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A framework for pricing the information products of self-funded corporate information services

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Contents

1. Introduction

The pricing of information products is a central issue within the information economy paradigm. Information as a tradable commodity or resource is different in many respects from material goods and pricing approaches need to reflect both the differences and the commonalities. The objective of this article is to propose an approach to the pricing of information products by corporate information services that serve a number of business units within a single corporation.

To avoid confusion and given that there are several definitions of key terms used in the literature, the terms 'information' and 'knowledge', as used in this article, need to be defined (the definitions are operational and are not intended to be unambiguous). 'Knowledge' comprises beliefs about the world (in the broadest sense) that are held implicitly and/or explicitly within the minds of people. 'Information' is knowledge that has been codified, represented on some physical medium, in some format such that it is ultimately communicable between people and/or automatons (for example, computers) and understood by them, in the appropriate sense. Information is not necessarily recorded or sustainable, and the spoken word is an example of information (assuming that it is understood by someone). Knowledge and information are not differentiated on the basis of any assumed implicit value and so knowledge is not of an intrinsically higher value than information. Some authors imply the following hierarchy in terms of value (in descending order): knowledge – information – data. This view is not shared and, depending on the context and the needs at hand, each can be valuable in its own right, with data, quantitative models and competitive intelligence being examples of information. Value is a separate concept altogether, one that can be applied to both knowledge and information.

Du Toit (1995) defines information products as 'the products, services, systems and channels which carry information'. This article focuses on the pricing of information content, rather than on all the products on the market within the information sector as a whole (PCs and printers for example), and specifically on information that is likely to be purchased by business enterprises in order to support decision making, rather than on entertainment, advertising or training information, for example.

The type of information services dealt with in this article does not create original content, and developments in information technology are making it increasingly feasible for end-users to acquire it directly from authors, publishers and other vendors. The role of the information service, or 'information proficiency' industry as some call it, is to increase the value of available information for its clients. Locating, retrieving and adding value to information can be very time-consuming and counter-productive if left to people who are not professionals in this area. Competitiveness depends on the efficiency with which these activities are carried out, and hence costs kept down, as well as on continually improving the value of the information products provided to clients. It is clear that this industry is likely to become highly competitive and rapidly changing, with only the most responsive and sophisticated businesses surviving.

Back to top

2. Information products of corporate information services

2.1 Nature of the enterprise

Traditional company libraries are having to adapt to their new role as true information centres that are expected to occupy a key place within information value chains. Increasingly, they are expected to provide high value information at competitive prices, or else the service will be shut down and outsourced. The type of corporate information service discussed in this article is in just this position, serving the needs of several business units within a single corporation and having to function as a self-funding service. Furthermore, income needs to exceed expenditure in order to fund the development of new products and grow at a pace that marginally outstrips its parent company's information needs. At least until the service is able to achieve its optimal size (assuming that it starts off too small), product range and cost structure, and assuming that it is not allowed to compete in the open market, the short- to medium-term price objective of the information service must be that of profit maximisation, within the constraints on pricing and product quality. It is also assumed that it cannot use advertising or any other external source of revenue to subsidise its products and lower the prices.

The product of such services tends to be custom-made for clients, with whom it is generally necessary to maintain a close relationship. In terms of intellectual capital, a major asset is the relationship capital acquired by the service as far as both its suppliers and clients are concerned, which represents a significant barrier to market entry by competitors. However, if their prices are significantly higher than those of competitors, and if this advantage is not well exploited, the client companies will almost certainly turn to another company for its information needs.

The market is quite different from that of commodity products, such as software or books, and so products tend to be well differentiated by virtue of their being developed for specific individual clients. Economies of scale are likely to be less important than in the case of commodity products and many of the other economic characteristics unique to information products also do not apply strongly. Information services offer a range of products, from those that are generic and can be used by several client companies and many people within those companies, to those that are designed for specific purposes within a single client company. For this reason, products are generally bundled together according to options selected by clients and priced accordingly, allowing much scope for client-led customisation of product bundles.

Owing to the fact that the information services in question are not competing in a commodity market, and focus on high-value, low-cost products and services, they can pursue a profit-maximising pricing objective. One of the critical issues in setting prices is likely to be the correct mix of subscription versus 'pay-per-use' approaches. As discussed below, this mix depends on the nature, cost structure and mix of products within a bundle as well as the preferences of each individual client. The objective of this article is not to provide an algorithm for price-setting, since this depends on many factors related to the competitive environment and the market being served. Rather, it seeks to develop a framework that can be used to construct product bundles and use pricing approaches so that the needs of the client and the profit maximising objective of the information service are met.

Back to top

2.2 Economic characteristics of the information products

Information- and knowledge-intensive products have economically significant characteristics, some of which are different from those of physical goods and traditional services. Firstly, information/knowledge is an example of a 'public good' and not appropriable (Arrow 1985), meaning that it can be used without being consumed, that is, it does not depreciate in value with sharing and use. In fact, its quantity and value may increase with use (Cleveland 1982; Stewart 1998:170). A consequence of this is that whenever information is traded the buyer never really knows that he needs it (or what price its worth) until he sees it, but once he has seen it he may no longer need to buy it (Arrow 1995; Stewart 1998). Furthermore, the information might only become useful long after it has been acquired.

Secondly, these products often have negligible marginal cost, with the bulk of the costs generally being the fixed costs of intellectual capital and resources needed to research, develop and produce the product (Shapiro and Varian 1998). Thereafter, its reproduction, distribution and other marginal costs contribute negligibly to the cost, regardless of the number of end-users. Furthermore, producers of information products tend to have few constraints in terms of production capacity. In Stewart's words (Stewart 1998:174), such products are 'front-loaded' with respect to costs. According to Shapiro and Varian (1998), these fixed costs are usually dominated by sunk costs, which cannot be recovered if the product is unsuccessful or if its production is stopped (for example, there is no factory which can be sold to recoup costs). These factors mean that economies of scale are a dominant feature of the information industry, which strongly favours large producers over smaller ones. In the case of information services that have only a few major clients, the products of most value to the client are often customised and so there are few economies of scale to exploit. However, in the case of products that are generic and of use to many users within a client corporation (for example, news clippings) scale economies can be used to offset the costs of the more expensive custom products.

Thirdly, information is not bound by space and can be distributed around the world almost instantly, which underlies the shift towards globalisation of the economy, although its value can be very sensitive to time. As a corollary to this, Cleveland (1982) notes that information is 'diffusive' and is difficult to make secure since it tends to diffuse easily from its source.

Stewart (1998:174) asserts that two fundamental principles of traditional economics break down to some extent in the information economy. Firstly, the law of supply and demand breaks down in the information economy to some extent because a) the distinction between buyer and seller is now blurred, with both parties contributing to the creation of knowledge/information-intensive products (for example, the phenomenon of 'mass customisation', in which customer and supplier collaborate to create unique products); and b) supply can be controlled by the consumer to a large extent. One of the challenges of corporate information services is to establish a virtually integrated supply chain with their customers (Magretta 1998), integrating customers into their value chain rather than seeing them as passive recipients of information. As far as possible, users should be able to get the information they need on demand, easily and quickly customised by themselves by means of software via a friendly interface.

Secondly, the law of diminishing returns breaks down to some extent as well. This law refers to the tendency for each further unit of investment to be less productive than the previous one (Stewart 1998:174). In the context of negligible marginal costs, a feature of some information-intensive products, extreme economies of scale may apply, which allows market leaders to exponentially outpace smaller competitors by investing very large amounts in R&D. This is unlikely to be a major factor for the kind of information service discussed in this article, since extreme economies of scale seldom apply.

Back to top

3. Value components of information products

What value does an information service add to the information available from existing vendors? In other words, why would employees within the client corporation not simply access this information directly? Firstly, the information service staff should be experienced in carrying

out the various activities involved in retrieving, processing and distributing high value information in the fastest and cheapest way. Secondly, it is likely to be cheaper to have a single gateway to information vendors than to give every staff member access to them, from both a search proficiency and a licensing point of view, the latter depending on the pricing approaches of the vendors. And thirdly, the products of the service should save time for the end users, for whom every minute spent sourcing and retrieving information is time not spent carrying out their own core functions. The products, if sufficiently relevant to individual users and timeously delivered, can therefore increase the productivity of the client company's staff.

The ability of an enterprise to add value to information as well as minimise costs by maximising efficiency depends on the professional competencies of the staff. An information service should leverage the high competence level of its staff, its principal asset along with its relationship with the client, by using this as part of its marketing and pricing strategy. These competencies must be consistent with the kinds of products being offered, and will mean higher salary costs.

The value of an information product depends entirely on the user's needs and his/her ability to use the product to achieve specific objectives. A list of 15 generic components of value to a user of content-based information products, excluding entertainment, is presented in Table 1 together with a brief description of each. This list is not meant to be exhaustive. The supplier of the product may offer a version that maximises all of these components, at a price premium. Other versions, with various components downgraded in value, may be offered at lower prices.

Table 1 List of 15 possible components of information product value, grouped into broader categories. (The elements marked with a # were taken from Shapiro and Varian 1998.)

Value element		Description
Content	Accuracy	The degree of precision of the information (for example, the number of decimal places to which numerical data is accurate). This could include the resolution of images
	Reliability	The degree to which the information is correct at the time of use, which depends on its source
	Relevance	The degree to which information matches the specific needs of a given client at a given time (for example, the minimum information requirements to make a specific decision)
	Comprehensiveness #	The degree to which information is presented the context and in depth of detail. Comprehensiveness may not always be desired and a premium is placed on the elimination of unnecessary detail (for example, an academic may require greater comprehensiveness than a busy executive)
Usablilty	Support #	The degree to which post-sale support and assistance is provided to the client
	Manipulation #	The degree to which the client can modify, reproduce, store, print or otherwise manipulate the information to suit his/her needs
	Supplementary	The degree to which other

	services and products	services and products are made available to the client in order to better utilise of an information product (for example, the supply of free software to analyse purchased data)
	Convenience #	The degree to which the use of the product is restricted (for example, to a particular time or place, or to a limited amount of time)
Inquirability	Interactivity #	The degree to which a user can explore or browse in order to uncover the information he/she needs, at the appropriate level of detail (for example, by means of hyperlinks to other information)
	Community access #	The degree to which purchase of a product entitles a client to access on-line communities, which may enrich the use of the product through discussions with other users
	Meta-information	The degree to which information about the information product is made available to the client (for example, information about the source and reliability of information)
Delivery	Mode	The format, style and medium by which the content is presented to the client (for example, a formal report on paper, or a personal e-mail)
	Timeliness	The degree to which content is made available to the client so that its utility value is maximised (for example, before other users have access to the information)
	Annoyance #	The degree to which the delivery of the product is free from annoying factors (for example, advertisements, partial views, etc.)
	User interface #	The way that the client accesses the product and the degree to which this allows him/her to customise the content and its delivery, and maximise other elements of value

The elements in Table 1 are simply examples, and others may be appropriate, depending on the nature of the product. The producer may tailor the product to maximise all of these, or purposely downgrade some of them and offer the product at a lower price.

Back to top

4. Pricing concepts and approaches

Since the value of information depends on the specific needs of the customer and his/her ability to exploit it, a simple demand analysis approach is not suitable for determining its price (Shapiro and Varian 1998). According to Best (1988), an information product can be regarded as a resource in the usual sense and priced as such if it contributes to some specific purpose in a demonstrable, measurable way. However, Eaton and Bawdon (1991) note that informal, browsable and peripheral information is excluded from these conditions and is more difficult to price, even though such information may prove to be valuable.

The pricing of information products should be done within an overall pricing objective, of which there are several generic types. Du Toit (1994) discusses two broad types of pricing objective, namely those that are sales-oriented, in which market penetration and turnover are emphasised, and those that are profit-oriented, in which prices are set with a specific profit margin in mind. In a market where there is minimal differentiation between information products with negligible marginal costs and high up-front costs, the profit maximisation objective will generally lead to ruin for all but the most dominant competitors (Shapiro and Varian 1998). This is why simple cost- or competitor-based pricing of information usually cannot be applied. In the case of a corporate information service, several basic principles must be satisfied by any pricing structure:

- The actual prices of products and services, the way they are bundled, and the methods of price measurement and calculation must be acceptable to clients.
- Information products that are 'mission critical' to clients must be of high quality and be sold at the lowest prices possible, even if the costs of providing these products are high. The consequence of high prices for these products may mean that the clients turn to competitors, who could cross-subsidise the high-cost, high-value products by charging extra for the more profitable products.
- Prices must generally reflect the value of the product/service to the client, and not the time or cost taken to produce it. In other words, if the market value does not exceed the costs incurred in producing the product (for example, the man-hours times the average hourly wages) then a) production must become more efficient, through training or automation; b) the product cannot be offered; c) the product must be bundled with more profitable products to offset the loss; or d) the product is only offered as a bonus to heavy users of the service.

Back to top

4.1 Versioning

If an objective of profit maximisation is to be pursued, a way must be found to differentiate information products on the basis of their value to groups of users. Shapiro and Varian (1998) suggest that the best approach is to base price on versions of the product and allowing the customer to choose which version to purchase. Each version will have a different value structure from the point of view of a given user and is offered at a different price, which often means reducing the value of a high-value product in specific sets of value components and charging less for it. The goal is to get each user to pay the highest possible price for the product, and they suggest that full advantage be taken of the phenomenon of extremity aversion by generally offering more than two versions of a product. This phenomenon refers to a tendency for most buyers not to opt for the top or bottom of the range product, but an intermediate one. These authors note that versioning and the associated product differentiation and positioning are good defenses against the commoditisation of information products and the consequent downward spiral of prices. Corporate information services could offer product versions that are tailor-made for their clients so that the users within the client corporations can select which versions they would like to purchase, given their individual needs and budget restrictions. The ability for users to create their own versions could be offered. Versioning can help these services defend their businesses from competitors, and facilitates bringing the users into their value chains.

Back to top

4.2 Discounts for value-adding

Another way of causing the users themselves to participate in the value chain of the information service is by offering incentives. Credits and discounts could be offered to end-users if they add value to the information base, especially digital databases, used by others.

For example, meta-information (that is, information about information) could be added by users on the basis of their own knowledge and experience in using the information (for example, a statement about its reliability or accuracy), and links to other sources could be added. Users who contribute in such ways could be awarded 'credits', allowing a certain amount of free use of products for each contribution. Since their identities would be recorded in order for this approach to work, there would be a strong disincentive to abuse the system!

Back to top

5. Pricing framework of information services

5.1 Cost versus added value for a client

The total cost of producing and supplying a single unit of a product incorporates both fixed and variable costs, including raw materials consumed (for example, paper) and man-hours. For example, the total cost of a manual search of Dialog includes both the direct searching costs and the wage rate of the person searching times the period of time required for the search. This equation will determine the 'wage-cost'. If the wage-cost is not taken into account in the price of a product, high demand for the product could result in the need for additional staff, thereby pushing up costs, or in the quality of other products being undermined due to a shortage of staff.

Certain information products are critical to the competitiveness of the client enterprise and are, in a sense, almost priceless. Value above the 'mission critical' level corresponds to 'must have' products, that while those below it corresponds to 'nice-to-have' ones. The total cost is the sum of the up-front and marginal costs, and it is the lowest cost for which a product can be made available to a user within a given client corporation. (See Table 2 for a brief description of each zone.)

In contrast to these 'must-haves' are products which are 'nice-to-have', but which could be sacrificed without competitiveness being significantly compromised.

Table 2 Meanings of the five zones, which represent the total cost of information products versus the value of the products to the client enterprise.

Zone	Description
A	Products are both profitable and mission-critical for the client ('must-haves'). High profits can be realised if these products are highly customised for the client, based on a high degree of relationship with the client (which serves as a barrier to competition)
B	Products are potentially profitable, but not mission-critical ('nice-to-haves'). If these products are offered on their own (that is, not part of a bundle), and especially if they are generic, profit margins will be forced downward by competition unless versioning is used to increase customisation and product differentiation
C	The total cost of the product exceeds its value to the client, and the products are not mission-critical. These products should only be offered as part of a high-value bundle, if at all
D	The products are mission-critical, but their total costs are so high that the client cannot afford to pay for them and would seek cheaper options from competitors unless they are subsidised
E	Products are mission-critical and can be afforded by the client, but are so expensive that it would be wise to cross-subsidised them to prevent the client

	from seeking cheaper options elsewhere

The term 'profitable' refers to the fact that a product's total cost is lower than the price the client is prepared to pay for it, even if only a single unit is sold.

5.2 Level of personalisation versus marginal costs

Another useful matrix could be one which characterises products in terms of the level of personalisation of products versus their marginal cost, which is 'the addition to the total cost resulting from the addition of one unit to total output' (Baumol and Blinder 1982:401). In the case of a product, such as information, that can be re-used and/or used by multiple customers, it refers to the additional cost incurred when one additional customer makes use of the product. The levels of personalisation vary from 'generic', which means that the same product is available to any user (for example, anything on an intranet site), to 'customised', which means that the product has been designed with a particular user in mind. An example of the latter would be a specific search of Dialog or the Web on behalf of a user. This search could be conducted by an information professional, and then have a high marginal cost due to the wage-cost involved, or by an automated search agent and have a lower marginal cost. Any customisation of information delivery, for example, carried out by the user by means of tools made available to him/her would incur minimal marginal costs. The marginal costs are divided into 'high', 'medium' and 'low'. Low marginal costs may allow minor economies of scale to be used if the product in question has some value to users from various client corporations.

The use of versioning allows products that are generic to be shifted towards customisation with no necessary increase in marginal cost if versions are set by the supplier or designed by the client by means of the tools provided. As discussed in section 5.2 above, versioning can have a significant impact on product differentiation, value to the client and pricing of the product. In particular, it can be used to defend the more generic products within a bundle against clients choosing to obtain these products from a competitor at lower prices. Products that are generic but have intermediate to high marginal costs, and are not offered as differentiated versions, are not likely to offer high profit margins due to competition and may even be unprofitable unless they are of high value to users within at least one client corporation.

5.3 Bundling and cross-subsidisation

Table 2 summarises some of the various possible scenarios based on the zones of the total cost-value and marginal cost-personalisation matrices. A pricing approach is suggested for each scenario. Whether or not a 'high' value rating means that the corresponding product is mission critical must be determined in consultation with the client. It is important to note that these are simply examples of scenarios and that the cost structure and total cost, for example, depend very much on copyright licensing agreements with content vendors.

Table 3 Examples of pricing approaches suggested on the basis of the total cost-added value and marginal cost-personalisation matrices

Total Cost / Value	Marginal Cost / Personalisation	Pricing Approach
High / High (zone D or E)	High / Custom	Subsidise if necessary and charge per-use (for example, online Dialog or Internet searches conducted by experts, articles in the news and business media etc.). These are flagship products offered by the information service to its major clients. Internet searching and browsing may offer somewhat less added value than a Dialog search since the latter arguably requires more expertise and has limited access
	Low / Generic	Highly profitable if economies of scale are exploited. Offer on subscription basis with significant mark-up. Examples include automated searching of databases and Web by

		means of agents, with possible advanced information processing and reporting capability, as well as managing the high-value documents (for example, research reports) of the client corporation
High / Low (zone C)	High / Custom or Generic	Unprofitable and probably not worth the effort. No such product offered
	Low / Generic	May be included within a subscription-based product bundle if the client expects it. Examples of such products include placing press clippings of general interest, but not importance, or other such information on the intranet
Low / High (zone A)	High / Custom	Charge per use (for example, photocopying of articles which themselves can be acquired relatively cheaply, and distributing them non-digitally). Only applies when it is difficult or impossible for end-users to acquire documents directly from suppliers
	Low / Generic	Very profitable, with the added advantage that economies of scale apply. Offer on subscription basis with significant mark-up
	Low / Custom	For example, an inter-library loan service or a personalised current awareness service according to user interest profile (assumed to be automated). Offer on subscription basis with significant mark-up
Low / Low (zone B or C)	High / Custom	Unprofitable and probably not worth the effort. No such product offered
	Low / Generic	May be included within a subscription-based product bundle if the client expects it

Where marginal costs are low or negligible, there is little justification for charging the client on a per-use basis. For example, a client would find it irritating to have to pay for each hit on generic content published on the Web page. Such products should be bundled together and priced on a subscription basis. On the other hand, high marginal cost products, such as manual Dialog searches should be priced according to the number of distinct search requests made by a user. As pointed out previously, if this not done, the wage costs for this product could become very high and prices would have to be increased significantly in the subsequent subscription period in order to cover the high costs of searching. This is likely to meet resistance from clients, especially if the excessive demand is driven by only a few employees or business units, who would pay no penalty for placing much greater demand on the information service's staff than anyone else. On the other hand, pricing should not be based on the time taken to carry out each search, a factor over which the user has no control and which must be optimised by the information professionals at the information service. The ability of clients to budget for their information needs on the basis of known prices that can be estimated in advance is essential.

The costs relating to the bundled products listed in Table 2 should be covered by an annual subscription fee, because they are mostly incurred in providing these products and because they are, in general, not amenable to being covered on a per-use basis. Information products and services that are very highly valued by the client, especially those that are mission critical to their businesses (zones D and E), must be offered at prices that are as low as possible, even below cost. Such products can be subsidised by the more profitable ones, namely those that are also highly valued, but associated with lower costs. For example, the subscription prices for bundled products can be structured so that income from these bundles significantly exceeds their total costs, assuming that there is at least one highly-valued product in the

bundle. Furthermore, custom products that are highly valued, but for which the marginal costs have been significantly reduced by automation, could also be offered on a higher-than-cost subscription basis. Indeed, any situation where there is a way of reducing the costs of highly valued products could be exploited to cross-subsidise the more expensive highly valued products. There would not be a tendency for clients to turn to competitors since they would then lose access to the subsidy on the very high value products.

Some sort of economy of scale may apply in the case of a single client comprising many users of a generic product for which marginal costs are low. For example, labour-intensive products such as a press-clipping service may be profitable only if it can be demonstrated, probably on the basis of the Web page hit-rate, that it is heavily used and believed to be important by many users. In this case it would be an attractive part of a high-value, profitable product bundle. On the other hand, if such a service is not well-used it becomes a liability and should be discontinued.

After the information service's products have been on the market for some time, the pricing structure should be reconsidered in terms of a) the clients' satisfaction with both the prices and the bundling arrangements; and b) the competitors' responses. The value that the client attributes to each product once they actually have to pay for it should be assessed regularly by means of questionnaires, Web page hit counts and the number of requests or orders for products and services. The simple framework outlined above should be reviewed and possibly made more sophisticated, and the assumptions made in applying it need to be tested. The advantage of constructing and using such a framework is that the seller is forced to address the unique economic nature of its information products, to construct product bundles and adopt pricing approaches that maximise profits and added value for clients in ways that are acceptable to them. The client may be willing to sanction a pilot programme, during which these activities are carried out, so that realistic costs, demand and prices can be developed by the end of the programme. In this way, minimum adjustments to prices will be required after the first full subscription period.

Back to top

6. Conclusions

As 'company libraries' become corporate information centres that must be self-funding and compete with external services, the pricing of their products becomes a critical issue. The pricing approach used should take into consideration the unique economic characteristics of information-intensive products, as well as the needs and preferences of the client corporations. It should reflect the unique nature of competition in that industry, avoiding a situation where price becomes the dominant basis of competition by manipulating the value components of product, for example. The basis of competition then becomes more focused on optimally meeting the needs of the end-users. Integrating the users into the value chain of the information service as much as possible ensures this and builds the customer capital of the service, making it more undesirable for the customer to switch to alternative information suppliers.

These general principles can be built into a framework for developing pricing strategies, as demonstrated in this article. Critical issues that such a framework should address are: a) the price structure of the products and how to exploit this; b) the value of the product to the customer; c) whether the product is customised or generic; and d) which products should be offered within bundles, priced on the basis of subscription, and which should be offered on a pay-per-use basis. Unless corporate information services confront these issues and adopt business principles to their service, they are likely to be closed down in favour of external services that operate more efficiently, incur lower costs and supply products of greater value to the customer.

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Back to top

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