 43-50.
- Smith, A. (1986, reprint). The Wealth of Nations. New York, Penguin Books.
- Timmermans, H. G. (1982). "Consumer choice of shopping centre: an information integration approach." 16(Regional Studies): 171-182.
- Varian, H. R. (1996). Intermediate Microeconomics: A Modern Approach, W. W. Norton&Company, Inc.
- Veblen, T. (1898). "Why is Economics not an Evolutionary Science?" Quarterly Journal of Economics **12**: 373-426.
- Veblen, T. (1953 (orig. 1898)). The Theory of the Leisure Class: An Economic Study of Institutions, Rev.ed.New York: Viking Press.
- Woo, H. K. H. (1992). Cognition, Value and Price, The University of Michigan Press.