Performance measurement systems in business networks: a literature review

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Abstract: Today, companies’ success is increasingly linked to their ability to manage agreements, alliance and networks. This article focuses on performance measurement systems in business networks, and develops a literature review in order to understand the state of the art of this topic. The scope of the research is to understand how PMSs have to be designed and used in different types of networks. A framework on the relationship between networks features and PMSs characteristics has been designed and three features of business networks relevant for performance measurement design have been identified: nature of partners, nature of relationships, nature of shared resources. The study shows that in the last decades ‘business networks’, on one hand, and PMS, on the other hand, have been widely studied but little attention has been given to the issue of performance measurement in a network context.

Keywords: performance measurement system; network management; business network; inter-organisational relationship; literature review.


Biographical notes: Daniela Mancini is a Professor of Accounting Information Systems at the Parthenope University of Naples. She is the Director of the Executive Master on Finance and Management Control at the University of Pisa. She has authored or co-authored various books and papers on accounting information systems, management control and company networks.

Giuseppina Piscitelli is a PhD student in Governance, Management and Economics at Pathenope University of Naples.

1 Introduction

In the last decades, companies’ success is increasingly linked to their ability to manage agreements, alliances, partnerships and networks.

Network agreements, even in the contexts characterised by low financial resources and skills, allows firms to preserve territoriality, localisation and specialisation and to stimulating innovation, competitiveness, social and sustainability (Bartoli et al., 2013).

In Italy, inter-organisational relationships are also growing because Law No. 122/2010 introduced the institution of business network agreement.¹ This law is a response to the need of corporate governance and organisational changes that the company law reform (2003) had only partially satisfied.

In the last decades, several studies are focused on performance measurement systems (PMS) within the boundaries of firms, such as balance scorecard (Kaplan and Norton, 2010), economic value added (Neely, 2002; Otley, 1999; Neely et al., 2002), activity-based costing, quality management, customer value analysis (Kellen, 2003). Little attention, instead, has been paid to the performance measurement in the network contexts (Caglio and Ditillo, 2008; Keung and Shen, 2012; Franco-Santos et al., 2012). Most of this research has analysed how and why performance measurement and information systems are important in business networks (Dekker, 2004; Mancini, 2010; Rizza and Rizzotti, 2007; Cardoni, 2013).

The design of PMS in inter-organisational context seems to be complex and delicate (Neely et al., 2000) for three main reasons:

1. the extensive application of performance measurement models developed for a single firm is ineffective, generates organisational friction and inconsistent behaviours
2. PMSs have to satisfy objectives and needs of different partners
3. performance measures depend on organisation’s features as strategy, culture, network formalities, context.

This might be some of the reasons why performance measurement in business networks is still little studied.

In conclusion, in that field of research the challenge seems to be to figure out:

- how the PMS have to be designed
- what performance measure have to be adopted
- if and why PMS have to be different, depending on the kind of network.

The scope of this paper is to carry out a literature review of the studies regarding PMS in business (Turrini et al., 2010) network. The main goal of the study is to highlight what factors have to be considered in designing the PMS in different network contexts (Varamaki et al., 2008).

The remainder of the paper is organised as follows. Next section discusses the research methodology, third presents the first results, while the fourth section describes the framework used to deeply analyse the literature. Finally, last section draws some conclusions and limits of the study.
2 Research methodology

This research work is a literature review of scientific papers published in the last 11 years (2004–2015) and concerning PSMs in business networks. This period of time has been considered because the performance measurement issues in network contexts had a significant growth in that period. Moreover, focus has been given on PMS because usually literature review studies concern networks in general.

In order to select relevant papers, we considered the following databases: Business Source Premier, Elsevier, Essper Association, Wiley Online Library. In order to identify the keywords, we considered articles concerning accounting and control in inter-organisational relationships (Dekker, 2004; Håkansson and Lind, 2004; Provan and Milward, 1995). The keywords used are the following: performance measurement; performance model; performance measurement system; performance measurement tools; network management; business network; inter-firm performance. We check the keywords in all parts of the article: title, keywords, abstract and full article.

By combining keywords, a first list with 120 items has been found. Reading the abstracts, a first screening was carried out, excluding articles not relevant to the search. In particular, we excluded articles dealing with networks in other contexts, as social network or information technology. Reading the articles, those dealing with governance network have also been excluded. Finally, a list of 33 articles has been obtained and used as the basis of our literature review.

3 Results and analysis of the articles

The following section presents a qualitative analysis of the articles. To presenting our results we take into account: the distribution of scientific articles by year of publication, by research methodology used and affiliation of the authors (Metallo et al., 2012).

3.1 Distribution of articles by year of publication

Figure 1 shows that in the period 2004–2015, the number of articles had a significant progression, although not linear, especially in the last six years (2010–2015). The growing interest on networks performance may be explained by the challenges of globalisation and financial crisis, that stimulated companies to improve managerial tools able to support a network and collaborative strategy.

In Italy, it is interesting to note that after the introduction of the law on networks agreements (2009) and its amendment (2010), the attention to the study of networks has grown significantly.
3.2 Distribution of the articles by research methodology

Considering the research methodology, articles have been classified by (Fattore, 2005):

- case study: i.e., articles containing an analytical study of one or more empirical cases, for verification and/or construction of a model

- literature review: i.e., articles with a summary and critical discussion of the literature in order to highlight any gaps and areas of studies to be developed

- survey: i.e., articles where data collection is typically done by questionnaires or databases, and for which the main research goal is to generate data for quantitative analysis.

Table 1 Distribution of the articles by research methodology

<table>
<thead>
<tr>
<th>Research methodology</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study</td>
<td>12</td>
</tr>
<tr>
<td>Literature review</td>
<td>11</td>
</tr>
<tr>
<td>Survey</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
</tr>
</tbody>
</table>

The three research methodologies (Table 1) are almost equal, with a little prevalence of case study and literature review. The use of case study confirms that this field of research is recent, business networks are an emerging phenomenon, and therefore require more empirical evidence. Moreover, literature review is relevant both in understanding what are the state of art in this research field and in systematising the acquired knowledge.
3.3 Distribution of the articles by authors’ affiliation

Table 2 classifies articles according to the number of co-authors, showing that most of the work is carried out by three or more scholars, highlighting that research on this topic is open and collaborative.

Table 2  Distribution of the articles by number of authors

<table>
<thead>
<tr>
<th>Authors number</th>
<th>Articles number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>21%</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>33%</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>21%</td>
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<tr>
<td>5</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

In order to identify what research centres were interested in network performance we take into account the authors’ affiliation. It regards the University or research Institute to which each author belongs to. If the article was written by more than one author coming from different universities and institutes we considered one count for each co-author. If co-authors had the same affiliation, only one count was considered. Table 3 shows that 50 affiliations are distributed among different countries and continents, highlighting that performance measures research in network contexts is distributed in several universities all over the world. Further analysis was conducted, matching current affiliation with geographic location, categorised by continent: 39 come from Europe, 6 from the USA, 3 from Asia and 2 from Australia (Table 3).

Table 3  Distribution of articles by affiliation and geographic location

<table>
<thead>
<tr>
<th>Europe</th>
<th>USA</th>
<th>Asia</th>
<th>Australia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
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<tr>
<td>Germany</td>
<td>2</td>
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<tr>
<td>Italy</td>
<td>11</td>
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<td>11</td>
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<tr>
<td>Poland</td>
<td>1</td>
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<tr>
<td>Portugal</td>
<td>2</td>
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<tr>
<td>Scandinavia</td>
<td>5</td>
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<tr>
<td>Spain</td>
<td>2</td>
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<tr>
<td>Switzerland</td>
<td>1</td>
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<tr>
<td>UK</td>
<td>13</td>
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<td>13</td>
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<tr>
<td>USA</td>
<td>6</td>
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<td></td>
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<tr>
<td>Australia</td>
<td>2</td>
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<tr>
<td>Asia</td>
<td>3</td>
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<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>6</strong></td>
<td><strong>3</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>
Figure 2 shows a significant concentration of affiliations in Europe, where studies are carried out especially in the UK, Italy and Scandinavian countries. Looking at the large number of Italian affiliations, the considerable interest is probably due to the district connotation of the Italian economy, the large presence of small and medium enterprises, and the introduction and adoption of the Law on network agreements.

Figure 2  Distribution of articles by country in Europe

Finally, considering the journals that published articles on performance measurement in business networks, 30 journals were counted out of 33 articles, but none of them paid great attention to this type of contribution, through special issues or high number of articles published during the period being analysed. What we would like to highlight is that there is almost a one-to-one ratio between the articles and journals considered, as on almost any magazine, a significant number of published articles on the subject appears.

4 The framework used for the literature review

In general, business networks include “a wide range of agreements, formal or informal, through which two or more companies establish a relationship of a certain duration and assume mutual obligations”. This definition reveals that agreements between companies can take very different forms, with distinctive features related to the shape, the duration and the specific content (Balcer and Viesti, 1986; Bastia, 1989; Mancini, 2010). Networks require the existence of a plurality of independent companies. The object of the agreement does not consist in the exchange of goods or services, but in working together around a business, a number of activities, one phase or more of the production process, etc. Furthermore, another precondition is the intention of partners to arrange their relationships; in other words, coordination and contributions of partners take place not only in an autonomous way (as in the market) but also coordinated in some ways (Mancini, 1999).

Several studies classify business networks considering some dimensions of analysis, in order to highlight network features regarding the kind of the relationship, the industry, the reasons of collaboration, etc. (Soda, 1998). Some studies classify networks according to four dimensions of analysis: the presence or absence of central players, the degree of
agreements formalisation, the presence or absence of coordination mechanisms and the presence or absence of contractual mechanisms (Grandori and Soda, 1991, 1997, 2006). Another classification divides business networks into two groups, considering the level of cooperation required and the size of the network: competitive cooperation network – horizontal networks, symbiotic cooperation network – supply chains or vertical networks (Alter and Hage, 1993).

In this research work, in order to design a framework useful for the literature review, we identify three features of business networks, relevant for their performance measurement design:

- nature of partners
- nature of relationships
- nature of shared resources.

Subsequently, the collected articles were examined in order to highlight performance measurement models and the indicators suggested in business networks (Figure 3).

**Figure 3** Framework

Partners of a business network can be analysed from different points of view (Lunghi et al., 2008) such as their legal status (public and private), or their size (large, medium and small firms).

According to the nature of the relationship, we can distinguish networks in bureaucratic, if coordination is formalised by exchange contracts or association; proprietary, if partners benefit jointly of property rights and/or participate to results of activities; social, if partners are in a dense network of information exchange, legal and emotional, based on uncodified and informal relationships (Soda, 1998).

Finally, resources have been classified into tangible and intangible resources, referring to structural capital and human capital. In business agreements we consider also the ‘network resource’ and Network Capital.

### 4.1 The nature of partners

According to the ‘nature’ of partners, literature classifies network’s participants in public and private partner based on their legal status, and in small, medium and large firms, based on their size. Table 4 shows the articles that analyse the relationship between nature of partners and performance measurement.
Table 4  Articles that link performance to the nature of the partners

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>How performance measurement systems support managerial actions in networks: evidence from an Italian Case study</td>
<td>2015</td>
<td>Agostino and Arnaboldi</td>
</tr>
<tr>
<td>Dual embeddedness, influence and performance of innovating subsidiaries in the multinational corporation</td>
<td>2014</td>
<td>Ciabuschi et al.</td>
</tr>
<tr>
<td>Measuring and improving the performance of health service networks</td>
<td>2012</td>
<td>Hammerschmidt et al.</td>
</tr>
<tr>
<td>Un modello per la misurazione delle performance delle reti: il caso studio del network antimalaria Tigray</td>
<td>2011</td>
<td>Cepiku et al.</td>
</tr>
</tbody>
</table>

Research shows that in public/private networks, partners obtain better performance especially when they are able to get access to resources and expertise they do not have their own (Cepiku et al., 2012).

Particularly relevant are the studies in health sector. Cepiku et al. (2012) where an interesting model of network performance measurement is proposed. The study shows that network performance comes from the symbiosis between two groups of partners, public and private, aware of the purpose for which the network was founded. The performance model is built starting from the identification of exogenous factors, i.e., the context, the availability of resources, the involvement of community, and endogenous factors, i.e., management processes, leadership styles. Performance was divided into two sequential categories: intermediate performance, as network results; final performance, as benefits for both partners and the community.

The literature, also, analyses the role of the PMS (Agostino and Arnaboldi, 2015) when the nature of partner is public, as in networks between different actors of government and civil society acting together to achieve a policy process (Agranoff, 2007; Koppenjan and Klijn, 2004). The results reveal a relationship between network management and PMS highlighting PMS impacts on partners’ involvement and on their performance improvement. Marques et al. (2011) have stressed the motivational role of PMS in such context, whose successful adoption depends on the willingness of the partners and their relative power within the network. Other studies (Bryson et al., 2006; Baker et al., 2016) recognise the effects that PMS have on partners’ behaviour and on the structure of their relationships. From a conceptual and methodological point of view, the adoption of a performance measurement system in public networks is challenging because is difficult for public partners to understand in a multi-level system of performance analysis. Public sector managers often do not control the organisation, traditionally based on hierarchical authority (Boschian et al., 2010). Furthermore, managers are increasingly responsible for organisation’s performance, particularly when public services are provided through a network organisation. In public networks one of the major conceptual challenges, in order to solve that management dilemma, is measuring performance through appropriate indicators.

Hammerschmidt et al. (2012) have paid attention on performance measurement of maintenance service in public health service networks. They proposed a two-step benchmark approach: the first concerned measuring and comparing service provider performance, the second relates a sharing of the lesson learned during the benchmarking
Performance measurement systems in business networks

In other words, to improve performance in healthcare networks, two key needs emerge:

1. to identify the best performers in a given service function
2. to improve the abilities of poor performers.

Even partners ‘size’ plays an important role in business networks, especially small and medium enterprises get some benefits not only in economic terms (economies of scale) but also in terms of competitiveness, knowledge and innovation (Bartoli et al., 2013). In this field of research, studies focus the attention on the identification of such areas. Bartoli et al. propose a set of indicators to measure the performance based on three strategic areas: innovation, internationalisation and human capital (Erickson and Jacoby, 2003). The relationship between collaboration and performance was analysed through a regression model that shows the positive effect on firm performance of the participation in a network agreement. This kind of network seems to be a winning solution to invest in innovation, access to export markets and invest in human capital.

Another research analyses the role of networks in stimulating innovation and considers innovation as a measure of network performance. Gronum et al. (2012) consider approximately 1,400 SME to understand the contribution of a network to innovation and performance. They show a strong correlation between innovation and performance, but the dynamics of this relationship is not yet entirely clear because, while there is a positive contribution of networks on innovation, there is a mixed effect of networks on performance (Baldwin and Gellatly, 2003; Mansury and Love, 2008; Roper et al., 2002; Roper and Love, 2001). Therefore, innovation plays a crucial role in the paradigm network-innovation-performance. The dominant point of view in the literature is that networks and social capital embedded in the relationships are positively related to innovation as well as to performance, in particular for SMEs (Pittaway et al., 2004).

Considering the size, a further point of view comes from the analysis of large firms group. The research highlights the relationship between the embeddedness of a subsidiary with the multinational company and the level of its involvement in developing innovation (Ciabuschi et al., 2014).

Another research (Wang et al., 2015) introduces the concept of ‘network centrality’ and examines its relationship with organisational innovation and performance. Based on samples from 40 studies involving 15,860 organisations, using the method of meta-analysis, this study measures the influence of the size of the organisation, of the institutional environment, and industry on this relationship. It has highlighted that the centrality of network positively influences both organisational innovation and performances. In addition, the results indicate that the impact of the network centrality on organisational innovation is stronger for small organisations than medium and large, and that network centrality acts stronger on organisations that operate in developed institutional contexts and knowledge-intensive industries.

4.2 The nature of the relationship

Literature considers the nature of the relationships as a relevant factor in measuring business networks performance (Table 5).
Table 5 Articles that link performance to the nature of relations

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring the networking Performance for contractors in practicing</td>
<td>2012</td>
<td>Keung and Shen</td>
</tr>
<tr>
<td>construction management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A network perspective on organizational architecture: performance</td>
<td>2012</td>
<td>Soda and Zaheer</td>
</tr>
<tr>
<td>effects of the interplay of formal and informal organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alignment prediction in collaborative networks</td>
<td>2012</td>
<td>da Piedade Francisco et al.</td>
</tr>
<tr>
<td>The moderating effect of environmental uncertainty on the</td>
<td>2012</td>
<td>Wang and Fang</td>
</tr>
<tr>
<td>relationship between network structures and the innovative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance of a new venture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>uncertainty, ambiguity, and conflict</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiducia e rischio nelle relazioni distrettuali</td>
<td>2008</td>
<td>Delbufalo</td>
</tr>
</tbody>
</table>

In a business network, the collaborative relationships are established between independent organisations immerse in a social and trusted environment (Cepiku, 2008). Research studies put a strong emphasis on how relationships should be built and how their success should be maintained over time (Keast and Hampson, 2007). In fact, relationships are not completely controlled by the partners (Håkansson and Ford, 2002) and so managers have to consider and prevent uncertainty, ambiguity and conflict as barriers which can affect relationship and their performance in a turbulent environment (Geersbro and Ritter, 2004; Wang and Fang, 2012).

Arcari (1996) classifies the nature of the relationships, according to their relevance in term of intensity and centrality of the relationships. The author distinguishes between operational and strategic relationship. An operational relationship mostly aims to the achievement of economies of scale or, more generally, to higher levels of efficiency; while a strategic relationship aims to the implementation of innovation of products, processes and markets, etc. A study (Francisco da Piedade et al., 2012) shows that network performance depends not only from the past and the present results of each partners but also from the approach to the future in building the intra and inter relationship (alignment in collaborative networks). In this study, the performance model is based on a two-level measurement of the degree of strategic alignment. The first level refers to the ability of each partner to provide information and data on their performance; the second level refers to the network performance and the contribution of each partner. The model is designed according to the Balanced Scorecard framework, distinguishing between ‘lead’ and ‘lag’ indicators, which are identified through the feed-forward and feedback analysis.

According to the relational view approach, another feature of the relationships is interpersonal and inter-organisational trust and its connection with risk (Newell and Clark, 1990).

Competitive advantage, in business networks, depends on formal and informal relationships that network develops successfully (Delbufalo, 2008). Formal relations are supported by contracts, while informal are developed on a voluntary basis. These organisational elements, formal and informal, should be examined together because they affect the performance of each partner (Soda and Zaheer, 2012). A research (Keung and Shen, 2012) regarding network in the building industry proposes a performance
measurement model considering five parameters: information exchange, communication system, sharing of knowledge-skills, culture of network and learning ability intra- and inter-organisational. The analysis conducted through a survey has allowed, for each of the parameters, to identify the basic elements for the construction of an interfirm-network.

4.3 Nature of resources

A third dimension to analyse the literature on network performance measurement is the nature of resources involved in the relationship (Table 6).

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building understanding of the development of performance management for collaborative networks with a knowledge maturity model</td>
<td>2013</td>
<td>Pekkola et al.</td>
</tr>
<tr>
<td>Case studies on collaboration, technology and performance factors in business networks</td>
<td>2013</td>
<td>Carneiro et al.</td>
</tr>
<tr>
<td>Networking capability in business relationships – concept and scale development</td>
<td>2012</td>
<td>Mitrega et al.</td>
</tr>
<tr>
<td>Analysing and enhancing IC in business networks: results from a recent study</td>
<td>2010</td>
<td>Mertins et al.</td>
</tr>
<tr>
<td>Forms of network resource: knowledge access and the role of inter-firm networks</td>
<td>2010</td>
<td>Huggins</td>
</tr>
</tbody>
</table>

The literature examined emphasises that intangible assets are the key elements for the success of a relationship (Mertins et al., 2010). These complex resources are defined as intellectual capital (IC). Understanding the value-drivers’ items of IC is important to promote the development of business network, leveraging on IC resources. In recent years, studies have been developed and tested several measurement approaches and reporting of IC. The European Commission (2008), which identifies the intangible resources included in the intellectual capital statement (ICS), represented a decisive step towards harmonisation of IC measurement and reporting. Following the most frequent assumption to describe the intangible resources (Mertins et al., 2010), the ICS approach divides IC into three dimensions: human, structural and relational. The research, conducted on a sample of 600 European companies aims to classify IC factors on the bases of their importance for firms’ success. The results showed the following order: human capital, relational capital, structural capital and tangible factors (Eisenhardt and Schoonhoven, 1996).

Pekkola et al. (2013) propose an interesting model for performance analysis in business networks. It is based on the measurement of the maturity level of knowledge in three key areas: organisation, human resources and technology. Another study (Huggins, 2010) considers the concept of network capital to identify key resources of business networks. The network capital is treated as an investment in relationships through which partners have access to new and different knowledge to improving the expected performance. Moreover, some studies propose the concept of networking capability (NC) as a complex organisational ability to manage relationship with partners and as a resource that significantly influence network performances (Mitrega et al., 2012).
An empirical study carried out in Portugal in 2012 (Carneiro et al., 2013; Hernández-Espallardo et al., 2011) developed a framework based on five components and a list of favourable conditions for good performance. Conditions are associated with resources of network classified in: human capital, financial capital, social capital, infrastructure and technological platform, management and organisation.

4.4 Models and indicators

The existing literature has not yet identified a shared model for performance measurement in business networks, so in this paragraph we explore how scholars suggest structuring that model. Researcher suggest unanimously a model with multiple dimensions and levels (Table 7) and stress the strategic value of performance metrics and measurement tools in business networks (Kaplan et al., 2010).

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing a network by utilizing performance measurement information</td>
<td>2013</td>
<td>Pekkola</td>
</tr>
<tr>
<td>Framework for performance measurement and management in a collaborative business environment.</td>
<td>2012</td>
<td>Ferreira Sena et al.</td>
</tr>
<tr>
<td>Contemporary performance measurement systems: a review of their consequences and a framework for research</td>
<td>2012</td>
<td>Franco-Santos et al.</td>
</tr>
<tr>
<td>The role of networks in small and medium-size enterprise innovation and firm performance</td>
<td>2012</td>
<td>Gronum et al.</td>
</tr>
<tr>
<td>Multilevel performance indicators for multisectoral networks and management</td>
<td>2010</td>
<td>Herranz</td>
</tr>
<tr>
<td>Measuring and managing performance in extended enterprise</td>
<td>2005</td>
<td>Bititci et al.</td>
</tr>
<tr>
<td>Networking and innovation: a systematic review of the evidence</td>
<td>2004</td>
<td>Pittaway et al.</td>
</tr>
</tbody>
</table>

A study conducted in Finland, Pekkola (2013) discuss a model that matches key factors and time. It considers the following variables: organisation, system and process, skills, incentive, culture (OSSIC Model); while time is articulated in past, present and future. Comparing variables across the three moments, the manager can understand the dynamic of network performance between the past, when the PM was not applied, the present, during its implementation, and the future, when the model is consolidated (Bititci et al., 1998). The study highlights that the use of a performance measurement system increases the level of communication, trust, commitment, participation and coordination among the network, recognising that these are key levers for the success of a network, as stated also by Kaplan et al. (2010) and Busi and Bititci (2006).

Herranz (2010) designs a matrix of values, based on two dimensions:

1. the coordination and strategic direction of the network
2. the performance indicators.
Those dimensions are declined, respectively, according two approaches: bureaucratic, entrepreneurial, relational, the first; organisational level, network level, level of relations, the second. At organisational level, performance indicators compare the results obtained through the network with those that would have been achieved regardless the network, in terms of efficiency, relations with external stakeholders, learning and internal legitimacy (Crosby and Bryson, 2010).

Another research designed a performance measurement system as a process that define the following factors:

- key success factors (KSF), as critical business areas and related strategic indicators
- key performance factors (KPF), as variables that influence KSF and so firm’s performance
- key performance indicators (KPI), as indicators of key performance at processes’ level.

5 Discussion and conclusions

Measuring performance in network environments is a stream of research that is attracting more and more attention from scholars and where the level of collaboration between scholars from different country and affiliations is high.

This study found that Europe is the geographical area where attention on performance measures in network contexts is very high, and, in this field of research, Italy provides an important contribution.

The analyses are mostly theoretical or based on case studies. We can assert that we need more case study research in order to understand the configuration of PMS in different context in term of nature of partners, shared resources and type of relationship. Moreover, we need empirical studies based on survey and quantitative research, in order to reach general conclusions supported by empirical evidences.

The literature analysis has also revealed that business networks, on one hand, and PMS, on the other hand, have been widely studied, but few studies jointly consider these two issues. Scholar has deeply investigated the role of PMS in business networks highlighting their impact in term of involvement, coordination, motivation of partners’ efforts.

Scholars’ interest is also focus on how performance measurement implementation affects business and management in different context, such as public versus private networks or small versus large firms.

However, there is not yet a general model able to map key areas of impact of network agreements, that addresses performance measurement. Literature mapped IC, innovation, trust, risk, and so on but we need more research to formulate a shared and consolidated model. Moreover, this research highlights that very few studies investigate how to design a performance measurement system in business networks.

Scholars suggested some different frameworks, often designed on a specific network such as supply chain, equity agreements, health sector, etc. Even in this field we need much effort of investigation in order to define shared models able to catch business network peculiarities when the nature of resource and relationship is different.
6 Limitations and future research

Due to its essential nature, research in the domain of networks need to be pursued in a strongly interdisciplinary way, to be able to address some fundamental challenges posed by these complex organisational structures. Our work is a literature review, mainly theoretical and qualitative. It did not allow us to develop a statistical model based on parameters and variables with which calculate some descriptive statistics that can highlight the causal links that we tried to detect with framework used for the literature analysis. Unfortunately, the framework developed does not take into account several elements that will undoubtedly have an impact in a network organisation, such as knowledge, industrial sector, motivation, external legitimacy, internal conflict, and last but not least uncertainty and ambiguity from the external environment to provide a better understanding of external performance barriers in business networks.

Following suggestion referees, a possible interesting point of view to be further analysed into the future, could be an assessment of performance measurement of SMEs belonging to business networks, to carry out by comparing two samples of firms: the first would be composed of companies belonging to a network; the second would include companies which do not belong to any network. The challenging part of such a research could be how to isolate (and measure) the ‘network effect’ on the performance of the SMEs. To measure this effect, two proxies may be used, based on the following hypotheses:

1. “the higher is the number of networks the firms belongs to, the better might be their performance”
2. “the higher is the compliance level to the network regulations, the better might be the performance”.

As mentioned this is still a very recent research field, and it is too early to say what the causal link is, if companies improve their performance through participation in a network or if it is just because they are the best performing, so some companies choose to make part of a network.

Thus, different pathways should be subject to future research: from network design and set-up, to operation and reconfiguration, with multiple dimension and perspective. Suggestions for further research could be the development of a broader analysis framework for collaborative networks with methods and tools to support companies to foster and capture new market opportunities.

References


Performance measurement systems in business networks


**Notes**

1. In network agreements two or more firms exercise in common one or more economic activities falling within their social objects in order to increase mutual innovation capacity and market competitiveness (Law 9 April 2009, n. 33 as amended by law 122/2010).

2. The network centrality should be understood as a measure of the main actor’s position in the decisive goal for the informal influence of the network (Lazer and Friedman, 2007).