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Valuing information in an information age: The price model and the emerging information divide among individuals, societies, and nations

Abstract: The problem of valuing and pricing information continues to exist despite years of research on the topic. Previous research on the various ways that consumers value information and on how price has been previously applied as a system for valuing information is examined. The paper examines whether price contributes to the emerging information divide and to identify existing gaps in economics of information research. Price is an important economic tool and a market allocation mechanism, but its application to information goods and services has not been as straightforward as it has been in the case of physical goods. The contributions of economics of information are examined, with emphasis placed upon the various characteristics that make information different from physical goods. The Subjectivity in valuing information is discussed. The importance of economics of information to the information profession is examined, as well as the impact of technology upon the former. Issues surrounding information pricing are raised and discussed, and emerging pricing trends and strategies examined. Suggestions of possible alternative models of valuing and pricing information are offered, and existing gaps in previous research on economics of information identified for further research.

Résumé: Le problème de l'évaluation et la facturation de l'information existe toujours malgré de nombreuses années de recherches à ce propos. Des recherches antérieures sur la manière dont l'utilisateur estime la valeur de l'information et sur la façon dont un prix a été fixé précédemment comme système d'évaluation du coût de l'information sont examinées. Cet article étudie si le coût contribue à l'émergence du fossé informationnel et à l'identification de lacunes financières de la recherche d'information. Le coût est un important outil financier et un mécanisme de partage des marchés, mais son application aux biens et services reliés à l'information ne s'est pas fait de façon franche, comme ce fut le cas pour les autres biens matériels. L'apport financier de l'information est examiné, en insistant sur le fait que les caractéristiques propres de l'information sont très différentes de celles d'autres biens. Le degré de subjectivité de la valeur de l'information est étudié. L'importance de l'apport économique de l'information à la profession elle-même est examinée, de même que l'impact de la technologie. Des problèmes découlant de l'estimation du coût de l'information sont soulevés et examinés, et les tendances et stratégies émergentes sont observées. Des suggestions de modèles alternatifs rentabiliser et estimer le coût de l'information sont offertes et les lacunes existantes dans les recherches antérieures sur l'apport financier de l'information sont identifiées pour des recherches futures.

1. INTRODUCTION

Economics has been applied to many aspects of human behaviour; its application to information has been in two main areas. One area examines information as an input in economic activity, i.e., information's role in economic decision-making. A second approach examines information as a product or output. This study will focus on information as an output, examine its dissemination

to intended users, and identify factors that lead to discrepancies in its accessibility. These discrepancies manifest themselves as an information divide among consumers and may be a result of differences in technology, the price of information, and the supply of information.

Various attempts have been made to measure information and to decide its value¹ and worth. This study focuses primarily on the characteristics of information and their effect on valuing and pricing information. Information has characteristics that make it both a private and a public good; it also has characteristics that make it similar to, and different from, physical goods. However, the intangible properties of information make it difficult to place value on it using the same system used to value physical goods. Differences in ways that consumers value information make this valuing problem more complex. Lack of a definite method of valuing information is a major drawback to the effective provision of information access and services by information professionals.

As intermediaries between information producers and consumers, information professionals are aware of the value of the profession and that of information. However, they face a major challenge to “make sure others understand the value, the importance of information, so they [consumers] can provide the support that is needed to maintain the value of librarianship and information” (Osif & Harwood, 2000, 173). McPherson (1994) sees the lack of a definite method of valuing information as a setback in justifying investment in knowledge workers, systems, libraries, and databases. The need for a methodology for valuing information is eminent, otherwise “a profession that does not really know how to value itself and its products is not going to be listened to very carefully” (McPherson, 1994, 203).

2. ECONOMICS FOR INFORMATION PROFESSIONALS

Information as an output is a commodity (an element of commerce) that is governed by the economic theory that is concerned with supply and demand. In this day and age, information professionals cannot ignore the supply and demand aspects of information and information services. The price model of resources allocation is based on supply and demand. Depending on the price of a good, consumers demand an amount that they can either afford or are willing to pay for and producers supply only that demanded amount. In order to deliver information services efficiently and effectively, information professionals allocate budgets based on the supply and demand for these services. In planning for the future of libraries, information professionals need to justify increasing expenditures to their funding agencies in order to maintain subscriptions. Most of the decisions that information professionals make are based on the price model of valuing information. Such decisions include subscription cancellations, information services fees, forming consortia, etc.

Kingma (2001) views economics as the study of the allocation of resources in a way that satisfies society's insatiable wants. Because society has less to offer than people wish to have, economic decisions must be made in order to manage available resources. These decisions involve weighing the benefits² against the costs³ of an alternative. If the benefits of one alternative outweigh its costs, then opting for that particular alternative is an economically efficient

decision, while an economically inefficient decision will be one that involves more costs than benefits.

Economics examines how individuals interact and behave in markets for goods and services. In the economics study of human behaviour, the main assumption that underlies economic models is that “individuals behave rationally in ways they believe give them most net benefit” (Kingma, 2001, 5). This means that people will opt for alternatives with the most benefits. According to Mankiw, Kneebone, McKenzie, & Rowe (1999), deciding between alternatives involves tradeoffs: “to get one thing we like, we usually have to give up another thing that we like” (Mankiw et al., 1999, 4). The cost of something is what one gives up in order to get it, also known as the opportunity cost, which is defined as “the highest value of alternative opportunities forgone by consuming a good or service” (Kingma, 2001, 8). Kingma emphasizes that opportunity cost differs from financial or monetary costs because it includes the value of time spent and the value of other opportunities lost through consumption of a service or good.

2.1 Economics of Information

Information professionals decide on ways of allocating scarce resources such that the maximum benefits are achieved with minimum cost. Economics provides information professionals with a set of operating principles to measure the costs and benefits of different alternatives and therefore settle at economically efficient decisions. Kingma (2001) lists these principles as demand, supply, costs, and benefits and he suggests that economics:

Identifies the benefits and costs of decisions and weighs these against the benefits and costs of alternative decisions. Consumers enjoy identifiable benefits from the use of goods and services, while producers spend identifiable costs on the production of a good or provision of a service (Kingma, 2001, 3).

These tools have, however, proven difficult to apply to information due to its nature and characteristics that, as will be discussed later, are very different from physical goods.

Alternative uses of available resources provide different benefits to various stakeholders. In order to determine the best allocation of available resources, these benefits need to be quantified. If the total benefits of an alternative exceed the total costs, the alternative is economically efficient, but if the costs exceed the benefits, the alternative is economically inefficient. It is, however, difficult to quantify benefits gained from use of information because of its subjectivity. Information has different values, depending on the user, thus it is difficult to quantify its benefits.

Economics of information has focused mainly on valuing information as an input in economic decision-making but it is worthwhile to note that correct decisions are not always based on explicit measurement of costs and benefits. This is especially so with information, where quantification of benefits from information is not always possible. In most cases, information is valued after it has been used, and therefore in most cases, benefits and costs of an alternative action may be perceived but not explicitly measured. Kingma concurs with this argument and offers an example of a perceived benefit that may form a sound basis for making a right decision:

If the library budget for collection development increases, it may be enough for the acquisitions librarian to subscribe to the additional journals he/she feels will best serve the library. This may be based on the opinions of a few patrons who have requested those journal titles (Kingma, 2001, 4).

In the above example, the author shows that without explicitly measuring costs and benefits, the librarian can decide that “the value to the patrons of requested journals exceeds the value of other journals for which no requests have been made” (Kingma, 2001, 4). The librarian then prioritizes purchase of new journals by first considering ones in which users have expressed interest. In such a case, although costs have not been quantified, the benefits are perceived to outweigh the costs.

2.2 Economics of Information and Technology

Technology has changed economics of information and has created a big shift in the value of information. This shift has prompted a parallel shift in the function of libraries and librarians. According to Telfer (1998), in recent years, technology has relieved information professionals of some tough decision-making. However, I would argue that technology has not relieved information professionals of any decision-making but, instead, has increased the decisions that information professionals have to make. In addition to the traditional decisions such as collection development, staffing, subscriptions, etc., information professionals must decide whether to subscribe to on-line or print versions of a journal, budget for changing technology, and decide whether to buy more books, or computer hardware and software in order to increase accessibility.

Many challenges that never existed in the print environment are now prevalent in the digital environment. Challenges that both publishers and information professional face include the enforcement of intellectual property rights, the archiving of digital documents, and the migration of content from one digital format to another. Monitoring and enforcing copyright laws has become complex in the digital environment. Archiving and accessing past issues of journals is a big challenge for both information professionals and publishers. In the print environment this was not a problem, because once a library had acquired a journal that journal was accessible to users as long as it remained in the library. In the digital environment, in most cases, publishers archive past issues and if a subscriber cancels a subscription, there is the likelihood that access to archived issues is no longer possible. Given the changes in technology, document formats currently in use may be obsolete in a few years. Consequently, content needs to be migrated regularly to new formats to ensure that information stays accessible over the years. This is not a problem in the print environment, where format rarely changes. Contrary to Telfer’s argument, technology has not only brought more challenges to the information profession, but has also made the decision-making process more complex for information professionals.

As technology changes, information delivery systems also change. Research findings are now published online and some of them are now accessible for free on the Internet. Telfer argues that such developments have “made our jobs as librarians easier and have fulfilled our longing to make more information available to more people” (Telfer, 1998). Although more information is accessible freely on the Internet, it is accessible to only those with access to, or can use, the

technology. Secondly, relevant information is more difficult to retrieve, due to the amount of information on the Internet. Thirdly, the credibility of information available on the Internet is not guaranteed because the Internet is not regulated, and therefore anybody can put up any information on the Internet, which lowers the credibility of this information. This free information is therefore not only accessible to a minority of people, but has also made librarians' work more difficult, as they have to sift through this information on behalf of their clients in order to provide credible information. Examples of efforts being made by librarians so as to provide credible information include projects such as the Librarians Index to the Internet (LII).⁴

It is evident that technology has changed the librarian's traditional tasks of archiving, cataloguing, retrieving, and distributing information. Telfer believes that the traditional functions of a library and the librarian have been overtaken by technology because "databases are an archive, a search engine can categorize and retrieve, and a network can distribute information" (Telfer, 1998). The librarian's intellectual tasks (cataloguing and retrieval) have consequently become redundant because search engines do not require professional intervention to scan for keywords in databases. Telfer's conclusion is refutable because computers and search engines will always need human intervention in order to carry out any meaningful tasks. Although search engines can index automatically using spiders, human intervention is necessary in the creation of these spiders and search algorithms. While I agree with Telfer that computers have the capability to store massive amounts of information, it is arguable that librarians' tasks have become redundant. Information archived in these computers is useless if it cannot be retrieved. A search string entered into a computer is a human intervention aimed at retrieving that part of the stored information that is useful to the searcher.

Technology is yet to take over the librarian's role of mediation, which Telfer defines as "the skill of evaluating what has been found, placing it in context with other similar information, and passing judgment on the quality of the information" (Telfer, 2001). Mediation remains the role of information professionals, as they decide which information has more benefits to its intended users. It is evident that information professionals still have a role, namely that of "interpreting the value of the non-cataloged, undifferentiated information found using that powerful search engine" (Telfer, 2001).

3. VALUING INFORMATION

The ways in which different consumers (societies and individuals) value information will determine how much information they will demand and be willing to buy. This demand determines how much information the producers are willing to sell to the different consumers. Because demand for information is based on its value as perceived by different consumers, there are discrepancies in both the demand and supply of information services. These discrepancies exist because there is no one universal method by which different users can value information; the same information will have a different value among different consumers. Producers tend to supply consumers with the highest value as indicated by a higher willingness to pay. Money has been used as the medium for expressing the value of various goods and services but according to McPherson (1994), this medium is inapplicable to information because of information's intangible properties.

3.1 Information as a Private and a Public Good

Kingma (2001) defines public goods as those that provide benefits to more than one person, as opposed to private goods (commodity), which are consumed by only one person. According to Kingma and Nas (1996) public goods are non-rival in consumption; their exclusion is either impossible or very costly. Public goods are non-rival because several people can share the benefits, and they are non-exclusionary because individuals cannot be effectively excluded from the benefits of consuming the goods. However, even with non-exclusionary public goods, there are always “free riders”; those who will receive benefits from a good but avoid paying for it. Because public goods are funded through taxes, people who do not pay taxes still benefit from these goods because the cost of excluding them would be high and inefficient.

Information can be modelled as a public and a private good. According to Fenner (2002), the possession of information is an asset and “today, successful people and businesses are those who control information: its development, access, analysis and presentation” (Fenner, 2002). As an element of commerce, information is a commodity but “there are no cogent, universally accepted accounting or economic theories of information” (Fenner, 2002). As a commodity, information should be bought and sold in a market and, according to Kingma (2001), the market price would be the allocation mechanism for both producers and consumers. However, when viewed as a public good, information then should be shared among many consumers in order to achieve collective benefits to the society.

According to Kingma (2001), Halliday (1991), and Fenner (2002) information goods and services fall in both the public and private categories. Fenner (2002) argues that information is non-rival in its consumption, i.e., it can be consumed by one person and, without any additional costs, the same information can be provided to others. This non-rivalry means that the use of a book by one user does not diminish the benefits that another user would gain from using the same book. Fenner’s argument is, however, flawed by the fact that in order for a library, for example, to provide more access to the same information, additional costs are inevitable. A library will need to purchase multiple copies of the book, provide several computer terminals, buy multiple users licensing agreements, etc., all at additional costs.

Information services and products become private goods (characterized by rivalry and exclusion) when, according to Kingma (2001), buyers and sellers exchange them in markets. A book that an individual buys at a bookstore becomes a private good; nobody may read the book without the owner's consent (its use is exclusionary). The same book, when bought by a public library and added to the library’s collection, becomes a public good. The public shares the cost of this book, and it is therefore accessible to the public, including the free riders. Kingma (2001) suggests that information can be modelled as a public good because it typically benefits several consumers. Information is available for use by anyone, but its packaging and delivery is becoming more privatized. It is in this private delivery of information that Fenner (2002) sees success for those who control information, its access, analysis and presentation.

3.2 The Value in Information

Various disciplines view, define, and measure information from different perspectives; this has made it difficult to develop universal theories for valuing information. In addition to these differences, Fenner (2002) suggests that because information passes through several stages, determination of the value of information at every stage is impossible. The author identifies stages in information thus:

It exists first in a latent state, waiting for the right paradigm or perspective, long before anyone recognizes it to be information. Then we realize that raw, unorganized data may be of some use. We collect it, organize it, analyze it, and draw conclusions from it. Both the information and our conclusions can be communicated. Only when information has been comprehended, can we value it and respond to it (Fenner, 2002).

McPherson (1994) concurs with Fenner and concludes that it is at the very last stage of information, the comprehension and cognition stage, that information can be valued.

Fenner (2002) sees the possibility of valuing and costing information in the same way as other assets of organizations, but Stiglitz (2000) and McPherson (1994) are convinced that economic methods such as cost-benefit analysis, previously used in other branches of economics, are not very applicable in the economics of information. According to Stiglitz (2000) the price system has failed to acknowledge problems of information that make information different from physical assets. Stiglitz suggests that only cost-free information can be efficiently distributed. Since information is not cost-free, there are discrepancies between prices and fundamental values (values that are not dependent on price). This means that the price associated with acquiring information is neither indicative of the value (benefits) that a consumer gains from that information, nor the cost of producing the information. Although Stiglitz does not identify this fundamental value, he suggests that it must be what provides the consumers with the incentive to obtain information, irrespective of its price.

The packaging and pricing of information is not always an incentive for its consumption, as Stiglitz (2000) has argued above. Rowley (1998) suggests that for information to be traded in a marketplace, it is important to commodify it. A way to commodify information would be to “view it in terms of information products and services, e.g. books, CD-ROMs, information brokerage, inter-library lending, and on-line searches services” (Rowley, 1998). This suggestion may not be feasible, because it will be impossible to separate the physical information product from the information contained therein. The information product cannot stand alone without the content, but the content is not dependent on the product or the media. Consequently, a problem similar to the one alluded to by Stiglitz (2000) arises, namely, the problem of identifying the information value that is dependent on neither its packaging nor its price.

Fenner (2002), Rowley (1998), and Barlow (1994) discuss the nature of information and list characteristics that make it difficult to apply the same system to value both information and physical assets. According to Barlow (1994), there are several non-monetary ways in which society values information. Unlike physical goods whose value increase as they get scarce, information becomes more valuable as it becomes more familiar. As information reaches more

people and as it gets easy to comprehend and apply (the final stage of information identified by Fenner and McPherson), its value increases. According to this argument, as the information divide widens, the information becomes less valuable because it reaches fewer people.

Although it is agreed that information is generally more valuable as it becomes more familiar and more available, this is not always the case. Barlow's suggestion is refutable in cases where information becomes more valuable if it is scarce. An example of such a situation is trade secrets that allow organizations to make more profits as long as the secret is held and protected. Another example is rare books. A dealer in rare books benefits from the book's scarcity; a buyer of a rare book places more value on it and will be willing to pay more for the item. Any control of information, whether at the production, access, or presentation level, can be seen as a way to increase the value of information (to the controller), but at the same time, this control decrease the information's value to the consumer. Fenner (2002) believes that information is not necessarily scarce, but what is not always available is the well-analyzed, well presented, and well-disseminated information. Although information may be available, it may not be provided when and where needed and, if provided, it may not always be used effectively.

According to Barlow (1994), society values information based also on its timeliness. As time passes between the production and use of information, this information becomes less relevant and therefore less valuable. This is true in cases of scientific research findings that sometimes get outdated even before they are published. Both Fenner (2002) and Barlow (1994) agree on the need for timeliness of information: "Information is subject to just-in-time requirements, just like physical inventory. Left on its own, its value may depreciate over time" (Fenner, 2002). Delays in information systems either at the production, delivery, consumption stage, or at any other stage identified by Fenner lower the quality, and therefore the value, of information.

Rowley (1998) and Barlow (1994) agree that society values information based also on its source, i.e., consumers of information will "associate quality with a specific brand, such as Microsoft, Encyclopedia Britannica" (Rowley, 1998). The value that society places on information is affected by the reputation of the provider. Consumers value the opinions of those whom they consider to be experts, and will be willing to pay more for such opinions. The price and quality of product have a close and a two-way relationship; price influences how buyers perceive quality and, conversely, quality affects price. The more the information is perceived to be of high quality, the higher it will be priced. Information pricing is therefore also dependent on the "brand", just as is the case for physical goods. Subscriptions from well-known and reputable publishers are evidently more expensive than those from otherwise unknown publishers. Although consumers may value information from a reputable source, the price is still a determining factor for discrepancies in consumption by different consumers. If the price of this high-quality information is prohibitive and one that subscribers cannot afford, then such subscriptions are cancelled. Due to differences in consumer demand and willingness to pay, there are discrepancies in supply and, consequently, gaps in information dissemination continue to widen among different consumers.

4. INFORMATION PRICING

The supply and demand of information goods and services determine their market price. Halliday (1991) says that the price of goods depends on how much of the commodity is available (its supply) and how many consumers are willing to buy (its demand). According to Rowley (1998), price mechanism is the dominant force in resource allocation; price determines the quantities demanded and supplied and income distribution among buyers and sellers. Price is “the value placed on what is exchanged. Price represents the value at which a seller is prepared to exchange and the value at which the customer is prepared to participate in that exchange” (Rowley, 1998). This definition takes the customary measure of utility (benefits) of a good or service in terms of monetary value. As discussed earlier in this paper, this measure of utility is not always applicable to information goods and services, because:

Money supplies only one dimension of value. This has been enough in the past for conventional business and cost accounting. But it is clearly no longer adequate when information with its awkward intangible properties is such an important corporate resource, when business must increasingly subscribe to social and environmental audits, and when ‘value for money’ is proclaimed as the ultimate value (McPherson, 1994, 204).

4.1 The Relationship Between Price and the Information Divide

The price of information plays a significant role in the availability of, and access to, information products and services. The influence that price has on the demand for goods and services is quantified through the price elasticity of demand⁵. Kingma (2001) argues that goods are elastic because there may be other close substitute goods⁶, but it can be argued also that other factors may determine elasticity. Such factors include variations in the number of consumers in a market, the consumers’ income, and hence their willingness to pay. Considering these other factors, it can be argued that when consumption decreases due to an increase in price, consumers are not necessarily switching to substitute goods; rather, they may be consuming neither the good nor its substitutes. Producers prefer to sell their products in markets with inelastic demand so that they can increase prices and profits with little effect on the quantity sold. In order to maximize on this inelasticity, producers differentiate their potential markets into categories such as students, libraries, institutions, individuals, etc., and charge different prices to each category of customers.

According to Mankiw et al. (1998), this practice of selling the same good at different prices to different customers is known as price discrimination. Through price discrimination, a seller charges different prices to different buyers for the same good or service. Stoller et al. (1996) suggest, for example, that journal prices vary according to market differentiation. Publishers charge higher prices to academic subscribers than to individual subscribers. Publishers differentiate also between local and international markets, and charge higher prices in the latter, even after allowing for charges such as shipping and handling. Such pricing is advantageous to markets that have many publishers, but discriminates against markets with few publishers, as is the case with most developing countries. Finally, publishers differentiate markets according to subject fields, and charge higher prices for journals in specific fields, e.g., medical journals are usually more expensive than social sciences journals.

Although price discrimination is desirable in some instances, I would argue that this practice discriminates against international markets because publishers charge higher prices to international subscribers. In developing countries, for example, there may not be many local publishers, and therefore some authors from such countries have their work published internationally. If price discrimination is practiced in such instances, it creates an information divide, because this information is charged an international price that many of these markets, perhaps in the very location where the information was written in the first place, cannot afford. While market differentiation benefits sellers, I would argue that it impacts negatively upon information access among these differentiated markets, and consequently creates discrepancies in the type and quantity of information accessible to different categories of markets. Sellers use market differentiation to categorize markets so that they supply only profitable markets, which results in discrepancies that manifest themselves through information divide.

4.2 The Pricing Dilemma

Information vendors and buyers bargain to a point where an agreement that benefits both parties is reached. The buyers campaign for subscription agreements that maximize their benefits, while the vendors offer deals that maximize their benefits. In these transactions, several pricing strategies are reached. These transactions may become vicious circles, with each party trying to maximize its benefits. Several pricing agreements, such as value-based and group pricing, have been reached with varying results.

4.2.1 Value-based Pricing

Value-based pricing is dependent on the value that consumers receive, or are likely to receive, from a good. The subjectivity of this value has been discussed in detail—earlier in the paper. According to Kingma (2001), the more value a consumer receives from a good, the more he or she is willing to pay for that good. This willingness to pay based on value is the basis upon which sellers practice price discrimination. Publishers currently practice value-based pricing for information, as is evident from the different prices that they charge their differentiated groups of customers, namely as individuals, groups, institutions, etc.

4.2.2 Group Pricing

Shapiro & Varian (1999) give four reasons why sellers prefer group pricing to individual end user pricing: price sensitivity, network effects, lock-in, and sharing. Consumers are price sensitive if changes in price will affect their consumption of a good. If an increase or decrease in price will lower or raise consumption respectively, then consumers are price sensitive. In order to utilize price sensitivity, sellers offer discounts to groups of consumers, e.g., students, international markets, etc., who are more sensitive to price. A publisher will, for example, sell a book in Canada for \$45, but will sell the same book in Kenya for \$20. Such price discrimination is possible because the willingness to pay will vary between Canada and Kenya; the latter being less willing to pay and are therefore more sensitive to price changes. The lower willingness to pay may be due to factors such as lower standards of living, lower income, currency exchange rates, etc. The publisher ensures that there are customers in both markets by offsetting the lower prices with the higher ones. Electronic publishing and access has broken down geographic boundaries and has made such discrimination impractical. This is because, assuming that users

have the required technology, they can easily access electronic information from anywhere in the world. However, this assumption does not always hold because technology is not equally developed among different societies. When prices are set based on the publisher's local market, an information divide is inevitable because international markets cannot afford to buy at prices set for the publisher's local market price.

Information consumers have tried to counteract this information divide created by price discrimination by making both local and international sharing arrangements. These arrangements include interlibrary loans, document delivery services, consortia, and site licenses. Through such arrangements, consumers are willing to pay the set price, which is offset by the fact that on average, each consumer in the sharing group will have access to more journal titles than in case of individual subscriptions. Vendors and publishers, in turn, react to these sharing arrangements by "pricing for sharing", a practice that is based on expected number of users, e.g., site licenses that are based on the number of users, concurrent usage, off-site access, etc. Most of these pricing for sharing practices are familiar in the current information market. As price bargains continue, both the buyers and the sellers make efforts to guarantee a party with whom to do business, i.e., vendors ensure they have guaranteed buyers, and vice versa.

4.2.3 The Lock-in Dilemma

Consumers buy goods and services from sellers who offer them the best market deals, the best price, the best license agreements, etc. Consumers and sellers therefore make efforts to bargain for the best deals. Consumers make sharing arrangements, mainly consortia arrangements, in order to buy in bulk, while sharing the cost. Sellers, in turn, sell in bundles and thus achieve economies of scale⁷. In order to maximize their bargains, information consumers identify vendors from whom to buy. The risk involved in buying from a single vendor is the possibility of a lock-in, which leaves consumers unable to change vendors, due to the high costs involved in switching.

As Shapiro & Varian (1999) explain, a vendor who sells a product that has a high switching cost can offer deep discounts to get consumers hooked to their products. In order to lock in subscribers and thus secure guaranteed customers, vendors will start with good deals (discounts and in some cases free trials). Once the subscribers "get hooked" the vendors can raise the prices without losing subscribers. Lock-in is especially prevalent in the online access and publishing environment, because switching vendors might involve changing software, retraining, acquiring new technology, etc. Unfortunately, many information consumers do not see this risk until it is too late; by then they are already "hooked", and it is too costly to switch.

4.2.4 Alternatives

Willemse and du Toit (1996) discuss an alternative framework for value assessment based on the fact that information value is context specific. This proposed framework is based on four levels:

1. Information value is situation specific;
2. Absolute value is hard to establish due to the problematic nature of the concepts of value and information;

3. The measurement of information value is a process. Certain steps have to be taken in a specific order; the different steps interact with each other, which means that a change in one impacts the other steps; and
4. Action and evaluation.

Level 1 above implies that “information value is always embedded in a specific context. Information value can never be removed from the specific context in which it is embedded.” (Willemse & du Toit, 1996). Level 2 of the framework entails the identification of the determinants of the specific situation, e.g., the goal of measurement, values to be measured, value to whom, and content, process and conduit. At the third level, a technique of information valuation that is to be applied to the specific context is chosen. The authors give examples of techniques such as cost-benefit analysis, information auditing, activity-based costing, and priority and performance evaluation. These first three levels of value assessment have been discussed in different contexts and at different levels in this paper. The final level of value assessment entails action and evaluation. One of the actions to be taken in this final step is the determination of pricing alternatives for specific information products or services.

Several authors have noted significant shifts in information seeking and use trends. A notable trend is that users are shifting from valuing information in terms of its content, to valuing information in terms of its “value added”. Pack (2001) refers to this value added as extra features such as interface, user support services, etc., that the vendor may wrap around content. Pack believes that these extra features are becoming increasingly more important to users, while content is becoming less important. Although trends in valuing information are changing, contrary to Pack’s suggestion, content continues to be a major point in information valuation. I believe that no matter what features are added to information or to its packaging, information seekers will always pay for information that is relevant to their needs. This relevance can be gauged only through content, not through features such as interface, support services, ranking, or other features that may be added to content.

Consumers are willing to pay for goods if they see the value of these goods. According to Pack (2001) information seekers will pay extra for content that has some value added while according to Hawkins (1996), consumers may be more interested in parts of information. Information should therefore be packaged and priced in a way that allows consumers to use and pay for only the specific portion of interest. McGarvey (2001) identifies several pricing trends. Many content providers offer a wide variety of price points such as fee access per article, per day access (up to a certain number of articles), or access per month (up to a certain number of articles). Such pricing strategies have not fared well because pricing per item tends to be higher than bulk pricing, and many of these pricing strategies have been experimental and aimed at establishing a pricing system that works better. Although these pricing strategies have not taken root, they would give the users some flexibility to pay for only what they need and only at the time they need it.

These new trends call for new information access models and have created the need for information access and delivery systems that are tailor-made to specific users’ needs. In his recommendations for alternative models, Pack (2001) suggests a single market but three models:

- The subscription model is ideal for professionals who want to stay current in their profession, their job function, or some related activity;
- The pay-per-view model would suit researchers who are gathering information specific to a project. This model is ideal for this group of users because they are interested in only specific information and therefore want to do precise searches and retrieve only directly relevant information;
- The corporate account model is the most commonly used by corporations (including libraries) with a combination of both types of users identified above. In this model, the customers are able to bargain for discounts on per publication basis as well as multiple users' license agreements basis.

4.2.5 Information Metering

Many consumers are interested in just a portion of the information to which they subscribe. Such specific demand has not been met in current subscription agreements, most of which are bundled. Consequently, consumers are forced to pay for information that they may never use because it is bundled with information that they need. Instead of campaigning for better prices for these bundled subscriptions, consumers should campaign for subscriptions that allow them to buy just that part of a product or of the bundle that they need. These just-in-time subscriptions would, for example, allow a user to buy only the chapter of a book he or she might be interested in, as opposed to buying the whole book just to read that one chapter of interest.

In order for the "just in time" model to work, some kind information metering devices would be necessary. Information metering would work just as any other services that are metered. For example, water consumers are not charged for the service until they turn on the tap. A similar metering model could be applied to information, whereby users would pay only if they access the information. After users get their hits list and determine which articles from the list would fill their information needs, users would request access to the pertinent articles. In order ensure that users pay for only pertinent information, records in the hit list would have a summary, an abstract, or an extract. Information metering devices would be embedded in the vendors' software or in the users' computers, so that when a user requests access to the pertinent information resulting from the search, these devices will intercept the requests and charge the user before displaying the requested articles. Hawkins (1996) explains the concept of information metering thus:

[The] entire collection of information is distributed at very low cost to a user in encrypted, i.e., unreadable, form. Some of the information or a description, such as an abstract, is furnished in open text so that the user can decide whether to purchase part or the complete item.

The main feature that would differentiate the information-metering model from the pay-per-view option is that the metered information is encrypted and distributed to the user through a medium such as a CD-ROM. An issue of a journal, for example, would be encrypted and made available to the customers at no cost, and users will pay only if they access an article in that issue. Unlike the pay-per-view model, users will not pay any subscription fee to access the citations and abstracts. Abstracts and citations will be made available at no cost, but the main articles are encrypted and can be read only upon payment. Information metering would give information

providers and users a lot of flexibility when it comes to the packaging, pricing, and use of, and payment for, information. Using encryption devices, information providers will decide how to package and sell the information, either by paragraph, by page, by article, or by image.

As Hawkins (1996) suggests, this model will allow users to access and therefore pay for only that piece of information that meets their needs. A cost will be incurred only after the consumer decides to purchase the full text of an article or document, at which point the user is informed of the price, the information decrypted, and the purchase recorded in a metering device. In order to give consumers a variety of choices, more information pricing models are necessary, as is suggested by McGarvey (2001). In addition to more pricing models, a variety of information packaging media is necessary in order to allow the “just in time” information delivery, which Fenner (2002) suggested characterizes information. Previous research has not given a lot of attention to the aspect of packaging information for just in time delivery, use, and payment.

5. CONCLUSION

Valuing information is difficult due to its intangible characteristics and the subjectivity in defining information value. Although price is used to indicate the value of goods and services, it has not been very applicable to information. However, as in other good and services, price is an important allocation tool. Price indicates how much consumers are willing to pay for a good or a service and indicates how much producers are willing to sell. Differences in the willingness to pay among individuals, societies, and nations influences the supply of services and goods to the respective markets. These differences in willingness to pay may be due to factors such as income level, education level, development level, etc. In order to maximize their benefits, producers are inclined to sell in markets with a higher willingness to pay and therefore markets with a lower willingness to pay have less supply. This is the case in the market for information goods and services and explains why the price system is a contributing factor to information divide. In order to bridge this divide, there is a need for different pricing alternatives that are tailored to the needs of the different information markets.

ACKNOWLEDGEMENT

Thanks to Dr. Louise Spiteri (SLIS, Dalhousie University) for her invaluable guidance and comments.

ENDNOTES

¹ “Economic values are the relative importance that a person assigns to his [her] various ends. Goods acquire value in achieving those ends. The value of goods is thus determined subjectively” (Foldvary, 1998, 291).

² Benefit is an “increase in well-being, from the viewpoint of a knowledgeable recipient” (Foldvary, 1998, 51).

³ Cost is “what must be paid in order to obtain something. Economically, a cost is the opportunity that must be foregone in order to obtain something. The true cost of buying something is not the money paid, but the next best thing one could have obtained with the funds” (Foldvary, 1998, 95).

⁴ Librarians’ Index to the Internet <http://lii.org> is a well-organized site with reliable, trustworthy, librarian-selected Internet resources. This site undergoes several reviews and kept up to date through active weeding.

⁵ Price elasticity of demand is “a measure of how much the quantity demanded of a good responds to a change in the price of that good, computed as the percentage change in quantity demanded divided by the percentage change in price” (Mankiw et al., 1999, 90).

⁶ Substitute goods are “two goods for which an increase in the price of one good leads to an increase in the demand for the other good” (Mankiw et al., 1999, 64).

⁷ Economy of scale is “the property whereby long-run average total cost falls as the quantity of output increases” (Mankiw et al., 1999, 281).

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