How to Move from Traditional to Innovative Models of Networked Organizations: A Methodology and a Case Study in the Metal-mechanic Industry.

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Abstract. Innovative forms of collaborations between companies have been proposed and modelled in literature in recent years. There is an increasing demand in the industrial world for concretely implement this new forms of collaborations. For example, demand often comes from pre-existent form of clusters or consortiums, which want to evolve to more efficient forms of collaboration. On the basis of a methodology whose guidelines have been proposed in a previous work by authors [1], the paper illustrates the steps and the tools utilized to analyze potential pool of partners in order to identify the type of long term Collaborative Networked Organizations (CNOs) alliance that would bring highest benefits to the partners. Three different forms of innovative CNOs are considered: the Virtual organizations Breeding Environment (VBE), the Virtual Development Office (VDO) and the T-Holding. The application of the proposed methodology is described in the case of a traditional industrial cluster of the metal-mechanic industry in Italy.

Keywords: Innovative Collaborative Networks, network creation, Virtual Breeding Environment, Virtual Development Office, T-Holding.

1 Introduction

The subject of the analysis and implementation of CNOs creation process is recently growing to the attention of academics and practitioners. Actually, there are several types of CNO manifestations. In many countries, as in Italy for example, several governmental and industry support institutions have promoted the formation of strategic alliances over the country, typically in the form of clusters or consortiums. But nowadays economy requirements, such as harder global competition, volatility, higher innovation needs, laid bare the limits of such traditional forms of collaboration [2][3]. The problem is to identify which kind of alliance evolution should they pursuit, if an alliance already exists, or, more generally, to analyse a potential pool of partner and to identify the most appropriate CNOs form that should be adopted.

This work is dedicated to the implementation of the framework elaborated by authors in a recent paper [1], in which a methodology to evaluate how a potential pool of partners can join together in different types of long-term Collaborative Networked Organizations (CNOs) has been proposed. In the framework, three possible types of final CNOs forms are considered: Virtual organization Breeding Environment (VBE) [2][4], Virtual Development Office (VDO) [1] and T-Hodling[1]. However, the methodology is generalizable and can be extended to include other forms of collaborative networks.

There are many interesting studies in literature related to partners selection and evaluation processes [5][6]. But most of these studies specifically address Virtual Organizations (VOs) creation process, i.e., they assume that a certain type of long-term CNOs has already been established and partners have to be selected to temporarily join in a VO, for example in order to respond to a specific business opportunity. Other approaches [7][8] aim at identifying readiness/preparedness for collaboration assessment procedures, in order to determine if a potential VBE member has the needed elements to collaborate and participate in a collaborative network such as a VBE or a VO. In this approaches, it is substantially assumed that the long-term CNO type is a VBE. The same assumption is done in [9], where a structured approach for implementing a VBE is illustrated and applied to a case study in the Mold and Die sector in Brazil. The perspective adopted in our framework is different, because the particular form of the long term CNO has not yet been defined, and the definition of the long term CNO type represents the very objective of the decision process.

This work presents the results of a study commissioned by the ICE (the Italian Institute for Foreign Trade) and by a local industrial association (Confartigianato Terni) to the University of Perugia, in order to investigate how the companies belonging to an industrial cluster of the metal-mechanic industry in Italy could be aggregated in an innovative way. The starting point is representative of many industrial environments in Italy and other countries, where a long-term alliance among a group of companies already exists (in the form of a consortium named CON.ART), but is facing some difficulties. The participants asked for the evolution of the actual form toward a more innovative collaboration form. Facing the difficult task of indicating which is the right way to do it, it is important to elaborate approaches that suitably balance theoretical abstraction and practical applicability, considering also that companies are Small and Medium Enterprises (SMEs), and they often cannot provide structured data to be analysed.

The paper is organized as follows: in section 2, a synthetic summary of the proposed framework is reported; in section 3, the tools utilized to perform the analysis are described and consolidated results are discussed; in section 4 the selection of the most appropriate CNOs is discussed and in section 5 conclusions are drawn.

2 The Framework

How already illustrated in [1], to define the most appropriate network mission for a potential pool of partners, three steps are required.

1) The definition of some types of networking collaboration forms: three possible collaborative networks forms, taken as representative of long term collaboration forms with different integration degree, are considered: VBE, VDO and T-Hodling.

2) The classification of strategic objectives a generic CNO can be based on. The strategic objectives (SOs) have been classified in SOs of "primary" type (i.e. to create new Business Opportunties, BOs, and new Core Process Opportunities, CPOs) and SOs of "secondary" type (i.e. to create new Supporting Process Opportunities, SPOs). The three collaboration forms considered are then assessed on the basis of their ability to satisfy the different types of strategic objectives, both in a stable and in an occasional manner (Figure 1).

		VBE	VDO	T-Holding
Business Opportunities (BOs)	Stable	+	+++	++
	Occasional	++	+	+
Core Process Opportunities (CPOs)	Stable	+	++	+++
	Occasional	++	+	+
Supporting Process Opportunities (SPOs)	Stable	+++	+	+++
	Occasional	+++	++	+

Fig. 1. Assessing CNOs forms on the basis of different strategic objectives.

3) The definition of the analysis dimensions through which assess a potential pool of companies in order to evaluate the possibility that their aggregation brings to new BOs, CPOs and SPOs, that is, to fulfill the strategic goals that have been defined in the previous step. The dimensions identified are: Segments of Business [12], Primary and Supporting Activities [13], Critical Resources [14], Financial statements analysis [15] (see Fig. 2).

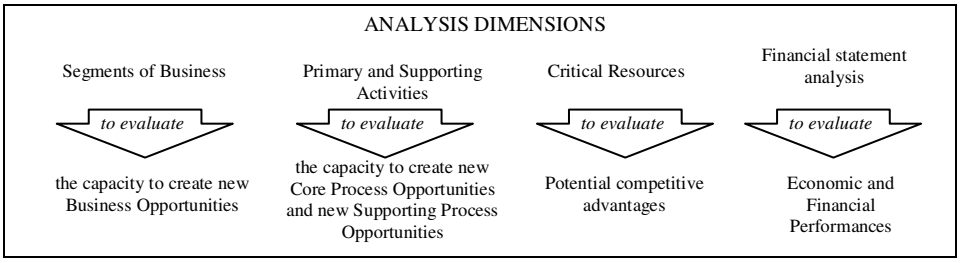

Fig 2. Analysis dimensions.

3. A Case Study: The Application of the Framework

The proposed framework has been applied to the case study described in the introduction. On a total of 19 companies constituting the actual consortium, 9 companies adhered to the project and provided information for our study. The questionnaire is the survey tool that has been utilized to collect information on qualitative and quantitative variables, and consists of three distinct sections, each one related to one of the analysis dimensions defined in the previous section. The first

section concerns the analysis of the "competitive dimension" of the company (its markets, its customers, its suppliers, its competitors) and is mainly dedicated to the definition of Segments of Business of each company. The second one, dedicated to define companies Primary and Supporting Activities, considers its "organizational dimension", which expresses the organizational and operational arrangements through which the company currently carries out its activities (logistics processes, manufacturing, purchasing, human resources, etc.). The third section covers the survey of the so-called company's critical resources. Data provided by the questionnaires have then been integrated trough economical and financial data provided by the companies' balance sheets.In the following, results provided by the three section of the questionnaire (1-3) and by the financial statements analysis (4) are discussed.

1) *The Competitive Dimension (Segments of Business).* The results obtained from the questionnaires (some of which are reported in Figure 3) show that the market is primarily at a regional level (66%) and to a lesser extent at national level. It is simple to deduce that the companies work for local customers, so they do not have the opportunity to meet the challenges and opportunities from a national and international competitive environment. Customers appear to be mostly big companies. The respondents confirms that their economic activity is mostly induced by ThyssenKrupp's industries, i.e. their revenues greatly depend from the German multinational of the steel industry. The survey shows that companies operates in different mechanics's fields, and consequently have a different work's specialization among them. There are no internal competitors among the examined companies and the degree of overlap of products and services offered is very limited. Machinery and equipment have a high degree of diversification and a medium-high degree of technological updating, which could lead to the creation of innovative and integrated products. Production processes were mainly those typical of the metal-mechanic industry, but characterized by a good degree of diversification. This consolidated set of data point out a high degree of heterogeneity of the strategic segments of business.

Markets: geographical distribution	
Regional	66%
National	33%
UE	1%
ExtraUE	0%
Clients dimension	
Big Clients (>250 employers)	59%
SME	41%
Clients relative dimensions: clients vs. firm	
All bigger	67%
All smaller	0%
Bigger and smaller	33%
Turnover generated by top 10 clients	
0-20%	0%
20-50%	25%
50-100%	75%

Number of direct competitors	4
Competition aggressiveness	
High	66%
Medium	33%
Low	0%
Threat: potential substitutive	
Yes	50%
No	50%
Threat: potential entering	
Yes	60%
No	40%

Fig. 3. Questionnaire results: the competitive dimension

2) *The Organizational dimension (Primary and Supporting activities).* Figure 4 shows some of the results form the Organizational Dimension section of the questionnaire. The number of common suppliers is quite limited, as the different types of products purchased. There is a limited impact of transportation costs, both for the 'inbound' and for the 'outbound' flows. The consolidated result suggests that a

Core Processes	
Annual transportation costs (€)	
Inbound	8962
Outbound	21798
Annual cost for plant maintenance (€)	6929
Plants utilization rate	51%
Human resources: n. of workers per area	
R&D	9
Product Design/Quality	23
Commercial	16
Production	147
Administration	16
TOT	210
Annual cost for production workers (€)	234143
Amortization and industrial leasings (€)	40742
After sales/returned management	67%
Customers assistance	83%
Warranties	92%
Annual explicit investments in R&D (€)	80000
Innovation sources (multiple answers allowed)	
Internal research	42%
Collaborations with research centres/institutions	42%
Induced by clients	33%
Induced by internal workers	17%
Other	8%

Supporting Processes	
Accounting	
Internal	42%
External	58%
Leasings	
Amount (€)	129042
Due date (monthes)	38
Long-term budgeting	
Complete	42%
Partial	17%
No	33%
Annual budgeting	
Complete	50%
Partial	17%
No	25%
Periodical reports	
Complete	50%
Partial	36%
No	8%
Financial Planning	
Yes	58%
No	42%

Fig. 4. The organizational dimension: Core Processes and Supporting Processes

collaboration could benefit of a very limited for new process opportunity, like potential synergies on logistics or on the purchasing process. The R&D area may represent an important synergy area for a network between these companies, because the number of persons employed in new product developments activities related to R&S and Product Design is not negligible on an aggregate basis. Similarly, companies could benefit from potential synergies in some other common activities, such as returned management, customers' assistance, warranties, and facilities maintenance. However, the amount of money involved in such activities is not relevant, and the aggregation could not be based on the sole strategy of achieving these type of synergies. From data collected through the financial section of the questionnaire, it emerges that companies face increasing difficulties to obtain the necessary financing that allow them to develop new products or processes. In Italy, the increasing size of banks brought to a corresponding decreasing fraction of loans directed to small and medium enterprises. Small firms face increasing difficulties in standardizing their unstructured information and transferring it to banks, so that banks consider more onerous the monitoring, the control and the overall management of relationships with entities of smaller size. It is therefore confirmed the role that a network of companies could play in supporting activities related to corporate planning and control, both in order to assess the feasibility of new businesses, both to facilitate the necessary access to credit.

3) *Critical resources*. Critical resources of firms surveyed are mainly technology, relations hips, while the majority of respondents highlight the difficulty of penetrating new markets and introducing innovation. The aggregation should be able to enhance the role of actual critical resources, and at the same time to improve the role of the other resources types that are poorly used until now.

4) *Financial statement analysis*. Following the consistent literature highlighting the importance of accounting on networking strategies [16], the framework design and implementation has been integrated with a financial statement analysis. The result of the consolidation is shown in the figure below (Fig. 4). From the economical perspective the pool of companies considered shows a strong volatility of the sales process, with an evident growth in 2008 balanced by an heavy decrease in 2009. This

demonstrates a strong dependence of the potential partners turnover from the negative trends the market was suffering over the reporting period. With reference to economic ratios, we can firstly observe a satisfactory level of operating profitability (ROI) and economic return on equity (ROE). Examining the financial indicators it is possible to highlit the improvement of the leverage during the observed period. The last phase of financial statement analysis has focused on the study of the performance variability within the sample analyzed, representing an important factor to take into consideration to assess the degree of dynamic homogeneity and the potential integrability of the processes. Comparing the incidence of value added on turnover calculated for each entity with the average level observed, companies tends to show very different performances, both in terms of percentage level and in terms of historical trend. Also analyzing the leverage there is a situation of greater homogeneity, with a significant group of companies that show a level below average, with a good financial position. Finally, considering the relationship between interest expenses and EBITDA, is still present a marked heterogeneity with about half of the companies placed below the average while the other half over that level.

Values in € thousand	2007		2008		2009	
Economic Values	**€ Mil**	**%**	**€ Mil**	**%**	**€ Mil**	**%**
TURNOVER	**20,420**	**100.0%**	**23,897**	**100.0%**	**21,565**	**100.0%**
VALUE ADDED	**10,861**	**53.2%**	**12,673**	**53.0%**	**11,918**	**55.3%**
EBITDA	**2,578**	**12.6%**	**2,535**	**10.6%**	**2,126**	**9.9%**
EBIT	**1,227**	**6.0%**	**848**	**3.5%**	**741**	**3.4%**
INTEREST EXPENSES	**(408)**	**-2.0%**	**(582)**	**-2.4%**	**(481)**	**-2.2%**
NET PROFIT	**813**	**4.0%**	**425**	**1.8%**	**331**	**1.5%**
Financial Values						
NET INVESTED CAPITAL	**11,087**	**100.0%**	**10,932**	**100.0%**	**12,026**	**100.0%**
covered by:						
NET FINANCIAL POSITION	**8,979**	**81.0%**	**7,243**	**66.3%**	**8,205**	**68.2%**
EQUITY	**2,108**	**19.0%**	**3,689**	**33.7%**	**3,821**	**31.8%**
Profitability Ratios						
ROI = Ebit/Net invested capital	11.1%		7.8%		6.2%	
ROE = Net profit/assets	38.6%		11.5%		8.7%	
Financial Ratios						
Leverage = NFP/Equity	4.26		1.96		2.15	
NFP/EBITDA	3.48		2.86		3.86	
NFE/EBITDA	16%		23%		23%	

Fig. 5. Economical and financial performances (consolidated data).

4. Selecting the Network Mission and the Collaboration Form

The results reported in the preceding sections allow to draw the actual situation of the pool, and to define which strategic objectives are most probably reachable and desirable by the new collaboration form that have to be implemented.

From the analysis of consolidated data, it emerges that potential synergies on core processes are very limited. Thus, it is unreasonable to choose a collaboration form, such as T-Holding, that is on the contrary the most appropriate when mainly new Core Process Opportunities are likely to arise (see Fig. 1). At the same time, the high heterogeneity degree of the segments of business, especially due to complementary technologies and scarce products/services overlapping, may be functional to the creation of a network capable of generating new integrated product-services that arise from the integration of the participants' skills. Thus, the creation of new Business

Opportunities seems to be an achievable strategic objective. Results also show that the aggregation could also benefit from some Supporting Process Opportunity (such as synergies for corporate planning and control activities and for financing). So, depending on the relative weight of these two components, the choice should be done among the other two models: the VDO, if the stable creation of new BOs are taken as main objective; and the VBE model, if the main objective will be the creation of new SPOs, and, occasionally, of new BOs. Considering the network activities implemented by the actual consortium, the consortium itself represents an earlier experience of VBE. A long term collaboration form in which business opportunities arising in the actual competitive scenario are occasionally caught, and are essentially proposed and managed by the single companies of the consortium. However, the ability to integrate products and services among partners is very limited, as also the ability to plan adequate investments in order to penetrate new markets. Without the possibility to plan investments at a network level, it is very difficult that collaborative actions could bring to a stable creation process of new BOs. This requires constant marketing intelligence, planning and investing activities that only a Virtual Development Office can provide. In this view, even the application of the newest conceptual framework for VBEs (the so called 2nd generation VBEs [4]) seems to provide a limited contribution with respect the actual state of the consortium.

In conclusions, the strategic objective that would bring to the highest benefit for the pool is the stable creation of new BOs. The analysis demonstrated that this objective is potentially achievable, and in this case the best type of collaborative form to achieve this objective is the VDO. The VDO should be able to provide products and services both at a national and at an international level, providing an independent management structure able to adequately plan the network activities, taking advantage of the complementary skills of participants, while paying attention to the financial and economic heterogeneity of the companies. The VDO is a model that provides the foundation of a for-profit company (the VDO itself), that have to find an own economical equilibrium. In pursuing new business opportunities the VDO realizes VOs and VEEs of network members and/or external partners.

The tangible success of the project has been measured by the understanding, by the participating partners, of the basic characteristic of the proposed network model, through which is been possible to give start to a change in the strategic logic of the actual collaboration.

5 Summary

The choice of the strategic goals of a CNO is a crucial phase for determining the most appropriate form of the alliance. In general, when analyzing a pool of company that wants to collaborate, strategic network goals are not defined ‘a priori’, but should be the result of an assessment of the possible opportunities deriving from the collaboration. The case study is related to the typical situation of an already existing long-term alliance among a group of SMEs, a consortium in the metal-mechanic sector in Italy, which is facing some difficulties, and asks for an evolution from the actual form toward a more innovative collaboration form. The framework provided

the assessment of the competitive and the organizational dimensions of the companies, of their critical resources, and of their economic and financial performances. The analysis of the consolidated data allowed identifying which types of strategic objectives are at same time desirable and achievable by the alliance. This in turn allowed determining the most appropriate type of CNOs. The methodology can be replicable to similar case studies, and it is an answer to the need of evolution from traditional towards innovative forms of collaboration.

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