Socio-cultural contexts and inter-firm relationships

Cinzia Panero
University of Genoa

ABSTRACT

The paper aims at analysing the way the socio-cultural context, where firms operate, affects the relationships they engage, particularly when exchange relationships (concerning, for instance, design and engineering activities) involve partners with complex knowledge from socio-culturally very different Countries. The relationship between knowledge and contexts and the implications for its transfer among considerably different and logistically far firms are exposed. The need of integrator nodes emerges. A special use will be made of recent surveys obtained from the network reorganisation in which General Electric is involved concerning aspects of designing and engineering in Europe, India and Mexico.

The paper aims at analysing the way the socio-cultural context, where firms operate, affects the relationships they engage, particularly when co-operative relationships with high content and exchange of knowledge (concerning, for instance, design and engineering activities) involve partners with complex knowledge from socio-culturally very different Countries.

A stressed point is that not only tacit (also contextual) knowledge cannot be codified and it is acquired through shared experiences, but also it is embodied in people, as well as in socio-cultural rules and institutions of territorially defined specific contexts and of specific Countries and it derives also from a well-defined group of social relationships, which contribute to its broad reproduction.

Therefore, if it is true that relationships developed within a common socio-cultural context allow an easy transfer of tacit and contextual knowledge, how can partner relationships be effectively organised, which problems must firms to cope with and how can they be dynamically managed when such relationships develop among firms considerably different in terms of socio-cultural context and logistically far?

The paper is organised in this way: the first part deals with the appropriability and transferability of knowledge in a context of inter-firm relationships, distinguishing tacit and explicit knowledge, its diffusion through IT and the close connection between knowledge and contexts. Then it is analysed the case of multinational companies which have developed relationships with firms logistically far and socio-culturally different, to verify how companies deal with the knowledge sharing in this particular situation. A special use will be made of recent surveys obtained from the network reorganisation in which General Electric is involved concerning aspects of designing and engineering in Europe and India. A discussion of the analysis results follows, in which the need of integrator nodes emerges, to connect different realities and to transfer knowledge.

INTER-FIRM RELATIONSHIPS AND KNOWLEDGE

In a context which is more and more dynamic and competitive, inter-firm relationships, among other resources, allowing the connection (Hakansson, Snehota 1995) of partner's knowledge and competencies, are of strategic importance in view of a rapid shared learning, thus leading to the achievement of sustainable competitive advantages. Several authors (among them, G. Lorenzoni and A. Lipparini (1999) and A. Lipparini (1998)) deal with the topic of the connection between inter-firm relationships and knowledge. They point out that the learning by co-operating enables firms to benefit from the sharing of critical information and the continuous flow of technical and managerial advice. Indeed the interactive process among the actors creates a greater planned and spontaneous quantity of information and it accelerates the learning process: the multiple and repeated ties among firms enable the access to specialised knowledge distributed among many enterprises, with significant effects on the creation and the flow of information.

Moreover the knowledge has some peculiarities (Grant R.M. 1998) which influence its acquisition and use to create value in the firm:

- Transferability of knowledge: it is necessary to enable its use. It allows to distinguish between explicit and tacit knowledge: the former can easily embodied either in a code or in a language, so it can be removed from the context and it can be communicated; the latter, immersed in the context, is not codified, it cannot be communicated by a language and it is acquired through shared experiences, by observation and imitation, as well as by organisational procedures which, though different, must be compatible with one another. As tacit knowledge can only be observed in the moment of its application and it can only be acquired through practice, its transfer among different individuals is a slow, expensive and uncertain process which involves a high level of intensity of direct interactions;
- Appropriability: knowledge is a resource exposed to complex problems of appropriability. The tacit knowledge is not directly appropriable because it cannot be directly transferred. Explicit knowledge enables its owner to transfer it without losing it; besides its presence on the market make it available for potential buyers. There is a trade-off: knowledge sharing enables its development, but also its appropriation by opportunistically acting actors. So there are two kind of strategic vulnerability (Hall R. 2000): the internal vulnerability, when there is a broad base of tacit knowledge and a small one of explicit knowledge, which makes the firm vulnerable to personnel leaks with irretrievable losses of knowledge; the external vulnerability, when there is a broad base of explicit knowledge and a small one of tacit knowledge, which makes the firm vulnerable to competitor imitation.

THE CODIFIED AND TACIT KNOWLEDGE: IT AND CONTEXTS

Among the knowledge conversion processes (from tacit to explicit and vice versa) by which Nonaka and Takeuchi (1995) illustrate knowledge creation processes, the transfer of the explicit component is favoured by the extraordinary development of IT. Such development, broadening and facilitating even complex, aspecific and fungible knowledge coding, as well as information access (Lipparini 2002), allows a faster learning and its spreading among firms and inside organisations. Knowledge has in fact, thanks to computer science advances, become easier to codify and, consequently, to transfer (Arora, Fosfuri, Gambardella 2001). The technology enables a rapid access to important information and the reduction of time between information collecting and knowledge development and its following spread to the whole organisation.

The case of tacit knowledge is different. It is not codified, it is acquired through shared experiences: besides several theoretical studies point out the importance of the socio-cultural context.

Knowledge is in fact the result of a large variety of historical developments. It is embodied in people, as well as in socio-cultural rules and institutions of territorially defined specific contexts and of specific Countries: so, it can be socialised (Becattini, 1998) through slow and expensive process of context and experiences sharing (Becattini, Rullani 1993; Becattini 1998); the contextual knowledge, deriving from work and life experiences, derives also from a well-defined group of social relationships, which contribute to its broad reproduction (Becattini 2000).

In fact every place introduces in the firm its history, its culture, its social organisation: they are aspects different from those available in any other place (Becattini, Rullani 1993), and the firm integrates them. The local context supplies the firm with some essential inputs, as work,

entrepreneurship, material and immaterial infrastructures, social culture and institutional organisation.

Besides belonging to the same socio-cultural context implies a superior mutual knowledge among the partners, who develop a precise identity and shared vision, mental models and interpretation patterns. They use also a common language: it is shared by all the members of that particular local or work community, while the remarkable cultural homogeneity implies common behaviours, codes, norms and value, as well as behavioural code. These aspects facilitate the comprehension of common goals and action strategies, factors that promote the development of trust and the reduction of opportunistic behaviours. So processes of mutual adaptation and the acceleration of the information spread are facilitated, as well as inter-firm relationships and reciprocal learning (Lipparini 2002).

Therefore, if it is true that relationships developed within a common socio-cultural context allow an easy transfer of tacit and contextual knowledge, how can partner relationships be effectively organised, which problems must firms to cope with and how can they be dynamically managed when such relationships develop among firms considerably different in terms of socio-cultural context and logistically far?

To understand how companies organise relationships with firms logistically far and socio-culturally different, the initial results of an enquiry have been used: the need of integrator nodes emerges.

THE EMPIRICAL CONTEXT

This enquiry regards Nuovo Pignone (NP), a firm that was founded in 1842 in Florence and bought by General Electric (GE) in 1994. Nuovo Pignone is the GE Oil & Gas Centre of Excellence for project engineering, gas and steam turbomachinery, centrifugal and reciprocating compressors, pumps, valves, oil and gas metering and fuel distribution

equipment, and turn key solutions: NP has a competitive advantage due to its capability in the customisation of the equipment according to the needs of customers.

This company has been chosen because NP/GE:

- it is a multinational company, which has developed partnerships with firms logistically far and socio-culturally different;
- these partnerships regard also aspects of designing, engineering and packaging of plants, therefore they have a high knowledge content and exchange.
- It uses advanced IT systems to facilitate the relationships with the global poles.

Therefore the enquiry (conducted through interviews with GE responsible of designing and engineering and with the residents of two global poles) regards the partnership agreements among GE Oil & Gas (Nuovo Pignone) and Mexican and Indian companies concerning services of plant designing and engineering.

These relationships were started by NP in 1998: that year GE Oil & Gas set a partnership with a Mexican company that had developed relationships with GE Power Systems (the company controlling Nuovo Pignone). In 1999 started the co-operation activity in designing and engineering with an Indian multinational company (Tata-TCS), concerning some pilot projects.

Different reasons were at the basis of these two relationships: the relationship with the Mexican company was developed to take advantage of the opportunities deriving from the Nafta agreement and to achieve cost reductions; the relationship with Tata-TCS was developed not only to achieve efficiency goals, but also to have a partner with superior knowledge and competencies.

Both the relationships had a period (1999-2000) of development on a poor technical level: the teams transferred project designs in AutoCAD. This approach did not allow mutual learning and knowledge and information exchange.

In 2000, the dissatisfaction for the partnership results (consequence of the shortage of knowledge exchange in the relationships themselves) and the different management policies, introduced by GE in Nuovo Pignone, led to a complete revision of these relationships.

Before the tasks were assigned by GE to the Mexican or Indian company, which assigned them to a team composed of its available designers (and therefore changing from time to time); in 2000 was selected a well determined project team in each global company, co-ordinated by a NP engineer, resident in the global pole.

So, in the middle of 2000, Tata-TCS selected a team composed of 15 people: since then, they have been working only for Nuovo Pignone. At the same time, NP has installed its engineer there: since then, he has been co-ordinating and training the Indian team. In this way the Indian team has learnt to project mid-complex components of turbines (while before it carried on its activity only on a low technical level).

In Mexico, before 2000, a 10 people team had been determined: in 2000 it was increased (18 people) and NP took its command to a NP engineer resident there: he has been training the team to the use of 3D design systems (already used by the Indian team) and he has been improving their technical profile.

NP has dealt with remarkable problems in both the relationships:

- in the case of the Indian team: cultural differences, different approach to the work (according to NP engineers the Indian designers need more detailed inputs; besides, they are less creative than the Latin people, and they have more problems to observe the deadlines), but they are well-prepared in the computer design (while they are less skilled in basic technical knowledge). Another important difference is the technical school: unlike NP engineers, the Indian engineer knowledge is based on computer science and on computer design (also 3D), with a consequent different approach (e.g., NP uses

normalised design scales, the Indian engineers use those they consider the more suitable to the computer design);

- the Mexican pole is technically less prepared than the Indian team, but it is considered more reliable and precise in the basic design: in particular, its approach is closer to NP (also the technical school is alike) and it has been very reactive in learning Unigraphics and 3D design use.

The process of training is still in progress. NP aims at leading the two teams to a comparable technical level. In this way NP will be able to assign the tasks to the teams without distinction, according to the workload and not to the limits of technical competencies of the partners. Nowadays in fact the Mexican pole carries out simpler designing and engineering tasks, with smaller engineering problems than the Indian pole (the former projects mainly compressor plants, while the latter turbine plants). The Mexican team specialisation depends on the specific competence in this field of the NP resident engineer: when NP decided to assign to the global poles more complex jobs than the original ones, his specific skill determined the assignment of this kind of work to the Mexican pole and, consequently, its specialisation in this sector.

Two ways have been engaged to achieve a comparable technical level. Resident engineers have been transferring working practices, routines, techniques (know-how) and programs and they have been giving similar organisational model, similar processes, GE guide-lines of engineering to the teams: in this way GE can easily communicate targets and its knowledge and it can also get in touch with the reality of the global pole. At the same time, there is a transfer process of the two teams best members to Italy (for 6 months periods). In this way the global team members will enrich their knowledge on products, they will increase their general knowledge: consequently, there will be more agreement among the firms, and more similar approaches.

The further step, according to the NP projects, is the entrusting of the global poles to local responsible people, trained in Italy. NP engineers will visit the global poles only periodically.

The goal is to have homogeneous, similar knowledge: for this reason, NP sought direct relationships with the partners and the flow of information among the firms was facilitated through the transfer of resident engineers and members of the global poles.

These aspects lack in the third global partnership, which was developed by NP with a Romanian company: it deals with alternative compressors and it is an appendix of an Italian supplier, which, on behalf of NP, has selected a partner and organised it. Now NP considers myopic this strategy: jobs are less expensive, but, because of the filter of the supplier, the team does not develop. So NP intends to increase its presence, by pursuing similar ways to those selected in the partnerships with the Mexican and Indian teams.

So these relationships have involved considerable commitment: NP needs a different approach from the relationships with the designing local firms (in particular global teams need more accuracy in information: the local firms, because they have been sharing activities with NP for many years, do not need so detailed inputs), there have been remarkable mutual adaptations, but these relationships have also facilitated mutual learning (NP has been favoured in its migration from 2D CAD designing to the design with 3D computer systems, because of the Indian team competence in this field and in Unigraphics).

Obviously the investments have been remarkable, and they have concerned training, resident people (both NP engineers in the global poles and Indian and Mexican ones in Italy); besides a lower productivity has been sustained (nowadays it is improving and in any case it is compensated by the lower costs). In particular the investments in IT and connectivity have been fundamental, because they are an essential tool to co-operate with global firms: they are not only Internet and Intranet, but also instant messaging systems ("Same Time") and digitised tools for the management of global work. These tools are, for instance, GEW –

Global Engineering Workflow – which manages the work from the assignment to the delivery (and its final feedback) through web pages; the realisation and sharing of particular standards in Intranet (that is part families that constitute a standard in NP design) and IMAN, digital archives system, which manages detail revisions and their effects on the models that use the same codified parts (this system is being extended to the global firms). Digitisation tools are fundamental in NP design, because it uses 3D design system, as Unigraphics: in this case, to manage its complex information, very sophisticated archives and tools of model importation and exportation (and systems of management of their modifications) are necessary. There is also another difficulty: these tools are remote managed by partners with different language, culture and technical knowledge.

Besides the co-operative relationships with global partners, recently developed, NP has been developing relationships with local designing firms for years: they have been supplying design services. In this case the management is obviously easier (in spite of their underdevelopment in connectivity), also because of the remarkable shared experience in their lasting co-operation. So they have mutual knowledge of needs and problems, but NP considers dangerous these relationships, because in the past they have risked of degenerating. Local partners, because of their knowledge of NP defects, may adopt opportunistic behaviours.

The past management of the relationships with local partners implied the risk of losing knowledge (NP had lost the control of some aspects of designing, because it did not have more the necessary competencies), a critical aspect according to GE.

The new NP strategy of knowledge development (and consequently of its management in relationships concerning designing and engineering services), due to the GE model, is different. Today the strategic knowledge and its relevant applications are kept inside, while the other ones can be outsourced, because they are standard. The model is dynamic: strategic

knowledge will become an application, applications will become standard and so they will be outsourced. In this way NP is able to concentrate both on the development of new competencies and on the settlement of a work methodology, that will be used by the partners.
So NP exploits the external relationships to increase the added value, to increase the business, avoiding the loss of knowledge (because NP transfers diffused knowledge, methodologies of work, but not their strategic foundations, which remain GE ownership). This model defines also the partners tasks: once their assignment criterion to NP or to the partners was not clear (with the risk, for NP, of losses of knowledge), nowadays it is defined according to the state of NP knowledge (it depends on the maintenance of strategic know-how).

CONCLUSIONS

The case history illustrates the influence of socio-cultural contexts on inter-firm relationships, under several outlines:

- Country culture: it influences inter-firm relationships in many ways: on a level of communication (different languages and approaches), of norms, of shared values in the groups and of organisation (e.g., organisation of the teams according to the role assigned by the local culture to the woman); different approach to the work (more similar to the Italian one in Mexico, less open in India). The interpretative models of the same reality and the communication forms change;
- Technical culture: while GE and the Mexican team base their knowledge on a long tradition school, which is dealing now with the new technologies, the Indian team base its knowledge on a school which is descendant from the new technologies, and so it is perfectly integrated and based on them. This aspect facilitated the NP migration from 2D CAD to the use of Unigraphics (that is a three-dimensional tool of design, with a superior content of information, which was planned by an Indian company), but sometimes it

creates incomprehension about the design: the same theoretical and technical tools are used, but on a different base of knowledge;

- Firm specific culture: it includes not only the corporate culture, but also the internal technical language, the practices, the internal standards on particular technical problem solving that have been developed by the large engineering companies.

These cultural gap were present since the beginning of the relationships, but the partnership management has been modified in time, according to the changing goals of the partners.

The need of increasing the knowledge exchange among the partners (and, therefore, of increasing the intellectual capital of firms), and the awareness that it can be achieved only through the thickening of relational web, that is by increasing the social capital (including the relationships among individuals inspired by trust, mutual comprehension and shared values and behaviours), have led the companies to organise their connections in order to make easier these processes (Lipparini 2002).

At the beginning the GE strategy was inspired by the search of efficiency goals: in this stage the knowledge exchange was low and every global designer worked only on a single project, so NP had to co-operate with teams composed of different people from time to time.

The search of results with higher quality and knowledge content has led to a different strategy: in this stage the project teams were reorganised in two ways, closely connected:

- on the one hand, the determination of a precise project team by the global pole: the selected members, endowed with the suitable competencies, are assigned by the global partner to the designing in co-operation with NP: so the knowledge dispersion and the necessary re-activation of designers' learning, because of their rotation, are avoided;
- on the other, the installation of NP engineers in the global companies (and, later, the transfer of global designers to Italy).

An effective relationship needs an organisational capacity: through the first step, it is created a pole of stable knowledge, where further processes of learning can be activated and where further knowledge can be accumulated; through the second one, in the global pole is established a node, a co-ordination mechanism which connects the different realities more closely. It enables the knowledge transfers and mutual learning processes, allowing also the overcoming of some limits due to the cultural gaps, through the organisational model learning, the value contamination and a consequent deeper mutual comprehension.

The simple remote management, through computer systems, would not allow the achievement of a closer co-operation than the original one, particularly because of their limits in the transfer of tacit (also contextual) knowledge. IT allow an easy transfer of explicit knowledge and they may also, thanks to the formation of online community, enhance the development of personal relationships among interacting actors. However, they show considerable limits to the creation of trust, commitment, and shared rules. Such elements are of paramount importance for the development of stable relationships and the co-ordination of the activities of the partners.

And the more the complex knowledge exchange among the partners increases, the more this is true.

The partners have so tried to overcome the lack of connection among the companies through the architecture reorganisation of their relationship (also through the installation of nodes) not only to link unconnected areas, where there is accumulated knowledge, so that to have the information access (Burt, 1992), but also to mix two different realities and to create knowledge.

Therefore the human factor centrality rises. The exchange of key people among involved organisations boosts the development and maintenance of inter-firm and intra-organisation relationships. In fact the exchange of engineers and researchers from firm to firm allows the

exchange of technology, the transfer of knowledge and of know-how and know-why (Arora, Fosfuri, Gambardella 2001).

They have a role of node, and they add value by connecting areas with high content of information, by developing personal relationships and by affirming co-operative norms.

The company can have an important enrichment of its set of knowledge: the contextual knowledge, that is used at the local level to innovate for specific uses, can be codified and communicated through systems of communication (that are used as a facilitating factor) to other firms. In these companies the nodes contribute to generate innovation, by combining and changing their tacit knowledge into explicit one and by transferring it to new contexts. In this way they facilitate the mutual integration of know-how and competencies.

In fact the process of knowledge production – conversion – circulation by Nonaka and Takeuchi (1995) takes place in local contexts, through the connection between the codified and transferable knowledge and the contextual knowledge of their members. In other words, to create new knowledge it is necessary to connect explicit, codified knowledge, which is available in the global networks, with tacit (also contextual) knowledge, which is available in the specific local context: and this result is achieved through the nodes, which codify and de-codify knowledge, by managing technological, communicational, and organisational codes in a context which has always a local specification ("versatile integrators", Becattini, Rullani 1993). And the relevance of these figures is also proven by the compressor specialisation of the Mexican team, due to the specific competence of GE resident engineer in this field and by the recent decision of NP concerning the transfer in Mexico of an expert in the turbine designing, in order to transfer his knowledge in this field to the Mexican team.

However the node operates within the limits set by the company, according to its strategy of maintenance of the core competencies and their know-why and know-how, in order to face the transferability/appropriability trade-off and the consequent risk of opportunistic

behaviours. So, if these limits are wide, there is the risk that the node cannot develop its function of new knowledge creator.

Besides the process implies the exchange of ideas and personal communication: the nodes develop relationships with the single members of the companies. In this way they act as intermediary between the two different realities and, by deeply knowing both of them, they facilitate the increase of trust and commitment among the partners, a common comprehension and shared values. So, through a personal network, they favour the development of inter-firm relationships and their co-ordination. In this sense, also the best designers transfer from global poles to NP is important: they accumulate and transfer knowledge, they learn organisational models, they set relationships with NP colleagues and they can absorb values by the context (not only technical and firm specific culture), creating further bridges among the companies.

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