The Virtual Economy As an Emerging Paradigm: An Essay

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Abstract
This paper investigates some of the manifestations and major forces driving the emergence of the new economy. A model of the virtual enterprise is proposed and investigated in the context of a virtual industry value chain. The transition to the virtual economy is definitely technology driven but is also shaped by social, economic, institutional forces. As such, it raises a number of significant issues presented as propositions concerning the new governance, restructuration, and social distancing.

1. Introduction

The transition to the virtual economy is a pervasive phenomenon: it has been invisible in the midst of other events. The virtual economy relies extensively on National and Global Information Infrastructures (NII/GII) and, to a certain extent, is related to the “global networked economy” [1]. It places considerable emphasis on knowledge and could be considered as an extension of the “knowledge-based economy”, about which we have gained considerable insight [2]. In the same vein, it shares the vision of a “knowledge society” [3,4] where knowledge is the basic and most crucial economic resource and knowledge workers play the central role. Also, it is aligned with the concept of the “information society” is put forward in the OECD’s recent work on “Economics of the Information Society” and on the “Global Information Society” and is attuned to the notion of the “digital economy” [5].

The concept of the virtual economy builds on the above-mentioned concepts and leads to a new economic order where opportunities are infinite but where the current ground rules will need to be redefined. The virtual economy refers to an era of business without borders (temporal, geographical, functional or organizational) and to entities called virtual enterprises which operate in high-performance networks. We will argue here that we are experiencing the transition from the virtual enterprise to the virtual economy and that, although some insights have been gained into the former, very little formal knowledge exists on the latter and on the mechanisms that will ensure this transition.

The paper is divided into four parts. The first section examines the first manifestations of the virtual economy at the firm and industry levels. The second section proposes a model for the virtual enterprise while the third section investigates the major forces driving the emergence of the virtual economy. Finally, in the fourth and last section, the main issues raised by the virtual economy are discussed.

2. Virtual value chain at the firm and industry levels

Managing virtually one or more core activities along the firm’s value chain is already a well established practice. For instance, virtual design is one of the earlier moves made by firms to fully exploit the benefits derived from the existing electronic methodologies and the digitalization of products and processes. Firms achieve significant benefits by: (i) substantial reductions in costs and time, mainly due to inefficiencies in data reentry (and resulting errors); (ii) continuous coordination of the best worldwide design teams where firms have their design teams working on a continuous 24-hour basis (savings equivalent to two-thirds in terms of elapsed time for the design schedule) by exploiting different time zones (e.g. Eastern U.S.A., Japan and Europe); (iii) ongoing and real-time input from geographically dispersed customers. Among prime examples of virtual design are the design of Ford’s Taurus / Sable and of Boeing’s 777 virtual design leads to virtual products that “mostly exist even before they are produced” [6:4]. Other core activities such as
logistics, procurement, marketing, sales or after sale services can be also managed virtually.

Electronic commerce, broadly defined as "commerce transacted using information infrastructure capabilities" [7], or as the use of electronic means to exchange information and execute transactions between and within firms, public or parapublic institutions, governments and individuals [8] represents the most visible component of the virtual economy. Activities formerly performed by hand, in person, by fax or by mail can now be executed automatically and electronically, regardless of location, by all parties involved in a given business venture (customers, manufacturers, suppliers, distributors, financial institutions, etc.). Some firms have taken full advantage of at least one aspect of electronic commerce. On-line selling is booming: for instance, Cisco Systems sells network equipment from its Web site at the annual rate of US $1 billion; on-line sales of PCs on the web represent close to 10% of business for Gateway 2000 and Dell Computer; Chrysler, whose sales for its first year on Internet reached 1.5% of its total sales, expects them to climb to 25% in four years' time [9]. On-line procurement activities are also moving at a fast pace: General Electric purchased $1 billion worth of components on-line from its suppliers in 1996.

This trend disrupts, although unevenly, firms in many traditional sectors. For instance, business in the financial sector with discount on-line brokers such as Schwab or in the retail sector with Auto-by-Tel (an Internet car-buying service) is booming, whereas virtual shopping malls are only in the embryonic stage. Improvements on both the technical and non-technical aspects are required but, once these improvements are implemented, the above-mentioned manifestations are likely to be only the top of the iceberg. In fact, the trend towards a virtual economy is at full strength when all activities along firms' value chain are realized in a virtual manner. It is even possible to envision electronic interorganizational relationships that will lead to virtual industry value chains.

3. Virtual enterprises

Virtual value chains at the firm and industry levels rely heavily on electronic interconnections and will become increasingly prevalent as firms begin to exploit the full potential of NII/GII. A step further into virtuality is the virtual enterprise which constitutes a (temporary)
consortium of business entities. More specifically, a virtual enterprise is organized according to the U.S. Department of Defense "as a continuously operable, direct business venture based on the mutual collaboration of an array potentially changing, independently operated component business entities. The assembled entities retain their separate corporate identities while forming a distinct new entity: the virtual enterprise. The component entities need not be collocated and may (or may not) be a portion of the same parent organization". The concept of virtual enterprise requires that firms within an industry and even among industries capitalize on what Lockheed Martin calls “network enabled business practices”. As a consequence, industries and groups of industries are being restructured into high-performance networks.

Figure 3

The virtual enterprise

At the heart of the proposed model of the virtual enterprise (figure 3) are the product integrators, which can be TNCs, SMEs or governments which, through a common information base and common international norms and standards, will integrate suppliers, subcontractors, vendors and bankers along a product's value chain to maximize the value between the different components of the chain and to provide the best possible product for all customers worldwide. This is done by ensuring that the network of firms involved is composed of a very effective and efficient cast of players operating in what we have referred to as a high-performance network.

This model also relies on a new set of players, referred to as “platform businesses,” who play an intermediary role between trade partners that are likely to be far apart and to have never traded with each other in the past. In that context, platform businesses provide the functions essential to trade on an open computer network, namely (i) provision of partner search functions; (ii) creation of trust among trading partners; (iii) evaluation of economic value; (iv) provision of standardized interface; (v) integration of functions [10]. The platform businesses also act as intermediaries between customers and product integrators, for example, in electronic retailing and market choice boxes.

The model presented in figure 3 leads us to consider that the virtual enterprise displays very distinct characteristics with respect to its organizational form (loosely coupled and intangible), its focus (customer-driven), its process (product life cycle approach), its way of conducting most of its core business functions (on line, in real time), its communication means (electronic interconnections and information in a digital form) and its use of technology (full exploitation of the applications and services provided in the NII/GII, adoption of international norms and technical standards, and updated knowledge of software protocols and of computer systems and networks).

The absence of territorial borders as shown in figure 3 raises a problematic issue namely the problem of “the relationship between legally significant phenomena and physical location.” Pioneering work is being carried out by the Harvard Information Infrastructure Project on issues of regulation and law in cyberspace [11]. The project group is coming to grasp with the basic parameters of moving from a legal system largely anchored on territorial borders in a "real world" to a system characterized by the absence of territorial borders and functioning in a "virtual world".

4. The emergence of the virtual economy led by powerful agents of change

The transition to the virtual economy is being accelerated by three types of lead users: multinational corporations (MNCs), national governments and supranational agencies. All of them are powerful.

MNCs can collectively exert an enormous influence: their total revenues exceed US $15.5 trillion; they account for 40 percent of the world’s manufacturing output,
almost a quarter of world trade and about a quarter of the world's GNP [12:4-5]. Most MNCs have already managed one or more of their internal key functions virtually and are now in the process of extending this to take full advantage of the potential of NII/GII as it is deployed. Numerous examples of this exist worldwide. In the aeronautics industry, Lockheed Martin is deploying its full spectrum electronic commerce which, over the period 1995-2005, should bring its network-enabled business practices from a simple EDI platform to outsourcing over GII and eventually to virtual enterprise operations. The program involves all of Lockheed Martin's suppliers worldwide including a significant number of SMEs. Lockheed Martin has recently extended the reach of this program by involving McDonnell Douglas and Dassault Systems. IBM is using its CATIA System to bridge the gap by allowing different suppliers from different parts of the world to operate in a virtual manner on product development cycles. Other examples abound worldwide: in the automobile industry, JAMA (Japanese Automobile Manufacturers Association), which is composed of most of the major actors in the industry, i.e. Honda, Nissan, Mazda, Mitsubishi and Toyota, is actively developing its electronic commerce model based on the CALS platform.

As for governments, their role has been and will continue to be instrumental. Government-driven consumption of goods and services represents between 5 and 15 percent of total GDP expenditures for OECD countries, with Japan being at the lower end of the scale and Canada, the U.S. and the U.K. at the higher. Actions such as that taken by the American Department of Defense (DOD) have had drastic impacts on numerous firms: as early as 1998, suppliers to DOD have to integrate the CALS underlying standards. The CALS technology will thus become a prequalifier for firms wanting to do business with DOD. Further, governments play an active role by ensuring the adequate diffusion of technologies, norms and standards. CommerceNet in the U.S., SWEDCALS in Sweden (a government-industry group which, among other activities, is extensivly developing the new international norms and standards with the ISO Group) and CIRPLS (Computer Integration for Requirements, Procurement and Logistic Support) in the U.K. are all good examples of government initiatives aimed at ensuring adequate adoption and diffusion of international norms and standards that will be required to operate on international business platforms.

At the supranational level, many organizations are preparing the transition to the virtual economy. NATO has been working since 1993 on the definition of the new business platform including the international norms and business practices required to operate on the GII. This effort is fueled by the understanding that one of the cornerstones of the new emerging economy is the need to rely on the best competencies, irrespective of where they are, and to form the best performing supplier chain. Other organizations such as the OECD, and the G 7 Commission are actively developing the framework within which this global virtual economy will operate. Many of the most industrialized countries in the Asia-Pacific region are also pursuing a common path and sharing a common vision in the development of their electronic commerce platform. One such mobilizing activity is the MATIC project supported by MITI of Japan. MATIC stands for manufacturing technology supported by advanced and integrated information system through international cooperation. The 5 year project which started in 1994 involved Japan, China, Indonesia, Malaysia, Singapore and Thailand. This kind of initiatives will have a significant impact not only within that region of the world but possibly worldwide, given the economic clout some of these countries will hold at the beginning of the next century.

5. Issues raised by the transition to the virtual economy: new governance, restructuration and social distancing

The transition to the virtual economy raises a number of significant issues which we will present as propositions.

Proposition 1: The emergence of the virtual economy is leading to a more integrated internationalized economy which challenges the traditional roles of governments. The virtual economy will require new governance mechanisms

The absence of territorial borders in the virtual economy challenges the ability of sovereign states to continue to protect their economic well-being. What will the span of action be for modeling the regulatory environment of the virtual economy?

Figure 4

The new regulatory environment

Source: Adapted from [14]
Figure 4 shows that the trend towards global economic convergence goes along with a more cooperative and coordinated approach to regulation and relies to a much greater extent on “soft” standards and procedures as opposed to “hard” laws and regulations. The figure also strongly suggests that the span of action is more limited as we move towards greater economic convergence. Thus, national governments will function less as “sovereign” entities and more as partners in an international commercial and trade policy. This is linked to the community-driven processes characterizing the era of ferment [13]. Regulation of the “softer” standards and procedures thus becomes an important lever to ensure the transition of national economies to the virtual economy and, as such, constitutes an important responsibility for national governments.

Governments are therefore faced with new challenges of competition policy. At whatever level of governance (community, local, regional, national or international) governments have to make sure competition is on a level playing field. Access to electronic networks, to communication infrastructures, to research consortia, to public procurement contracts must be safeguarded without excess interference in private decision making. Markets must remain contestable.

**Proposition 2: The emergence of the virtual economy is generating drastic changes in the structure of organizations, of industries and of the workplace. The virtual economy will require a restructuration in order to compete.**

The transition to the virtual economy will have profound impacts on the internal structure of firms and on the industrial structures which in turn modify the structure of the labor market. Firms are restructuring to offer better quality, better prices and more customisation to increasingly demanding and geographically dispersed customers. The pressures are important and potential cost savings are huge as may be witnessed from the estimates provided by the American group CommerceNet on the impacts of CALS technology utilisation for companies: 80% reduction in purchasing cycle, 5%-10% reduction in inventories, 90% reduction in engineering changes. In fact, the potential for an increase in operating efficiency by firms is so significant that opting out of the upcoming deal using “intelligent agent” software [15], leading us to believe that patterns of consumption are also changing radically. Virtual consumption in the “global general store” is at our footstep and is being driven by a proliferation in the use of electronic commerce by consumers in North America, Europe and tomorrow in the Asia-Pacific region. New patterns of consumption is thus both the direct consequence of the virtual economy and at the same time the most powerful driving force behind it. Market forces will be difficult to constrain.

As a result of the above structural changes, the labor market will also have to adapt. In particular, the number of non-permanent jobs slightly higher than the ones observed today. In a static world with routine work, job security seems appropriate but, when competition becomes a “war of movement” [16], continuous and dynamic adaptation is necessary. Job redistribution within and among sectors of economic activity is also very likely and job redistribution among different countries is an even more disturbing possibility.

**Proposition 3: The emergence of the virtual economy may create new social inequalities. The virtual economy will require increased attention to social distancing.**

The transition to the virtual economy may exacerbate knowledge and skill gaps between and within countries. For instance, less developed countries should obviously gain access to NII/GII: this is already a prime concern for OECD and the World Bank. However, even in an industrialized country such as Canada that ranks first out of 175 countries in 1997 for its human development index, there is possibility of a two-tier society in the form of “information rich” and “information poor” or “haves” and “have nots”. This is a rather disturbing possibility but empirical evidence points to a polarisation in the use by individuals of electronic interconnections and computers. It is biased towards high income [17] and younger generations [18]. The same phenomenon in the U.S. is observed with Internet and Web users: 42 percent of Internet and Web users have annual household incomes of more than 50 000 $ U.S.2 [19]. Since income seems the most significant determinant, one of the highest priorities is to give universal access to NII/GII and to develop infrastructures from libraries, schools and other public institutions.

Innovation strategies can therefore be directed to ensure universal access to NII/GII and to develop applications to promote lifelong learning. In addition, public education systems will have to be aligned with the new required skills of the virtual economy and, therefore, will need to be upgraded and enhanced. But public

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1 Since students are heavy users, the projected bias towards high income may be greater than actually observed. It is also interesting to note that gender is not a significant factor anymore.

2 HDI (Human development index) is based on three different dimensions: life expectancy, educational attainment (adult literacy and combined primary, secondary and tertiary enrolment) and real GDP per capita (in PPPs).
education is not enough: employers will also have to play an increasingly important role. Employer-sponsored training system is however biased against the less skilled workers and this situation threatens to widen even more the current skill gap. Some government sponsored incentives could correct this bias but more and more observers believe that government and employers are equally responsible to create and maintain “good” jobs.

6. Conclusion

In conclusion, change is now underway and we are moving into a largely misunderstood realm of business. First, it is still not very clear when or how change will become overwhelming. Second, the transition to the virtual economy can be neither the cause of, nor the solution to all problems. Third, the transition to the virtual economy will raise deep concerns about governance issues, structural issues and social issues. Although these issues are presented in a linear fashion in the paper, they strongly interact and therefore increase the levels of uncertainty.

This paper seeks to offer some proactive reflections concerning an emerging paradigm which we have referred to as “the virtual economy”. The transition to the virtual economy is definitely technology driven but is also strongly shaped by social, economic, institutional and cultural forces. As such, it is typical and at the heart of technology management which indeed requires a multidisciplinary perspective [20]. It is however acknowledged that trying to bypass certain “disciplinary rigidities” and shortcomings is rather difficult as it requires to be both conceptually and methodologically proficient in several disciplines. Further, the transition to the virtual economy can be envisioned as a technological innovation that involves systems at many levels, from individuals to groups of individuals, firms, industries, governments, nations and even supra-national institutions. Each level of analysis contributes a unique and distinct understanding of the virtual economy and is characterised by certain distinct properties. Weik’s notion of “loose coupling” and Simon’s concept of the “decomposability of systems” demonstrate that aggregation goes beyond the mere process of pooling lower levels. Mixing and matching levels of analysis allows us to creatively uncover a variety of perspectives and courses of action for an emerging paradigm which is still difficult to grasp.

7. References


