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Francesco Maria Barbini

*Universita di Bologna, barbini@economia.unibo.it*

Alessandro D'Atri

*Centro di Ricerca sui Sistemi Informativi, datri@luiss.it*

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# HOW INNOVATIVE ARE VIRTUAL ENTERPRISES?

Francesco Maria Barbini, Dipartimento di Discipline Economico-Aziendali, Università di Bologna, Piazza Scaravilli 1, 40126 Bologna, Italy, Tel +39-051-20.98.087 Fax +39-051-23.72.65, barbini@economia.unibo.it

Alessandro D'Atri, Centro di Ricerca sui Sistemi Informativi, Luiss Guido Carli, Via O.Tomassini 1, 00162 Roma, Italy, Tel +39-06-86.506.792 Fax +39-06-86.506.516, datri@luiss.it

## Abstract

*The virtual enterprise is usually cited as an innovative inter-organizational configuration. Is it possible to justify and to assert the innovativeness of virtual enterprises just by claiming that they are made up of innovative "elements"? Is a sum of innovative features making the resulting system innovative too? This contribution will investigate the conditions and the situations in which a virtual enterprise can be regarded as innovative from an organizational point of view. In addition, a comparison with other inter-firm cooperation configurations (e.g. extended enterprise, digital districts, inter-organizational projects) will point out the most innovative features characterizing the virtual enterprise.*

## Keywords

*Virtual enterprise, Cooperation among SMEs, e-Business innovation, Comparison of inter-organizational configurations.*

## 1 INTRODUCTION

The contemporary competitive market, global and interconnected, is threatening the competitiveness of Western small and medium enterprises (SMEs). The competitiveness of the Western economic system is threatened as well, being SMEs its building blocks.

Traditionally, small and medium enterprises are used to match environmental complexity by connecting themselves in industrial districts, i.e. networks of enterprises located in a narrowed geographical area and performing complementary or homogeneous activities. Within an industrial district, SMEs develop a complete suite of horizontal and vertical inter-relationships. Industrial districts are geographically localized organizations; hence, they are able to take advantage of their proximity to start tight and extensive communication processes. In addition, the geographical proximity allows enterprise to join on the basis of common culture, understanding and behavior, and, in general, of a solid trust among partners (Brusco 1992).

However, the geographical characterization of industrial districts may in the long run represent their limit: the possibility to integrate firms having specific competencies necessary is

subordinate to the actual availability of such enterprises in the geographical area the district belongs to. Moreover, the existence of strong and long-lasting relationships among SMEs within an industrial cluster may end up in rigid specialization situations; in such cases, the industrial district becomes very similar to a traditional hierarchy, losing flexibility and global competitiveness (Micelli 2000, Barbini 2003).

Western enterprises should then engage a process of continuous organizational change in order to proactively dominate their environments: “the only way to positively meet the forces imposing organizational change is to create and institutionalise in the firm strong change capabilities” (Hammer 1997).

Such goal could be achieved by means of a strategic approach based on the focalization on core business and the simultaneous delegation of other activities to temporary collaborations with other enterprises.

Focalization is necessary because, to succeed on the market, it is generally preferable to master a limited section of the value chain (thus becoming a center of excellence on the field) instead of being “one of the many” in many fields (Hamel and Prahalad 1994). Focalization imposes to constantly look for partners able to perform the remaining activities of the value chain.

The temporality of the collaboration is a key factor for achieving a certain level of organizational flexibility: the focalized enterprise should be able to provide its expertise in many different ventures, choosing time to time the cooperation more suitable for meeting the market’s needs.

Western SMEs, given their present strategies and organizational configurations, are not able to cooperate in such a flexible and simple way. For these reasons, we need to deeply rethink both the way small and medium enterprise are organized and their cooperative attitude.

Virtual enterprise configuration may be one of the more desirable paths of development for Western SMEs. The objective of this contribution is to introduce an organizational discourse to analyze the concept of virtual enterprise and to investigate its innovativeness, also with respect to other cooperative configurations. The next Section is summarizing the main characteristics of the virtual enterprise, then, Section 3 will explore its nature, highlighting three main points of view. In the Fourth Section, a qualitative comparison among virtual enterprise, extended enterprise, digital district, adhocracy and inter-firm project will be sketched. A discussion about main findings will conclude the contribution.

## **2 THE VIRTUAL ENTERPRISE**

A virtual enterprise is a temporary network of autonomous firms dynamically connecting themselves stimulated and driven by a business opportunity arising on market. Every member makes available some proprietary sub-processes and part of its own knowledge. When the business opportunity is over, members disconnect and look for new businesses (D’Atri 2003).

Consisting in a set of small and medium enterprises (SMEs), the virtual enterprise is usually informally organized and adopts non-hierarchical, lean and modular configurations. This network acts toward the external environment as a single organization and is shaped to exploit the emerging opportunity as best as possible.

A key implication of virtual enterprises is that they are more reconfigurable and their boundaries are considerably more blurred than traditional networks (Aken et al. 1995). The glue among these autonomous business units is represented, at the higher level, by a deep result-orientation and, at the operational level, by the adoption of standard platforms and by information systems integration (Ciborra 1997). A virtual enterprise is flexible, dynamic, proactive and not constrained by pre-defined structure (Goldman et al. 1995).

A direct consequence of such a virtual approach is the high reconfigurability of inter-organizational structures, the explosion and the blurring of organizational boundaries and the adoption of procedural regulation methods (Sobrero 1998).

In the literature (e.g. D'Atri et al. 2001, Martinez et al. 2001, Camarinha-Matos 2003, Barbini 2005), it is generally agreed that the main features of a virtual enterprise are:

Environment & resource oriented features:

- *Market-driven cooperation*: the network is set-up to exploit a specific business opportunity; it exists a relevant teleological linkage among partners. Indeed, the main cohesion drivers are common business culture and strong result-orientation.
- *Complementarity*: each partner excels in particular sub-processes and/or has a critical knowledge about the process, the product or the market. Every partner has to contribute (more or less directly) to the value creation for the customer. In particular, mutual interdependencies among members have to be identified and managed to create a unique combination of resources, skills and knowledge.
- *Dynamic participation*: organizations can connect into the network and disconnect from it in simple ways. The competitive environment in which the virtual enterprise operates would be able to provide backup solutions to allow the substitution of disconnected partners.
- *Legal and economic independence of partners*: the network is not based on strategic partnership agreements, it is more likely a constellation of contracts and fuzzy agreements. In addition, the virtual enterprise it usually not shaped around a focal enterprise, economic power is usually shared in the network. Hence, the virtual enterprise is flexible, rapid, proactive and capable of adapting to the market without being inhibited by rigid legal and economic barriers. It is a permeable structure, in which the physical borders are blurred.
- *Processes/resources sharing*: partners work together, integrating business processes and sharing resources, in particular data, information and knowledge.

Process oriented features:

- *Time limitation*: the virtual organization is not intended for operating in the long term; it is usually aimed to achieve short/medium terms business opportunities;
- *Transparency*: the achievement of cooperation goals is based on the partners' willingness to communicate share all necessary information. However, the virtual enterprise has to allow members to protect their own private core information and knowledge assets from being accessed by others (D'Atri and Motro 2002).
- *Polymorphism*: it is not possible to conceive one, universal organizational structure for all virtual enterprises; rather, the organizational structure depends on the business to be exploited and on the characteristics of the partners. Indeed, the virtual enterprise is particularly suitable for allowing partners to focus on their core businesses and to achieve scale factors by means of dynamic cooperation. The unique combination between flexibility (a facet of the participating SMEs) and scale (a facet of cooperation) is one of the main benefits of the virtual enterprise paradigm.
- *Automation*: the required degree of collaboration among partners is possible only by means of both tight information systems integration and intense adoption of new ICTs. Private information system integration is the glue allowing, at the operational level, the cooperation (Coyne and Dye 1998). Data and information are shared among autonomous partners cooperating to produce a common output.

Virtual Enterprise environments are usually more complex than the traditional ones: relevant efficiency constraints (in particular with regard to time-to-market) are pushing the need for

frictionless integration negotiations. Hence, the initial (normative) phase of the virtual enterprise should be as lean and rapid as possible. This means that participating enterprises would be characterized (at least) by:

- *Common business culture*, basic prerequisite to develop a cooperation. This would allow partners, initially, to “speak a common language” and then to actively work together (DeSanctis and Monge 1999).
- *Open information systems*, as soon as the cooperation is sketched out in broad terms, private information systems would be interfaced, possibly integrated, to develop the “digital nervous system” of the new virtual enterprise. The adoption of open standards allows autonomous information systems to be efficiently connected (Camarinha-Matos and Afsarmanesh 2003).

In addition, it is necessary to point out that not every organization is suitable for joining a virtual enterprise. Candidate partners should be characterized (at least) by process orientation, high cooperation attitude, tight focus on core business, prominent interest in developing critical knowledge and skills.

Virtual enterprises cannot spontaneously arise as a result from spot interactions among members; trust, reputation, loyalty, common value systems are key features for enabling the creation of any interfirm network. The creation of on-line aggregation points where SMEs may get in touch, develop relationships, share information and knowledge is then a prerequisite for stimulating the development of virtual interfirm networks (Barbini 2003)

### **3 ON THE INNOVATIVENESS OF VIRTUAL ENTERPRISES**

Virtual enterprises are often described as a sum of modern management paradigms; their definitions include quotes and approaches belonging to the general framework of business process management, business process reengineering, outsourcing, cooptation, time-based management, and industrial cluster management and organization (Eschenbaecher and Ellmann 2003).

In addition, virtual enterprises are intended to apply and deploy in creative ways the most recent achievements of information and communication technologies: they would develop interorganizational networks by taking full advantage of Internet and e-business technologies, while supporting the internal effectiveness (i.e. the effectiveness of the interorganizational business process) by adopting innovative workflow management systems and by efficiently sharing data (Camarinha-Matos 2003).

It is now relevant to understand whether it is sufficient to blend together and amalgamate in creative ways new managerial paradigms and new technological achievements in order to design an innovative organization. In other words, is it possible to justify and to assert the innovativeness of virtual enterprises just by claiming that they are made up of innovative “elements”? Is a sum of innovative features making the resulting system innovative too?

The literature does not definitely answer to this problem, we can identify at least two main stream of thought: technology-centered considering ICT as the basis for a new industrial revolution (Venkatraman 1994), and business-centered viewing technology just as one of the many enablers for organizational change (Porter 2001).

The answer to the problem depends first of all on the adopted definition of organizational innovation. In this contribution we assume organizational innovation as a major breakthrough in the managerial and organizational philosophy of the firm, i.e. a deep evolution in the way the business is perceived, analyzed and exploited, then being innovative is obviously far from being a sum of innovations. The innovation acts on the institutional level of the firm, fostering

changes on the objectives of the organization, on the beliefs about the cause-effects relationships (i.e. on the technology) and on the preferences about possible future situations.

In other words, we have higher innovation when the dominant coalition (i.e. the set of people able to exercise in a certain moment the power on the organization) of the firm changes in an integrated way (Thompson 1967, Maggi 2003):

- The domain of the organization, by modifying the strategic choices related to (1) the range of products offered, (2) the population served and (3) the services rendered;
- The strategy adopted for managing the inter-relationships with its task environment, redefining power-dependence relationships with (1) clients, (2) suppliers of materials, labor, and capital, (3) competitors for markets and resources, and (4) regulatory groups;
- The technology (intended not as sum of artifacts but as beliefs about the cause-effect relationships), by improving its technical knowledge and re-assessing the cause-effect relationships management;
- The structure, by redesigning the way business processes are managed and coordinated.

Following this approach, the innovativeness of the virtual enterprise may be stated only by analyzing in depth its nature and by comparing this latter with similar interorganizational configurations (e.g. interfirm projects, extended enterprises, adhocracies, digital industrial districts).

With reference to the nature of the virtual enterprise, three different approaches can be introduced:

1. *Virtual enterprise as a rational choice* made by the dominant coalition of member SMEs. The constitution of a rational interorganizational network is a deliberated agreement made after a specific economic and strategic analysis and a detailed negotiation process.
2. *Virtual enterprise as an ex-post construction*, regrouping a series of autonomous and independent interorganizational transactions. Firms cooperate in unstructured ways, without the awareness of being part of a virtual enterprise; ex-post, it would be possible to identify interdependent behavior and to aggregate them in a construct called virtual enterprise.
3. *Virtual enterprise as a continuous process*, i.e. a sequence of decisions and actions deliberated by the member enterprises. The dominant coalition of any member enterprise decides to collaborate within such framework for reaching its private goals. The cooperation is functional to the exploitation of autonomous, cooperative goals of the members.

The first vision (positivist) is not highly innovative (its strategic and operative scheme is the one adopted in traditional cooperation forms). In addition, in a virtual enterprise environment, it appears to be inefficient both in economic and instrumental terms: the need for detailed preliminary negotiations prevents rapid developments and may cause conflicts and goal translations.

The second vision (subjectivist), based on an ex-post reconstruction (by means of a sensemaking activity) of the virtual enterprise, is limitative since it does not recognize in any way all the intentional activities carried out by members before and during the cooperation. It rejects the possibility to intentionally plan and coordinate the life of the virtual enterprise.

The third approach, considering the virtual enterprise as a continuous process of decisions and actions evolving in dynamic and not fully foreseeable ways, it appears much more prolific to our ends. In such a framework, the virtual enterprise appears by demanding a specific domain

and thus enacting its task environment. The virtual enterprise is controlled by the dominant coalition of the most powerful member or, more usually, by a committee composed by the dominant coalitions of more important member firms. Management and control are soft, usually based on program so which partners accept to adhere. Individual actions are managed in synergic ways by means of operative programs (Mowshovitz 1997). From the operative point of view, the coordination is achieved by allowing partners to mutually adapt each others. The virtual enterprise is not visible by the customer, who is only interacting with the front-end partner, i.e. the partner in charge for the commercialization and exploitation of the virtual product.

## **4 COMPARISON WITH OTHER INTER-ORGANIZATIONAL CONFIGURATIONS**

Hereafter we are focusing on the inter-organizational configurations usually cited as similar to the virtual enterprise. Our goal is to highlight major differences and to trace the borders of each of them.

### **4.1 Extended enterprise**

The extended enterprise is a network of firms structured around a focal organization. The latter is taking advantage of a constellation of small or medium enterprise to achieve a larger and more flexible supply chain (Browne and Zhang 1999).

It is a stable structure, in which the power is concentrated on the focal organization, which deploys state of the art technologies in order to manage and keep connected the network (Rockart and Short 1991). This kind of cooperation is based on contractual regulatory agreements. Usually, the constellation of SMEs is a sum of enterprises created as spin-offs from the focal organization and managing in outsourcing some of the processes of the latter.

The extended enterprise shares with the virtual enterprise the pervasive adoption of new information and communication technologies, but it is much more rigid and based on long-range cooperation relationships.

The development of an extended enterprise requires relevant investments on infrastructures and on coordination agreements, hence it is usually intended to operate for a long (undetermined) period of time.

### **4.2 Adhocracy**

It is a configuration that splits an organization in work constellations, with a selective power decentralization and emphasis on the possibility to achieve inter and intra-constellation coordination by means of mutual adaptation. Adhocracy is also referred as an “organized chaos” (Waterman 1993).

The concept is similar to the virtual enterprise, even though the adhocracy is generally a way to organize and manage singular firm (i.e. it is an intra-organizational configuration). In addition, it is not clear whether, in adhocracies, it exists an institutional level of responsibility managing and controlling the work constellations.

The idea of *adhocracy among firms*, although considered in the literature, is not sufficiently exploited to allow an actual comparison with the virtual enterprise concept.

### 4.3 Inter-organizational projects

The development of inter-organizational projects is a largely adopted strategy in order to carry out complex or risky activities. Working together for a determined period of time allows to split investments and prevent a single firm to bear on itself the whole risk of the project.

Organizations formally agree, before the startup, on the tasks to be carried out, on the breakdown of the activities and on the articulation of authorities and responsibilities on the process.

Inter-organizational projects are similar with virtual enterprises for the strong goal orientation, but they are much more formalized. The level and the length of the commitment of every organization are predefined as well.

### 4.4 Digital industrial districts

Digital districts are the extension in the virtual world of the traditional industrial districts.

This often happens by means of ad-hoc Internet portals or private marketplaces. Added value services are usually highly customized on the needs of the specific members.

The digital district is generally a virtual mirror (one-to-one) of the physical district. It is developed to achieve efficiency gains by means of new information and communication technologies (e.g. integrated logistics management, unified supply chain management, exploitation of new markets...).

We could highlight many similarities with the virtual enterprise, but the strong localization of the digital district makes it really different.

### 4.5 Synthesis

In order to achieve a meaningful comparison among the various inter-organizational configuration proposed, we have identified a set of indicators appearing relevant in organizational literature (Malone et al. 1987, Oliver 1990, Powell 1990, Sobrero 1998, Grandori 1999). We have compared the virtual enterprise with extended enterprises, inter-organizational projects, and digital districts; adhocracies have not been considered since, as already highlighted, they are mainly intra-organizational configurations.

The key indicators identified (with their variation range) are:

- *Span of cooperation.* Few members (1), Many members (5).
- *Length.* Predefined (1), Not defined (5).
- *Localization.* Local (1), Global (5).
- *Regulatory mechanisms.* Contractual (1), Procedural (5).
- *Information structure.* Integrated information system (1), Fuzzy, distributed network (5).
- *Tasks formalization.* Formal (1), Informal (5).
- *Participation.* Static (1), Dynamic (5).
- *Autonomy of participants.* Decisions centralized (1), Quasi-independence (5).
- *Economic/legal independence of partners.* Dependent (1), Independent (5)

A cooperation form placed on the left side (1) is highly hierarchical and formalized. It has specific procedures and routines, the efficiency is then strongly pursued. Usually, such kind of collaboration is developed for operating in the long term, hence relevant set up costs can be settled during the time.



On the other side, a cooperation placed on the right side (5) is informal and lean. It is suitable for spot collaboration, it is pursuing effectiveness instead efficiency.

	Virtual Enterpr.	Extended Enterpr.	Interorg. Project	Digital Districts
Span of cooperation	4	1	2	3
Length	5	5	2	5
Regulatory mechanism	4	1	2	4
Information structure	3	1	4	3
Tasks formalization	4	2	4	4
Participation	5	2	2	4
Autonomy of participants	4	1	3	4
Localization	4	2	3	2
Economic and legal independence	5	1	4	5

Table 1: Comparison of Inter-organizational Configurations.

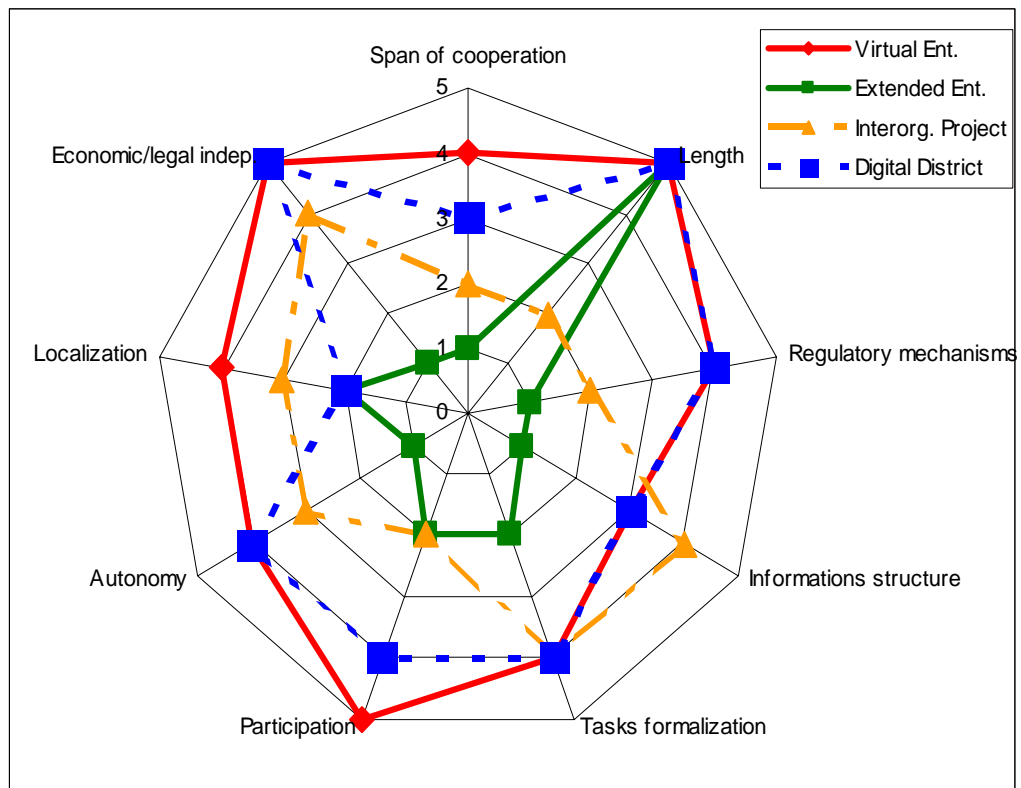


Figure 1: Graphical Representation of the Comparison.

Our qualitative analysis shows the higher flexibility of virtual enterprise with respect to other cooperative configurations. Indeed, virtual enterprise is potentially able to gather, without geographic limits, a large number of members and to let them cooperate in integrated way without imposing strict regulation and task formalization. In addition, it allows members to preserve their independence and their usual information systems infrastructures.

The extended enterprise appears to be the more formalized and long lasting one, while the digital district form is in many ways similar to the virtual enterprise. The most evident difference between virtual enterprise and digital district is the localization, since the latter is belonging to a specific geographic location, while the former is not constrained by space.

Concluding, such comparison allows us to state the innovativeness of the virtual enterprise as cooperative configuration. It cannot be confused or assimilated to other interorganizational forms.

## 5 CONCLUSION AND FURTHER RESEARCH

Once investigated the innovativeness of the virtual enterprise as an inter-organizational configuration, it could be now interesting to analyze on the impact of such cooperative form on the organizations constituting it.

Throwing away the marginal impact on firms joining virtual enterprises in sporadic ways, we are focusing on organizations adopting a sort of virtual philosophy, i.e. firms adhering to virtual enterprises in strategic and consistent ways.

For such firms, virtual enterprising may become a sort of *managerial philosophy* based on dynamic, temporary and unstructured collaborations among dispersed partners.

This virtual philosophy is translated in higher awareness of the strategic relevance of the decision to continuously operate within virtual enterprises and in stronger willingness to develop their business on cooperative (Nalebuff, Brandenburger 1997), dynamic, and temporary interactions with other organizations

If the dominant coalition of a SME decides to fully exploit the virtual enterprise approach, then this would be likely to result in organizational innovation. A typical innovative decision enabled by virtual enterprising is the possibility to focus on core business (relying on ad-hoc virtual enterprises for dynamically shaping the supply chain and for reaching the end customers).

Then, the virtual enterprise approach becomes an important driver for innovation when it is considered as a strategic choice made by small and medium enterprises.

The higher innovative potential of virtual enterprises is not originated by their peculiar organizational configuration, but by the philosophy of making business by means of them.

The virtual enterprise “philosophy” may stimulate innovation on member firms by:

- *Allowing SMEs to concentrate on their core activities*, relying for the non-strategic ones on the possibility to develop specific virtual enterprises. This would result on a narrowed domain.
- *Supporting a continuous fine-tuning of their task environment*. Even though the task environment of the single SME will not consistently change, being in large part identified with the *virtual community* of enterprises in which virtual collaborations arise, every involvement in a virtual enterprise is likely to drive the need for contingent task environment modifications.
- *Establishing cooperative behaviors with other enterprises*; it makes less relevant the dependency constraints imposed by other enterprises. The dynamicity of the networks

allows overcoming the rigidities related to fixed supply-chain links. However, the concepts of power and reputation are still very important within the virtual community.

- *Facilitating the enhancement of their technology*; narrowing their domain, SMEs could improve both their technical knowledge and their cause-effect relationships comprehension abilities.

At the end, the virtual enterprise can be an innovative medium for enabling members' organizational innovation; organizations operating with a virtual enterprise approach can secure and increase their instrumental rationality and, at the same time, they will meet the environmental contingencies by continuously redefining their task environment (by selectively enacting a part of their task environment) in order to endogenize such contingencies. Their structure will evolve consequently.

Next research activities would focus on a quantitative declination of the qualitative assertions related to the comparison between the virtual enterprise and other cooperative configurations. In addition, the concept of virtual philosophy needs to be studied in depth and to be verified on the field.

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