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Contested Hegemony: The Demise of Industry Economics in Information Systems Analyses?

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Abstract. For several decades industrial economics in Michael Porter's rendering has ruled business analysis in information systems. Have Internet technologies brought the demise of Industrial Economics as tool for information systems (IS) analyses? Examples of electronic exchanges indicate a break between business and information models. We critically assess Porter's analysis of the Internet and exchanges finding relationships, coordination and complementarity rather than positioning and activity analysis applicable. Whether to amend or discard Porterian models considering the relevance of network economics and collaboration models for information systems analyses concludes our discussion.

Information Systems as a discipline exploits models from the social and economic sciences as reference for information models. Information Systems refers to components: hardware, software and peripherals, and includes organization and people applying or working with these artefacts to capture, transmit, store, retrieve, manipulate, and display information thereby supporting other work systems (Alter 2002). In the early days of computing, applications were epiphenomena to activities having minor impact upon processes and coordination. Today, applications furnish information to coordinate, control and monitor processes without which work systems could not operate. Do analytic models adequately reflect the role of information systems vis-à-vis economic and organizational work systems?

In historical perspective information systems has been devoted to design and construction (like architectural design). Proliferation of information systems now imposes upon people a digital interface to more and more work systems. Applications with high learning requirements have become embedded in off-the-shelve programs with high degree of adaptability and interchange capability. The architectural design model has become a less persuasive metaphor than it used to be because the "construction" is delivered semi-

manufactured. Still, the customers are not given a free hand to change the application program, except in Open Source software.

Today, information systems reaching across several organizational routines and functions challenge the concept of the (self-sufficient) work group. Who benefits how from an application is an entangled and contentious issue and the more so with network interfaces in most information systems.

Investments in information technology continue to grow (Digital Economy 2002). What has happened is that in the last decades information systems have moved from an investment option to an operational requirement not only in a few but in most businesses.

Do the analytic models of information systems requirements support the present role of information systems in business and government organizations? In particular, do business economics offer relevant and sufficient guidance to information systems development?

After a brief outline of information systems development in recent decades we move on to an analysis of present day information systems. We tune in on exchanges. Studies of three exchanges give reason to reconsider the applicability of the dominant economic model. This model is discussed in the following section and we raise the question if exchanges require an information systems model to complement the industrial economic model? Leading the discussion on inadequacies in the business model we propose why information systems demand improved analytic models and tools from business economics. Contrary to what was previously the case, information systems now raises questions that this discipline must answer to stay relevant to management rather than the other way around.

1. Information systems development: Entering economic models

No single reference discipline suffices to account for all aspects of an information system. Nor does a single model capture all information interchange in an organization. Even a multilevel view of information requires that we limit ourselves. Here, we take economics as a perspective on information systems.

Opportunities to apply and implement information systems require a comprehensive model of business economics. Information systems applies economic analysis to motivate why, where, when and how much to spend on information technology. In this paper, we only address economic models leaving the management and organizational challenges to another paper.

An industrial economic line of thinking furnished the idea of positioning business using information systems to acquire a competitive advantage (Porter & Miller, 1985). It reflected new insight inspired by a few stories of information systems based business success. These were the cases of Sabre, McKesson and Otis Elevator that became “the stories” of strategic impact of information systems. Prominent economic theory support came from Harvard’s Michael E. Porter’s stress on sustainable competitive advantage as an outcome of strategic positioning and value chain reconfiguration (Porter 1980, 1985). The core impact of strategic information systems was strategic competitive advantages, i.e. sustainable competitive advantages rather than easily imitated efficiency improvements as expected from standard information systems.

High expectations to electronic markets and transactions (E-commerce) on low cost open standard technology have fuelled the Internet. Is the value chain model of industrial economics still the dominant economic framework in IS?

The question is significant because in the start of 80s it was the breakthrough in industrial economics that paved the way for a new understanding of information systems. To each primary and support activity in Michael Porter's model corresponds an application (in principle), which provides data processing about the same activity. The data creates an opportunity to choose between "make or buy" an activity, later to be known as outsourcing when the choice concerned the information systems department. For more than a decade information systems have been continuously expanding into every value chain commanding an ever-increasing share of business investments.

We have conducted a citation analysis to measure the impact upon IS research of Michael E. Porter's industrial economics model. Selecting seven top IS journals (by IS World ranking) and adding two European journals (started in the 90s) the number of articles citing Porter 1985-2001 has shown an increasing, high impact that has levelled off since1995 except for two years' peaks (see table 1). The stagnating growth in citations may be an indication of the demise of industrial economics in IS research though we have not included other economists in our study.

Year	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	1	TOTAL
COMMUNICATION OF THE ACM						2	1			1				1			1	**6**
DECISION SCIENCE				1	2	1	6	4	4	1	2	2	1	4	1			**29**
DECISION SUPPORT SYSTEMS											1				3	1	2	**7**
J MANAGEMENT INFORM SYST													1		1	5	1	**8**
INFORMATION AND MANAGEMENT				1	8	3	5	6	5	11	2	1	3	3	5		6	**59**
INFORMATION SYST RESEARCH										1	1	1	5	1	2	2	3	**16**
MIS QUARTERLY	1	2	2	6	2	2	5	4	2	1	3	2	3	1	1	1		**38**
EUR J INFORMATION SYST											2	6	1	1	3	3	1	**17**
J STRATEGIC INF SYST											4	1		1	2	1	4	**13**
TOTAL	**1**	**2**	**2**	**8**	**12**	**8**	**17**	**14**	**11**	**15**	**15**	**13**	**14**	**12**	**18**	**13**	**18**	**193**

Table 1. Citations in IS journals of M.E. Porter, 1985-2001.

One more reason to take stock on the economic framework for information systems is the postulate that information systems are no longer an epiphenomenon of the value chain activity as presumed by Michael Porter in 1980 and 1985. To Hammer they are the drivers of intercompany processes (2001). Each activity being a separable production function makes sense in the industrial era. Does it make sense to day where information systems have penetrated all business processes and increasingly feed data into each other to ensure consistency, control and coordination so that business success "is largely based on a company's ability to build, implement, and maintain information systems that help people do their work, support effective collaboration, codify individual business processes, integrate those processes with other processes including those of suppliers, and maximize value received by customers" (Alter 2002, 7)?

Is the industrial economic framework paving the way for a new role to information systems today? Does information systems need a new economic framework? The following analysis explores these questions.

2. Method

If information systems (IS) is driven by exogenous conditions we need to know which are the influential ones. If IS is driven by endogenous conditions we will need to track the root causes of change within the field itself. In this paper, we will only explore the hypothesis of an external impetus to information systems and we do so by looking at how industrial economics and business economics in particular have responded to the Internet as a new digital phenomenon. The Internet as a test case does not *per se* forego the opportunity to include drivers like major, new technologies coming from "a scientific push". We are not offering a balanced view of the relative merit of either driver even though they seem complementary as well as competing in development.

Adopting an exogenous view reflects the statement that IS has been thriving on the fruits of the industrial economics framework. Two decades of domination calls for a reassessment. We review the match between industrial economics and present day information systems adopting a particular application as test case.

And we will critically assess Porter's own viewpoints as to the relevance of his models for Internet applications analyses.

The method of study falls in two parts. First, we will look into a new IS phenomenon that is so ubiquitous as not to represent a particularly biased choice of a new IS. We have chosen to look into e-exchanges. These are Internet applications for exchange of information to settle a transaction.

We include data on three exchanges, Covisint (US), Gatetrade (DK) and IBX (SE). We ask if the value chain captures the business case and data requirements, i.e. that the value chain's activities capture the value opportunities of these exchanges? We confront the analysis with data on performance ("liquidity", announced changes and developments in response to disappointed expectations, and other measures). Evaluating the validity of the industrial economic analysis of exchanges concludes the section.

The second part of our method is the reassessment of a recent contribution by Porter himself (Porter 2001) on the need for a new economic framework to capture the value contributions from information systems in the 21st century. Interpreting Porter's analyses of the Internet we are drawn to the conclusion that to a large extent this epitomizes the difference between "real" economic activity and information activity. Porter's models are on real economic transactions. Information is about what could be, what is, and what was and what might become, etc., hence the notion of information as an intangible. We cannot equate information interchange with that of real economic transaction exchange. And if we look at markets, they are real exchanges. A critical assessment of challenges to the classical industrial economics view of markets follows. This and other blind spots in Porter's framework could eventually explain a demise in applicability of the industrial economics framework for IS analysis reflecting the recent developments in Internet based information systems.

3. The Internet Exchanges

We offer an analysis of three different exchanges. They are the following: Covisint, Gatetrade and IBX.

We draw upon three cases because we look for evidence across different types of exchanges if any of these has got the right economic framework and proven so in practice. Since none of these exchanges have existed for so many years that they have become stable structures we hesitate to conclude that they represent three different models. We will only state that they have had three different starting points positioning them differently. The data on these exchanges comes from consultant reports, trade magazines, and from interviews with two exchanges (Gatetrade and IBX).

We distinguish between sourcing that are recurrent and systematic and that which are directed by business opportunity because demand is infrequent or hard to predict. On the other dimension we distinguish between sourcing indirect products versus procuring for production or manufacturing, i.e. direct materials. Systematic sourcing means to acquire those materials and products that enter directly into producing. For most industries the distinction between indirect and direct materials make sense where investments can be separated from operations giving the latter a clear profile within the business. Beneath (figure 1) we thus distinguish four types of procurement (Kaplan & Sawhney, 2000).

Horizontal Hubs improve efficiencies in procurement processes for operating supplies for a diverse set of industries.

Yield Managers work in spot procuring of supplies that are not essential to the production flow. Spot procurement is therefore taking advantage of volatile prices or reflects high fixed-cost assets that cannot be liquidated or acquired at short notice.

Exchanges are set up to create spot markets for commodities or near-commodities within industry verticals and may even serve a yield-management role.

Vertical Hubs are built on e-catalogues that are industry-specific. They have to work closely with distributors, especially on specialized fulfillment and logistics services.

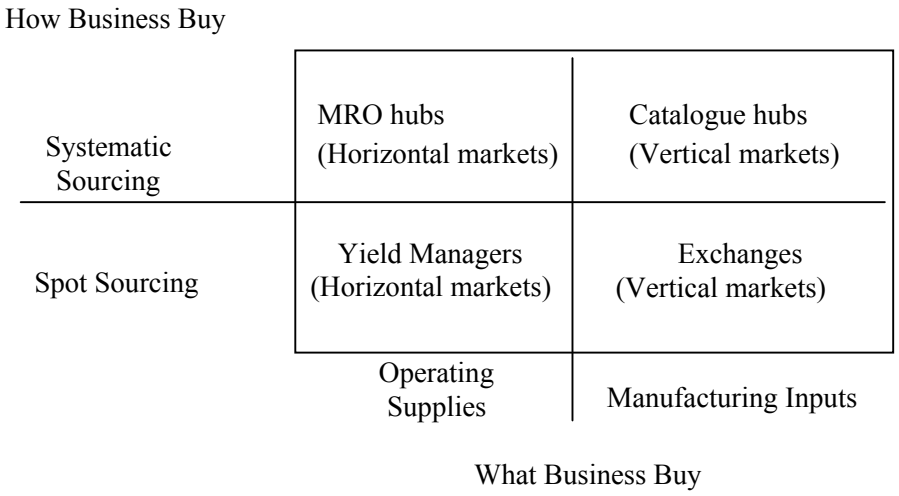

Figure 1. The types of business-to-business hubs.

Source: Kaplan & Sawhney 2000.

In recent years we have seen numerous business initiatives to set up exchanges for business-to-business trading (Kaplan & Sawhney 2000, Aberdeen Group October 2000, Aberdeen Group February 2001). Aggregating demand to create economies of scale and to squeeze margins in upstream supply chains through positioning in the value chain have motivated the investors. These effects may vary according to ownership; hence we will

analyze the three cases according to this factor. Besides ownership we will also consider the objective of the exchange. We need to distinguish between types of exchanges to capture how they differ in achieving competitive advantage. In our sample of three exchanges, the common denominator is indirect procurement though Covisint also conduct direct. The second common denominator is the technology platform. All exchanges emerged with the Internet. The open technology platform is decisive to the advantages postulated by exchange analysts like Kaplan & Sawhney (2000).

A recent study on European exchanges found the reasons why to join or build a trading exchange to be the following: "Supply chain efficiency, i.e. faster information flow and turnaround, plus reduced inventory throughout the supply chain" (AMR Research October 2000, 3-4). And they add: "The sales results of leading trading exchange platform providers reveal a strong increase in interest. Whilst this alone does not signify increased adoption by users, the investment in trading exchanges that are under construction certainly indicates that companies behind these exchanges expect fast adoption" (op.cit.). The study identified four types of exchange.

Owners facilitate trade	Independent vertical exchange (IVX)	Independent horizontal exchange (IHX)
Owners are major traders	Consortium trading exchange (CTX)	Private trading exchange (PTX)
	Make market efficient	Enhance process

Table 2. Trading Exchange Landscape.

Source: AMR Research, 2000.

The two dimensional framework reveals the impact of ownership because if owners are independent they are in business if there is a need for independent marketplaces or for improving process procurement efficiency in indirect materials like office supplies or in maintenance, repair and operations goods (MRO). The IHXs operate in many industries connecting many buyers to many sellers.

In our study we place Gatetrade in the category of independent horizontal exchange (IHX) since the owners do not come from the same industry and therefore do not take advantage of the exchange. They might benefit if they tune their own procurement to the exchange for spot procurement (Berntsen & Pihl, 2001).

Beneath, we have categorized the sample of three exchanges.

Exchange (founded)	Founders (owners)	Type of Exchange	Performance
Covisint (1999) USA Operational Oct. 2000.	DaimlerChrysler, General Motors, Ford, Nissan/Renault, Peugeot Citroen	CVX Tier 1 suppliers to the auto industry: 1700. 200 online supplier catalogues. Auction option.	($200 million investment). July 2001: $129 billion in transactions of $240 billion spent (53%). Ford expects total savings of $350 million in 2001.
IBX (2001) Sweden, Norway and Denmark	Ericsson, SEBanken, ABB, AstraZeneca, SAAB, WM-data	PTX Offer catalogues on market place and on supplier's web	No performance data. (Liquidity increasing for some customers)
Gatetrade (2000) Denmark Operational January 2002.	Danske Bank, Post Danmark, TDC, Maersk Data	IHX Catalogues on marketplace. Auction option. By September 2001: 800 vendors and 10000 buyers announced to participate.	No performance data. (100 million DKR investment). (Liquidity below expectations)

Table 3. A sample of exchanges.

Observing the performance of Gatetrade (on an Oracle Exchange platform) it has come as a surprise how little the founding consortium has taken advantage of the exchange. Coming from quite different service industries (Maersk Data, Danske Bank, Post Danmark, TDC) they have had little in common in procurement except for indirect materials, which these companies themselves procure independently. We would have imagined the ROI to be better secured if the exchange had been tuned in on serving the investors targeting some of their suppliers. Instead of serving the investors' needs the exchange won a bid on a public exchange for municipalities and the state contributing to an even more dispersed procurement pattern. Considering the fact that the pattern of procurement in municipalities and the state is highly fragmented and in many ways local, the opportunity to aggregate demand via the exchange has remained theoretical and has not yet succeeded in practice. Performance is behind the expected.

A consortium of industry players can create an exchange with categories of goods they themselves need and aggregate demand to get bargaining power, forming a CTX. An example of this is Covisint in the US. The major US car manufacturers, a Japanese and a European have banded together to aggregate demand for supplies of parts, semi-manufactured materials, components etc. The risk of retaliation by suppliers leading to price cartels and other restrictions upon trade is evident. If the exchange would be so powerful as to prevent that from happening is an empirical question not yet revealed. What has been revealed is an

instant pressure upon suppliers to play by the tune of the scale of the operation in creating the exchange.

A major player like Ford has joined the consortium (line56.com August 30,2001) while at the same time establishing a private trading exchange (PTX), Ford Supplier Network, in 1998 to share information and applications with Ford's suppliers over the web with the explicit goal to decrease vehicle delivery times by increasing flow rate of information. This network with over four thousand suppliers has committed to create a single point of entry using Covisint. Besides Ford's initiative another player has opted for a PTX (Volkswagen) that has achieved a comparatively high liquidity in the first year of operation. DaimlerChrysler announced in January 2002 that they have chosen Covisint to build and host a private supplier portal similar to the one of Ford's launched six months earlier (line56.com January 24, 2002).

A private trading exchange (PTX) is focused on the roots of trading efficiency, which are the internal procedures and operations in the procuring company. If a PTX succeeds not only does it provide more efficient trading, it also enhances internal processes. Overall efficiency impact is achieved when a better integration with the supply chain resolves in inventory binding less capital and final demand fluctuation causing less losses and swifter adaptation to meet new demand.

IBX offers an exchange tailor-made to the customer wanting a PTX. A case of IBX is Novozymes in Denmark. The adoption of IBX technology implies using them as a third party to deliver the technology (on CommerceOne and SAP technology) as well as the support to suppliers and as a hub to other companies also present on the "Global Trading Web", which is a collaborative effort amongst vendors of Internet exchange technologies with every vendor offering directory services for its customers. Buyers and suppliers develop their electronic trading architecture on the same vendor technology and get value adding interoperability services, which are added to the Internet transmission protocol and the WWW document standards. The IBX marketplace exploits WWW and the Internet as an infrastructural platform for fast building of collaboration and transaction exchange relations between companies acting as buyers and sellers (IBX Exchange and e-procurement, 2001).

An analysis of exchanges applying the industrial economic framework follows beneath.

4. Porter on exchanges

The exchanges we have analyzed are all focused on the operational processes of procurement and selling. From the point of view of Porter, we here have instances of only operational effectiveness (Porter 2001, 70-71). No strategic positioning can be discerned according to Porter as he states "companies today define competition involving the Internet almost entirely in terms of operational effectiveness. Believing that no sustainable advantages exist, they seek speed and agility, hoping to stay one step ahead of the competition."

Interpreting his statements we explicate the Internet exchanges as a technology auxiliary to the nature of competitive forces. Since Porter does not provide any new model of competition we are permitted to go back to his original works to see how he explained competitive advantage. He defined this as either differentiation or cost advantage. Now, the question is if achieving both differentiation and cost advantages are contradictory to his 1980 model? And we also need to ask if positioning makes sense if you are present in several channels at the same time and what it means to position yourself in a virtual channel?

The logic behind these questions is the problem: Do we know how to define the activity of a virtual activity? An activity is a production function specifying inputs by which to obtain a definite output. So long as information processes are perceived as a complement to a physical activity we are within Porter's models from 1980 and 1985. If we substitute physical activities with information processing we are in another universe than the one of Porter's.

The case of exchanges indicates an incomplete model of information processes leaving much of what the exchanges offers outside the realm of strategic analysis and confines it to operational effectiveness.

Further, we challenge the presumption of information *stickiness* in value chain activity based information analysis (Porter 1985). Stickiness means that information is glued to economic activities so that activities define the role and relevance of information. Information activities like search, selection, comparison and assessment fall more or less aside the value chain if none of these activities add value to anything in the chain. They are pre-value or sub-value activities because they are not modelled in the value chain. Activity processes are constitutive of industry positioning, which means that they take place with structural effect. Information cannot have structural effects per se, only as aspect of activities.

In all three exchanges we see a stress on information interchange before any transaction and exchange takes place. A process of inquiry and coordination to enhance fit between buyer's needs and suppliers' capacities and capabilities distinguish the successful exchange from the less successful. In all three cases a convergence process between buyer and supplier is more essential than the (narrowly defined) transaction efficiency.

The exchange cases also draw attention to *relationships*. We know about interrelationships in Porter's work. He define them as sharing common (tangible) assets and discusses the intangible ones without becoming specific (1985, 134-6). We define relationships are pre- and post factual, mutual considerations whereby an agent orients attitudes and activities towards another expecting reciprocity. Relationships are intangible assets because expected future activity options are embedded in them when mutually confirmed but more specific than expectations of future proceeds from investment assets.

If we consider relationships with customers we expect these to reflect a degree of trust, mutually relevant and realistic expectations (positive) accompanied by flexible, including forgiving, mutual attitudes and respect of competency (cfr Zigurs & Qureshi, 2001, 128). As intangible assets they provide value through enhanced coordination and mutual responsiveness reflected in the value impact on both sides of the equation, one on better fit between want (or need) and satisfiers, and on the other side, a better use of resources to achieve just what is wanted (without waste and error). The argument presumes that we do not exchange on perfect markets, thus transaction costs are present. Where transaction costs deprive value from a relationship, a better fit increases value.

The exchange analysis therefore takes us the full way from information systems to value chain activities and value adding. The conclusion is that Porterian value chain analysis is too meager to capture the intrinsic, intangible value of relationships that form a major aspect of the convergence and coordination between buyers and suppliers in the process of procurement, which we capture in information analyses.

5. Industrial Economics and the Internet

Now, we present the view of industrial economics on the Internet. How does Michael Porter perceive the role of his industry economics for present day information systems?

According to Porter (Porter, 2001), what it needs to gain competitive advantage "goes far beyond the pursuit of best practices. It involves the configuration of a tailored value chain – the series of activities required to produce and deliver a product or service – that enables a company to offer unique value." When "a company's activities fit together as a self-reinforcing system, any competitor wishing to imitate a strategy must replicate the whole system rather than copy just one or two discrete product features or ways of performing particular activities" (op.cit. 72).

Moving ahead with the Internet technologies provide better opportunities for strategic positioning than previously according to Porter, stating that "Internet architecture, together with other improvements in software architecture and development tools, has turned IT into a far more powerful tool for strategy. It is much easier to customize packaged Internet application to a company's unique strategic positioning. By providing a common IT delivery platform across the value chain, Internet architecture and standards also make it possible to build truly integrated and customized systems that reinforce the fit among activities" (op.cit. 72).

Getting the Internet right according to Porter means to acknowledge the technology as a complement rather than to perceive it as substituting existing channels or cannibalizing activities in the value chain. The destructive powers of the Internet have been presumed and now found generally untenable and to apply only in special cases, he says.

Porter subscribes to an industry-by-industry and business-by-business approach admitting a particular role for complements if taking caution not to equate complement with profitable. His use of the concept of complement is at odds with the one presented by microeconomics. Milgrom-Roberts definition states, "several activities are mutually complementary if doing more of any one activity increases (or at least does not decrease) the marginal profitability of each other activity in the group" (Milgrom & Roberts 1992, 108).

Porter discards the definition by separating the complement from its effects on profitability. The reason for that is to be found in his model of activities. In the value chain approach every value activity "employs purchased inputs, human resources (labor and management), and some form of technology to perform its function. Each value activity also uses and creates information, such as buyer data (order entry), performance parameters (testing), and product failure statistics. Value activities may also create financial assets such as inventory and accounts receivable, or liabilities such as accounts payable" (Porter 1985, 38).

Building competitive advantages on the value chain "views the firm as being a collection of discrete but related production functions, if production functions are defined as activities" (Porter 1985, 39). Dividing the firm into activities requires each a separate logic. According to Porter three reasons exist: "different economics, high potential impact of differentiation, and represent a significant or growing proportion of costs" (op.cit. 45).

This approach is untenable if applied to information goods characterized as relation-building rather than as discrete entities. The more information intensive the production the more intertwined and interdependent the activities become. Disregarding information

interchange handicaps or hinders a precise execution of activities in the value chain and leaves the discrete activity model inconclusive.

The limits of the Internet vis-à-vis physical activities, personal encounters, information overload, etc. call for a tempered vision of the business opportunities with the Internet. Instead of separation of Internet activities, the Internet "should be the responsibility of mainstream units in all parts of a company" (op.cit. 77). Though stressing the complementarity of Internet technologies, Porter admits that it is "not enough, however, just to graft the Internet onto historical ways of competing in simplistic "clicks-and-mortar" configurations. Established companies will be most successful when they deploy Internet technology to reconfigure traditional activities or when they find new combinations of Internet and traditional approaches" (op.cit. 78).

Within the industrial economic framework we understand that it is business as usual adding the tools of a new technology without inflicting any changes in the economic principles. Porter finds that we confuse ourselves if talking about a "new economy", an "e-strategy", or an "e-business" challenge. We have "an old economy that has access to a new technology."

The industrial economic framework views the Internet as a technology (though potentially with a higher strategic impact than previous information technologies) where "the fundamentals of competition remain unchanged." We have found reasons in the case of exchanges to question this. In the next section we will argue why.

6. A microeconomic critique of the industrial economics position on the Internet

Microeconomics has taken an interest in the applicability of industrial economics for analyses of the Internet. "Adam Smith's case for the *invisible hand* … is one of the foundation-stones of our civilization's social thought. Our purpose ... is to shake these foundations--or at least to make readers aware that the changes in technology now going on as a result of the revolutions in data processing and data communications may shake these foundations. Unexpressed but implicit in Adam Smith's argument for the efficiency of the market system are assumptions about the nature of goods and services and the process of exchange--assumptions that fit reality less well today than they did back in Adam Smith's day. Moreover, these implicit underlying assumptions are likely to fit the "new economy" of the future even less well than they fit the economy of today" according to DeLong and Froomkin (1999).

We confront Porter's industrial economics with DeLong and Froomkin's three provisos suggesting why "the new economy" may be a euphemism for the demise of industrial economics. The technological prerequisites for industrial economics are excludability, rivalry, and transparency. Each is decisive to the working of competition. *Excludability* refers to "the ability of sellers to force consumers to become buyers, and thus to pay for whatever goods and services they use. The second feature *rivalry*: a structure of costs in which two cannot partake as cheaply as one, in which producing enough for two million people to use will cost

at least twice as many of society's resources as producing enough for one million people to use. And the third *transparency*: the ability of individuals to see clearly what they need and what is for sale, so that they truly know just what it is that they wish to buy.

Without *excludability* the producers need alternative sources of revenue. Internet content providers realized just like broadcasters had previously that they had need to sell something else than subscriptions when content couldn't be protected from being copied at almost no cost. The Internet looks like broadcasting so content providers go for revenues by bringing commercials for advertisers. "In the absence of excludability industries today and tomorrow are likely to fall prey to analogous distortions. Producers' revenue streams…will be only tangentially related to the intensity of user demand..." (DeLong & Froomkin 1999, 11). The competitive forces are distorted.

Rivalry requires producers to optimize their allocation of resources to satisfy their customers and avoid building stock and to do so less than or as costly as their competitors. Unable to do so, they are--in due time--out of business. For rivalry to operate increasing costs of production must prevail. The Internet as a distribution channel shows diminishing costs as more and more consumers take advantage of it. So, it is for digital content production, too.

"If goods are non-rival--if two can consume as cheaply as one--then charging a per-unit price to users artificially restricts distribution. And if the marginal cost of reproduction of a digital good is near zero that means almost everyone should have it for almost free. However, charging price equal to marginal cost almost surely leaves the producer bankrupt" (DeLong & Froomkin 1999, 12)

Relevant to the many non-rival information goods they observe "the existence of large numbers of important and valuable goods that are non-rival casts the value of competition itself into doubt." And they add, "A good economic market is characterized by competition to limit the exercise of private economic power... impossible to achieve all at once in markets for non-rival goods--and digital goods are certainly non-rival" (op cit 14). The competitive forces are distorted.

Turning to the third technological prerequisite, *transparency* we are asked: "Why is transparency at risk? Because much of the value-added in the data-processing and data-communications industries today comes from complicated and evolving systems of information provision… today's purchaser of, say, a cable modem connection to the internet…is purchasing a bundle of present goods and future services, and is making a down payment on the establishment of a long-term relationship" (op.cit. 15). The competitive forces are distorted.

While Porter rejects lock-in due to switching costs, our argument states "the producer of a software product has every incentive to attempt to "lock in" as many customers as possible. Operating system revisions that break old software versions require upgrades. And a producer has an attractive and inelastic revenue source to the extent that "lock in" makes switching to an alternative painful" (op.cit. 16). Porter is concerned more with entry barriers than with exit barriers. In the case of software there is an asymmetry. Non-transparent products trap consumers. The competitive forces are distorted.

Considered as "frictions" welfare economics has offered a range of means to counter them without jeopardizing the function of the market. Michael Porter disregards these characteristics of information intensive goods as unimportant; nonetheless economists agree that they undermine market-based competition. If rare and minor compared to sound

economic goods these kinds of goods may not threaten the functioning of the economy. This used to be true. It may no longer be so.

One reason is the scale of operations of industries providing information intensive goods: The information and telecommunication industries together form the largest sector of all in the modern capitalist economies, disregarding the public sector. The other is the scale of the capital markets involvement in the "new industries" of information intensive goods that have emerged partly due to privatization of the previously public owned telecoms.

If we consider Porter's critique of the stock exchange and the venture capital market in the early days of the Internet (i.e. 1996-2000) we learn that it takes time for the market to assert itself. Thus, Porter presumes that capital markets have got it right now. But how would he know if not it was in the heydays of the "dotcom" companies that markets got it right? The "dotcoms" had generated funding in capital markets for investments as well operations. We may say that the Internet business started out right but the capital market withdrew support causing dependent companies to fail. Has the capital market come to terms with non-excludability, non-rivalry and non-transparent goods? If not, this is no less a problem to day than it was by the end of the 90s.

7. Extensions or blind spots in Porter's framework

In the previous section we presented a microeconomic analysis of the impact of information goods on the efficiency of competition. In this section we assess the consequences for IS use of the industrial economics framework.

What is truly remarkable is the gap between the opening articles on the issue of the Internet for business economics and the later contributions to the debate. Opening the discussion in the name of value chain reconfiguration, Rayport & Sviokla's (1995) article on the virtual value chain raised the question about a new impact of IT on value adding. High on the agenda in 1997 was "The New Economy" which was seen as propelled by the Internet (Evans & Wurster 1997). Those were the years of high growth rates in the stock market evaluations of "dotcoms". Eventually, the analysis was reduced to two in five of the competitive forces known as supply chain management and customer relationship management.

The Internet became a locus of new issues. Institutional theory focused on transaction costs, uncertainty and new economic institutions like e-hierarchies and networks. New microeconomics analyzed incentive problems aligned to innovative products and information services. Certainly, the Internet required strategic analyses and positioning management. But the Internet had aspects not caught by the conventional model as shown in the concept of a (parallel) virtual value chain.

The early Internet era was played out in an era of strong growth, low inflation and highly available venture capital. According to Porter, these were coincidental to the development of the Internet and not caused by the Internet. On the other hand, the US Department of Commerce report on the digital economy from 2001 (and in 2000) supports the view that both vendors of IT and the strong demand for IT equipment and services had raised the level of

non-inflationary growth in previous years. The high share of IT in total productivity growth was significant according to their estimates.

Michael Porter has challenged the significance and the influence mechanisms of the Internet and other information systems and technologies. We have questioned the adequacy and fundamental assumptions in his framework and drawn attention to the processes that elude the grid of Porter's value chain and positioning models, in the case of exchanges. Without making exchanges the only possible test bed, it is a choice of a service embedded in the Internet congenial to activities and relationships in the "new economy" building market structures for mutual competitive advantages.

8. Conclusion

In the past decades, the information systems discipline has been strongly influenced by industrial economics.

In this paper we investigated whether recent developments in Internet based applications calls for a rethinking of our foundation of business analysis for information systems development. The research object was if Porter's models were adequate for analysis of the Internet business opportunities, which lead to the research question: "Have Internet technologies brought the demise of industrial economics as tool for information systems (IS) analyses?" The empirical basis was three exchanges, i.e. Covisint, Gatetrade and IBX. We suggested that a mismatch between business and information models had emerged and adding theoretical arguments we concluded that industrial economics is an inadequate framework of analysis for these inter-organizational information systems.

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