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***Challenges of the Information Economy:
Asymmetry of Information in the Information Society***

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ABSTRACT

This article analyses information asymmetry in conceptual terms. It presents one characterization of the asymmetric information concept, described more by a socio-economic vision of it and its relationship with the digital economy. It also frames asymmetry of information as a public good versus private good versus common good, and checks how it creates externalities.

Finally, it identifies the challenges and potential policies that will mitigate the negative effects of information asymmetry.

Keywords: Information, Information Asymmetry, Digital Economy, Information Society.

JEL Classification: D82, D83.

1. INTRODUCTION

Information has always been the critical factor of development as well as the crucial centre of economic activity. However, since the Internet impetus, and particularly with the emergence of second-generation Internet, access to, dissemination and creation of information has become simpler, faster and with a global impact.

If we look at the importance of the sector directly connected to information (technology and information systems, and knowledge), we can see its growth in all economic activities as well as in the value chain.

Nowadays, information and knowledge society are concepts that have entered the lexicon of social and political actors, being repeated constantly in the announcement of different public policies and in interventions by various actors and agents.

Thus, today's society is characterized by a sharp growth of industrial production of information and is sustained by the creation of productive systems based and heavily dependent on information.

However, information is a human construct, and therefore a human concept. Information only intends to provide information about what happens and / or has happened, trying to understand the past, justify the present, and thus "steer" the future.

Economic science has used this principle abundantly through the use of econometric tools, the construction of explanatory models of economic situations and the way that economic agents (should) behave in their decision-making.

We know, however, that not everyone has the same access to information, not everyone understands it in the same way,, not everyone analyses it in the same way, and so on.

If not all of us see, understand and analyse it in the same way, we can be in a context of information asymmetry. The concept of asymmetry allows us to understand there is a gap in what we know or how we understand something.

In this sense, information asymmetry may be defined as a sort of cartography of access to, and knowledge about, a particular fact, i.e., not everyone has the same access and not everyone knows what is happening. Therefore, we are in a scenario where, on the same subject, data or event, we have incomplete interpretations.

It is now recognized that information is imperfect, obtaining information can be costly, there are important asymmetries of information, and the extent of information asymmetries is affected by the actions of firms and individuals (Stiglitz, 1985).

Information being, in simplistic terms, the assignment of patterns of reading data, facts and events, aiming to take notice of how to act in situations (Le-Moigne, 1979) with the intention to take decisions, we must realize that there are three dimensions of analysis within the economy: the individual; the organization; and the market (economy, in the broadest sense).

Information has always two possible interpretations, in terms of the conception of a public or private good. If we think about information as a public good, the existence of asymmetric information leads us to an asymmetry of society in the access to information; but if information is a private good, we have asymmetry in the market, i.e., not everyone has the same information, or not all have the same perception of a given economic situation.

In most studies performed by leading economists investigating the issue of information asymmetry, the focus has been centred on the asymmetry of the market, e.g., information as a private good.

However, we can propose, in the information society context, that information is also a public good, which means it is freely available (inevitably including its production) and without cost to the information consumers, and we can see this in what has been provided by the Internet, such as wiki.

The information society has the particularity of the main economic activities being integrated by information technology, linked to electronic networks through which information circulates (Castro Neves, 2007).

The reason it becomes relevant to develop a specific study on asymmetric information is because the perfect market of information does not exist. This understanding will also allow us to analyse the impact created by information externalities, especially externalities associated with access to information.

The information market is inherently imperfect, because "the world is not convex; the behaviour of the economy cannot be described as if it were solving any (simple) maximization problem; the law of demand and supply has been repealed" (Stiglitz, 1985: 22).

The information market is characterized by several interesting peculiarities, such as:

- when we think of information as a public good, it has a production cost which cannot be neglected;
- each piece of information is by definition different from any other - unlike other products in the economy;

- when information becomes available - either as a public or private good – it can be used by all social and economic actors (firms and individuals) and is freely accessible³, leading us to the perception of information as a public good.

Concerning the first two particularities, because information production has an inherent cost that will cause difficulties in accessing it, and there are no equal pieces of information, this inevitably leads to difficult comprehension of the specific subject the information is focused on.

Both peculiarities increase the asymmetry of information, whether in knowing or learning of an event (causing asymmetries of knowledge), in access to sources of information or the well known problem of information quality.

In the case of the third feature, we have a positive impact for agents. When the information becomes available to them, they may experience a reduction in information asymmetry. However, this asymmetry can only be reduced if there is no asymmetry in the access to information networks and communication.

This article aims to analyse information asymmetry in conceptual terms and check how public policies can reduce information asymmetry. So this study is a first approach to the subject, being an exploratory research in the field.

Thus, our specific objectives are to: (1) characterize the asymmetric information concept; (2) describe a more socio-economic vision of information asymmetry and its relationship with the digital economy; (3) frame the asymmetry of information within public good versus private good versus common good, and check how it creates externalities; and, (4) identify the challenges and potential policies that would mitigate the negative effects of information asymmetry.

The remainder of the paper is organized as follows. The next section reviews the literature on the economics of information and information asymmetry. Section three frames the proposed vision of information asymmetry in this paper. Section four explores the type of good and the externalities associated with information. Concluding remarks and challenges are provided in the final section.

³ So now the question of intellectual property has greater emphasis, compared to the recent past.

2. THE ECONOMICS OF INFORMATION AND INFORMATION ASYMMETRY: ECONOMIC PERSPECTIVE

Information is known to be an essential element in the decision-making process. When we try to do something, our first requirement is generally for information that will help us to interpret the situation.

In the context of society and economy, information is a critical element to judge a situation, to act on the present, trying to build the future. However, some constraints are placed in the area of information economics, "in practice ... we're often woefully uninformed" (Frank, 2006: 188) and this fact leads us to a market where the model is based on imperfect information. This information market, and the fact that we do not have adequate information, leads us to the asymmetry of information.

The information economy is a distinct system from the industrial economy. It is not based exclusively on physical transformation, with a production system based on labour-intensive or mechanical processes, but rather a system based on knowledge and information and informational processes.

Machlup (1962) was one of the first authors to empirically demonstrate this distinction, and therefore the existence of a new category of economic wealth, showing the link between information, knowledge and economy.

This leads us to change from the industrial logic to the informational logic, with informational activities that produce and distribute based on information and knowledge embedded in the production system through the increasing capacity of information and communication technologies (Putnam et al, 2002). Then we have the informational agro-industry and the informational industry (tangible and intangible industry).

One of the bases for understanding information asymmetry is to look at it from the role of each actor in iteration of the social and economic process, e.g., actions and decisions taken depend on the available information and how it is transformed into knowledge about reality, and therefore depend on the actor's performance.

In essence, the type of activities man carries out has not changed, only the technological capability has changed and the use of knowledge as a critical productive force in the pursuit of success and economic decision-making, i.e., we have passed from a world of physical economy to the metaphysical economy. We increasingly recognize it is consciousness and not raw materials or tangible resources which are wealth (Hoeller, 2002).

What becomes relevant and, simultaneously, enhances information asymmetries is

symbol processing, leading to the concept of network society and the development of symbolic politics (Castells, 2003). This situation leads us to the growing need for the creation of knowledge and information networking, facilitating and fostering the share of information.

Greater share of information improves the knowledge we have to act and decide on. It is like a game, hence "one of the most essential elements is the information for the decision, where the perception of the circumstances and the data on which we rely for choice determine, to a large extent, its outcome" (César das Neves, 1998: 133-4), thereby analysing, even if only implicitly, the topic of information quality and information sources.

There is asymmetry of information when the information available is not the same for everyone and not everyone has access to information or to the same information, e.g., "an information asymmetry exists when one party in a transaction has more information that is important for the transaction than the other party" (Hirshleifer and Riley, 1992: 258). Thus, the information asymmetry between producers and consumers occurs when the necessary information for consumers cannot be understood by them, is not available, insufficient or leads to entropy.

In the information economics theory, the study and understanding of information asymmetry is caused by the communication process analysis and negotiation between economic agents. It is clear that from this analysis, and in today's information society, we can transpose the analysis to information accessibility issues. This happens because, as we shall see, access to information allows a better understanding of reality and the potential choices that social agents have to make.

However, we never forget that "although the decision quality can always be improved by intelligent information gathering, it is almost impossible to get all the potentially relevant information" (Frank, 2006: 188). This is one of the main reasons why economic units invest, often almost unconsciously, in systems and information and communication technologies.

Information has characteristics of both a private and a public good (Mackaay, 1990). In this sense, there are several situations in which governments act - trying to remedy - because of information asymmetries in society. This action is not yet taken into account and recognized by economic theory. Mann and Wüstemann (2010) show us, for the first time, a taxonomy of situations where the government tries to correct existing information asymmetries. These authors distinguish government intervention in two types: due to information asymmetries between market players; and due to information asymmetries between government and citizens. In the first case, the government plans to provide more equitable conditions for the formation of contracts, whereas in the second type, the

government is responsible for directing citizens to more rational choices. The authors also show the existence of a third category of information asymmetries in political markets.

Addressing the problem of asymmetric information aims to pursue three objectives:

- Social - improving access to information and the ability to understand phenomena.
- Economic - improving information quality for decision-making processes.
- Organizational - improving the quality of information sharing and the use of information systems, in order to act on problems.

With regard to the social context, creating accessibility and improving the ability to understand phenomena require public policies that promote investment in accessibility technologies and in the qualification and training of citizens. On the other hand, the economic context requires a clear definition of regulatory mechanisms that promote and “control” how agents provide information and in what format they do so. Finally, in the organizational context, we are in the presence of business activity, that is, information that is relevant to a particular company, and this is determined exclusively by each company, in the internal forum of each economic unit.

In the economic sphere, the issue of information asymmetry has been widely studied and used following the work done by the economists George Akerlof, Michael Spence and Joseph Stiglitz in the study of the theory of markets with asymmetric information (Nobel, 2001), James Mirrless and William Vickrey and their contributions to the theory of incentives under asymmetric information and Leonid Hurwicz, Eric Maskin and Roger Myerson with their contributions to asymmetric information and economic institutions (Nobel, 2007).

The work these economists developed focused, globally, on one assumption: one side of the market has better information than the other (Nobel, 2001: 1).

So we can say that information asymmetry occurs when there is market information shared only by some economic agents.

Traditional neoclassical economic literature assumes that markets are perfect, or that information is symmetric for all economic agents, but in 1970, Akerlof demonstrates for the first time the existence of unequal distribution of information that can affect economic transactions. This important conclusion for economics, and for corporate finance, is illustrated through a simple example of the used car market. This analysis will serve as a basis for developing theories related to the distribution of information among economic agents, including theories of signalling and certification.

Two known problems in relations between economic agents arise from the existence of information asymmetry: adverse selection; and moral hazard. According to Brealey and Myers (1998), adverse selection refers to a situation in which an evaluation policy leads to less desirable customers coming to do business (that is, adverse selection is present if the agent has private or unobservable information about their own situation). For example, in the insurance market, an increase in the premiums charged can lead to mainly higher risk customers coming to purchase insurance. Moral hazard refers to the risk that a particular contract will contribute to changing the behaviour of one or both parties. For example, if a company has a good fire insurance contract, it may take less precautions with respect to potential fires.

The signalling theory appears to minimize the effects of information asymmetries. Signalling refers to activities whose ultimate goal is to reduce the information asymmetry between economic agents. This theory was firstly formulated by Spence (1973, 1974), although Akerlof (1970) suggested several mechanisms that reduce information asymmetry between buyers and sellers.

Spence (1974) states that market signals are activities or attributes of individuals in a market which, accidentally or on purpose, modify their views on other subjects or give information to others in the market.

Like Akerlof, Spence uses a specific market, the labour market, to explain his theory, but his findings can be extrapolated to any other market. However, there are real life aspects that affect the signalling capacity of economic agents. In his work, Spence (1974) states that, to be reliable and effective, signalling must fulfil two conditions. In the first condition, signal adjustment must be costly, otherwise all economic agents continually adjust their signals with the aim of maximizing their profits. The second condition, necessary but not sufficient, requires the signal adjustment cost to be negatively correlated with quality, in the sense that higher quality economic agents are able to adjust their signals to a lower cost than low quality agents.

Stiglitz discussed the asymmetry of information in terms of information that agents possess, and how they seek to remedy their information deficiencies by acquiring information from agents who have that information. This work had a major impact on the financial sector and financial markets, and with Grossman (1980), they introduced the so-called Paradox of Stiglitz and Grossman (1980): "if a market were informationally efficient – e.g., all relevant information is reflected in market prices – no agent would have an incentive to acquire information on which prices are based. But if everyone is uninformed, then it pays some agent

to become informed" (Nobel, 2001: 9-10).

The capital market is known for the existence of information asymmetry between sellers and potential buyers. Thus, signalling theory has become an important issue in the financial literature.

Leland and Pyle (1977) made a pioneering application of the signalling hypothesis to the debt market, according to which entrepreneurs face a moral hazard problem when they want to convey to the market the true quality of their projects. Leland and Pyle (1977) show that entrepreneurs' willingness to invest in their own project while increasing debt sends a real and reliable signal of the true quality of the project to other economic agents.

In the financial literature, financial intermediaries are viewed as the main providers of objective information for other economic agents, which would reduce the adverse effect of information asymmetry. However, financial intermediaries are also faced with a moral hazard problem, in that the evaluations they make are not directly observable in the market, and also because "to err is human" and they can make some errors in carrying out these assessments. Following Leland and Pyle (1977), Campbell and Kracaw (1980) argue that financial intermediaries can minimize the problem of information asymmetry by investing part of their wealth in the project they are evaluating.

These four authors have motivated other researchers to further research and deepen the relations between asymmetric information and the role of financial intermediaries, for example Chan (1983), Myers and Majluf (1984), Allen and Faulhaber (1989), Grinblatt and Hwang (1989), Welch (1989) and Gale and Stiglitz (1989).

Issues related to the theory of asymmetric information and signalling led to the emergence of certification by Klein and Leffler (1981), who presented what they called the reputation signalling of the quality of company products.

Certification is the ability of third parties to reduce the uncertainty concerning the quality of other associated entities.

This concept was implemented in the context of financial markets and intermediaries by Booth and Smith (1986) who, inspired by the work of Klein and Leffler (1981), model the ability of underwriters to certify the price of shares in high-risk markets with asymmetric information. In this paper, they develop a criterion to assess whether certifications are credible in the capital market.

Following this study, James (1990), Blackwell et al. (1990) and Barry et al. (1990) developed and tested models based partly on the certification hypothesis by Booth and Smith (1986).

This hypothesis was further explored by DeAngelo (1981), Beatty and Ritter (1986), Titman and Trueman (1986), Johnson and Miller (1988), Carter (1992), Simon (1989), Carter and Manaster (1990), Megginson and Weiss (1991) and Chemmanur and Fulghieri (1994), who examined how investment bankers and auditors help to solve the information asymmetries inherent in Initial Public Offering (IPO) processes.

This is how the issue of information asymmetry has operated and been studied in the economic domain. However, information asymmetry may also occur in accessibility to information sources in the information society, with consequent analysis of asymmetry from other perspectives rather than merely those driven by the information economy.

In the current state of social, economic and technological development, asymmetry of information can and should be examined from a broader perspective.

3. A VISION OF INFORMATION ASYMMETRY

Information is the key element in decision-making. Thus, to overcome information asymmetry, the aim is to create the conditions for possession of the relevant information for the decision-making process (either a buying decision, search for information, consultation or leading to a management action and an economic action).

At this moment a question arises: when can we confirm the existence of asymmetric information?

In a perfect market, we can assume that current models and decision-making processes occur based on perfect information. In this case, we can say there is no information asymmetry. However, in most cases we do not have all the information about an event.

This fact becomes more visible and understandable when we consider there is always a limit to information processing capacity, that limit being the saturation point. Thus, there is always information wastage, between what we need and use, between what we know and communicate and between the information available and what we understand.

The defining principles of information asymmetry are: full disclosure; and "deceive is expensive" (Frank, 2006: 189-95). Not to have asymmetry of information, it is necessary to present and communicate all features, even the less positive and less negative ones, and for someone else to find a signal credible, it must be hard to fake.

Knowing that according to economic theory, there is always information asymmetry, just as in the network society context we live in – of knowledge and information -, it should be viewed with new dimensions of analysis.

The information society is built on the marriage between computer science and communication, enabling the development of information system/information technology concepts and communication. This situation means: easier access to information sources, whether primary or secondary; an increase in direct communication between sender and receiver; and greater networking capacity of actors and social and economic agents.

In this context, to analyse and understand the full extent of information asymmetry, we must devise a framework that enables this analysis, on the one hand, and allows easier detection of the challenges facing us, on the other hand.

To structure this framework, we must start by understanding the major purposes of information and its concept as a product.

What do we want from information? In no particular order, we can claim that information is important to reveal a fact, create learning capacities in actors (individual, social, economic and political) and lead to decision-making processes which are consistent and understandable (especially, understandable to actors who make the decision). In short, it is desired that actors seize the facts in order to obtain the critical knowledge to act.

Thus, information always has three specific objectives: to know/learn; to learn/understand; and to decide.

From these goals arise the different meanings associated with the concept of information, namely (Hirshleifer and Riley, 1992: 167-9):

- Information as knowledge versus information as news;
- Information versus beliefs;
- News and message: messages versus message service;
- Communication: intended versus inadvertent and inaccurate versus deceptive;
- Public information versus private information;
- First-order information versus second-order information.

In general, here we can identify meanings at the communication level (information to inform the other), at the organizational knowledge and market level (factual information and the situation of the organization and the market) and at the economic level (information as a

public or private good).

We therefore have concepts of information as an object and as a subject, which leads to the need to work the data and information that might be useful to the players. Concerning information as an object, it has to be produced, and as a subject, it describes the events that happen.

In considering information as an object, it must be produced in order to meet a certain demand for information. Besides, if there is a demand for information, that means there is information asymmetry, i.e., someone does not know and asks someone else who does. However, the information produced can be reformatted and distributed by an infinite variety of agents.

In this context, asymmetry of information can be analysed in three dimensions: individual; organizational; and market.

Information requires that public policies exist to increase, improve and facilitate access to information. It requires mechanisms to regulate the economy and society to monitor the spread, and how the information is formatted and transmitted also requires communication policies and information management in organizations.

In considering information as a product, it has characteristics that distinguishes it from other goods, namely (Lourenço, 2004: 57):

- unlike a traditional good, the informational product cannot be imbued with tangible qualities. It can be entirely detached in a unique way and its distribution does not require direct contact between supplier and consumer.
- the value of these goods and information services to consumers is not referenced in the tangible qualities of the product, but in their informational, educational, cultural or entertainment content.
- cultural and informational goods and services can easily be replicated at an extremely low marginal cost.
- an information good and an information service are not "consumed" in the same way as a traditional product or service. An audio-visual product can be used many times without depreciation or losing value.

As mentioned, information asymmetry occurs when one agent has information or

deeper knowledge about a domain that is the subject of a relationship with another party or parties. In the recent past, access to information was through direct access to information sources and subject to difficulties in the capacity to store data and information, as well as dependent on the ability of secondary sources to seek and make available information about a given event. Today, with knowledge and embedding of the information society, the way we analyse information and the information asymmetry should be different.

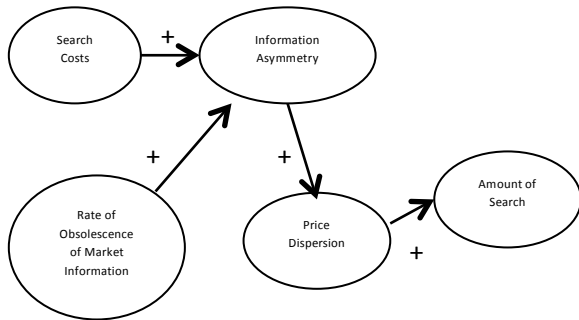
For example, when considering the Internet as a means of disseminating and accessing information, the way we attempt to analyse resolution of information asymmetries with respect to price and quality, must change. Biswas (2004) begins by reminding us how the traditional economy approached this issue, which brings us to Figures 1 and 2.

Those two figures give the main idea about what is changing with the new web economy. That is, in the traditional economy, the quantity and possibility of searching is so limited that asymmetric information is almost explained by the search cost and how much easier access to better information sources is, e.g., the ease of access to important sources of information is not an issue when agents have the capacity to analyse risks and the expertise to use a research process.

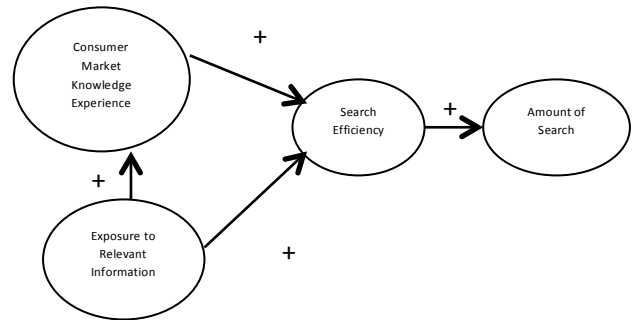
In the web economy, asymmetry of information is always a result of the research capacity of agents, because they have unlimited access at a cost; they need to be able to request, find and search for data and information. In this case, the problem is the perceived risk and the expertise in navigating the web technology. Although an economic issue, we cannot neglect to say that it is also a human problem.

Unlimited access to data and information does not mean its availability whenever agents want and need it, but that it is available by requesting and searching. So agents need to know how to search and find, they need to know the risks associated with the informational product and to recognize the quality of sources. In addition, agents need to be able to define an appropriate payment for that data and information.

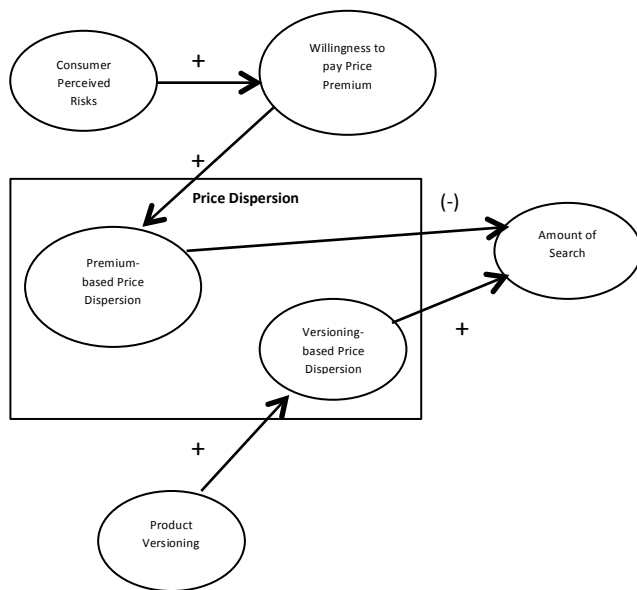
(a) In the Traditional Economy
(As suggested by traditional EoI theory)



(a) In the Traditional Economy
(As suggested by traditional EoI theory)



(b) In the Web Economy



(b) In the Web Economy

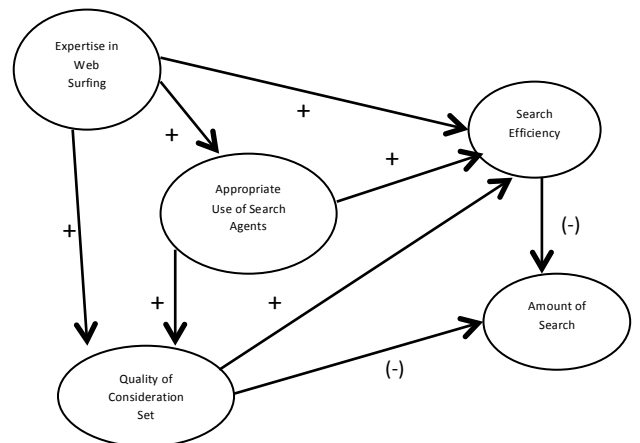


Figure 1: Antecedents of price dispersion (Biswas, 2004).

Figure 2: Search efficiency and amount of search (Adapted from Biswas, 2004).

Later Biswas (2004) proposed an integrated conceptual model considering the Internet effect, shown here in Figure 3:

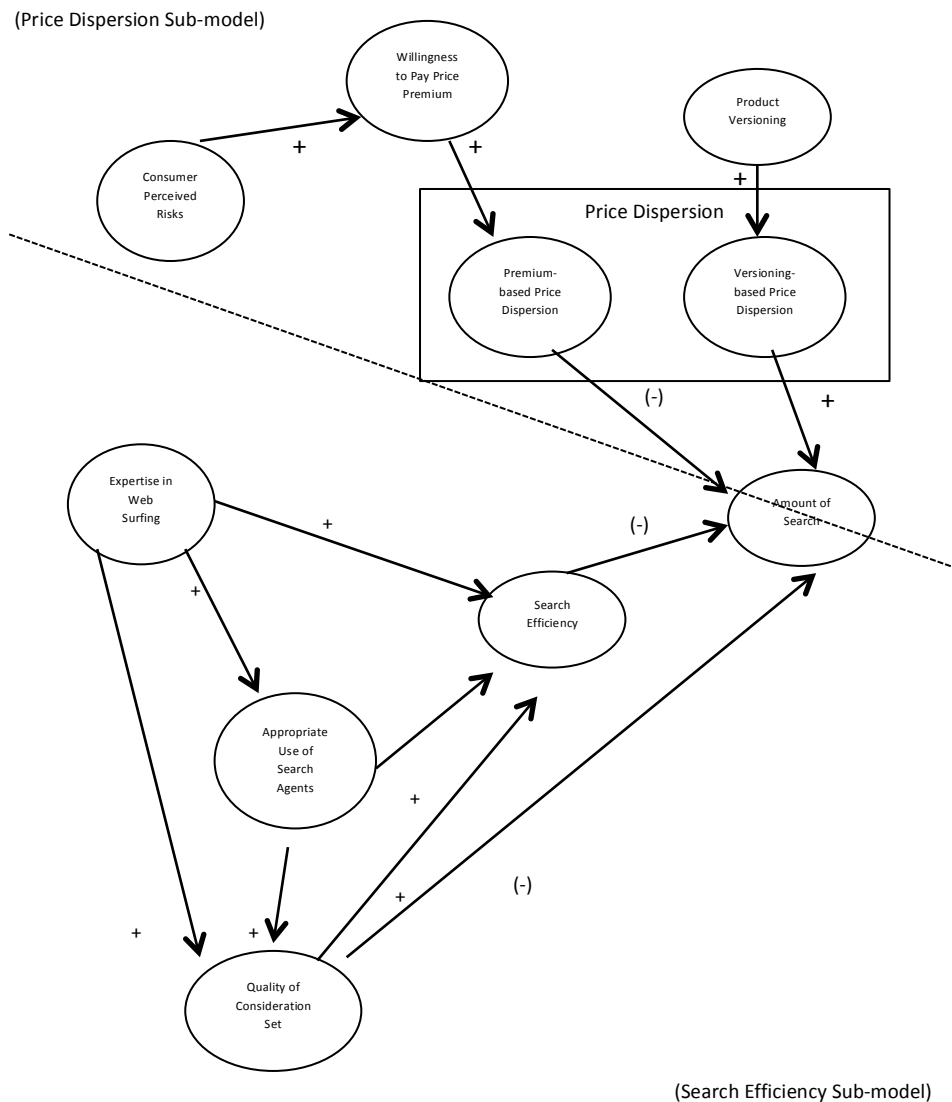


Figure 3: Perceived risks, price dispersion, search efficiency and amount of search in the Web: an integrated model (Biswas, 2004).

In this web economy, with the internet effect, some characteristics of the traditional economy remain, but with a new perspective and new issues.

Looking at the search costs, they increase with:

- less access to information sources;
- less clarity about the value associated with the information source;
- the time needed for information analysis;

- the time needed to understand the information code.

In the end, the effectiveness of information depends on its quality, the degree of expertise in searching and the technology used, and if buyer agents are informed about the alternative prices available.

4. ASYMMETRY OF INFORMATION: PUBLIC CHOICES AND PUBLIC POLICIES (WHAT TYPE OF GOODS AND WHAT EXTERNALITIES?)

By its nature, information creates advantages but may have disadvantages for agents' actions. Intending to represent events and give interpretations to data - whether data from business or socio-economic activity - access to information is crucial in the decision-making process. According to Lucas (1987), information is anything that reduces uncertainty about a given situation or event.

For its real importance, two important issues arise. First, what kind of good is information (public, private or common)? Second, what externalities are created with information?

According to Samuelson (1987: 155), the distinction between public goods and private goods concerns the way we consume them, i.e., if goods are consumed individually, through the voluntary acquisition process (e.g.: footwear, restaurant meal, newspaper, etc.), or if we consume goods collectively, paying for them even without directly benefiting from those goods, through public expenditure (public security forces, defence, roads, judges, etc.).

Most goods are by nature private ones, "a large number of goods are pure private goods, or close enough to pure private goods that a government would not consider intervening in their markets" (Tresch, 2002: 159).

However, when we think of the marginal costs, when they are zero or near zero, and the use of goods that does not prevent others from using those same goods (when we read a newspaper, we do not prevent the same newspaper from being read by another person; and when we use a road we use it jointly with other drivers, etc) then we are in the presence of a public good. We are, thus, in the presence of not rival goods, that is, "any one person's consumption of the goods does not diminish the quantity available for others to consume" (Tresch, 2002: 295) and what Bator (1960) calls publicness, i.e., "there are activities... where additional costs of extra use are literally zero; the economist labels the output of such activities "public"" (Bator, 1960: 94).

Starting from the asymmetric information concept, based on the fact that someone has information that another does not, we can say, put simply, that information consumption is always a private good.

Private information is, by nature, an important source of market failure and, according to Tresch (2002: 18), it requires government intervention, satisfying the economic principles of welfare and Pareto analysis. However, this analysis is not linear, because according to the Coase Theorem, the government cannot correct market failures, but instead create anomalies in the market (Coase, 1992).

If there is government intervention to act on information asymmetry problems, we can say there is a market failure in the way information is disseminated and, in some cases, in its very conception and construction.

We can now identify some aspects, in terms of the economy market profile, the good profile and the potential externalities created.

Information has some very interesting features that must be considered when we attempt to study the information market and seek to characterize the type of good and externalities created there, whether by the noblest concept of information or by existing asymmetries (asymmetries in the ability to understand the piece of information, the difficulty of not having the information technology to access the piece of information, the difficulty of negotiating access to the piece of information and the inability to buy the piece of information). We can thus identify four characteristics:

- Information always has a transaction cost, because it is an object created and formatted by man, on the one hand, and it is consumed and sold in the market, on the other hand.
- To access information, we need to find the means of transmission and access to it, and negotiate how to access it, implying that each economic agent has the means to access it, as well as the information technologies that enable him to receive the piece of information.
- By nature, information is always distinct, and there are no two identical pieces of information. Even when there is repetition, something is always added (a comment, another perspective of understanding, etc.);
- When information is available, all agents that can see and use it, can do so as often as they want, without incurring additional costs or diminishing others' ability to see and use it.

As mentioned, there are three areas in which we should study information (Figure 4): the social, economic and organizational areas. For each of these areas, information will necessarily have different understandings and representations. Overall, we all hope that: society has the ability to access and understand information (which requires precise public choices to create the conditions of understanding and access); organizations access and possess critical information for their business process and for the normal development of economic activity (which implies that organizations clearly concentrate on their informational models, knowledge and the skills of their staff); economic information is accurate, complete and timely (which implies measuring instruments and well-defined metrics, and that data sources are clear and available and also that there are instruments for the analysis models to be applied and run).

How can we understand information regarding the type of good? Considering the three-dimensional information framework, we present below a table positioning information:

Social	⇒	Improving access to information and the ability to understand the phenomena Public Good: Requires public policy
Organizational	⇒	Improving the quality of information sharing and use of information systems, to act on problems Private good: Requires information strategy
Economic	⇒	Improving the quality of information for decision-making processes “...” Good: Requires regulation

Figure 4 - Framework for information studies and the relation with the type of good.

5. CONCLUSIONS AND CHALLENGES

This paper intends to study the information concept and information asymmetry framed in the information society.

Thus, we introduced the asymmetric information concept according to economics and outlined how this concept transferred to the information society, presenting the Internet as a way to allow the emergence of a new integrated model to solve problems of information asymmetry.

Information can be regarded as a good, and we intend to position it as a private and/or public one. We reach the conclusion that, depending on the context/scope we consider, it can

be seen as both.

In the proposed analysis in this paper, we can identify several challenges resulting from the analysis of information asymmetry in the context of the information society, such as:

1. Leverage in the access to communication networks and information.
2. Develop instruments aimed at improving the skills of citizens (technology), improve education and language skills (Language and Philosophy Teaching).
3. Promote awareness actions and specific management and technological support plans to increase market presence and company business on the Internet.
4. Reduce the info-exclusion of citizens.
5. Promote and raise awareness of the need to provide citizens with better information for business, as well as for customers and consumers, and in some cases force firms to do so.
6. Reduce digital discrimination phenomena.

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