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Understanding the Configuration of Studies On Virtual Organizations: A Synthesis of Themes for Future Researches

Emerson Gomes dos Santos
PhD student in Production Engineering at the University of São Paulo (USP), Brazil
egomesantos@gmail.com

ABSTRACT

The use of new technologies made it possible to improve business and transactions, reinforce cooperation models, strategic alliances and internal and external networks for enterprises. In addition, companies gain competitiveness, innovation and explore new markets. In this context, the virtual organization has become an important research topic. However, given the complexity of the issue several areas have studied virtual organizations under different aspects which may delay the direction and contribution of research on this subject. In order to identify and evaluate the production of recent years, it was possible to understand the recent research configuration to serve as a source for future research opportunities. Therefore, from a systematic literature review, a classification was created to analyze the characteristics of the events and the scientific journals in which these references were published. Despite the systematic method used for the search of references, this study cannot be considered exhaustive and was conducted in order to explore and describe the topics related with cooperation and innovation in virtual organizations. It was observed that, regardless of the channel (event, scientific journal), most of the references is regarded, first, to Computing or Systems and, secondly, to the Management or Production, two areas of study with opportunities for future researches. Theme researchers or new researchers interested in this topic can thus understand the configuration of the studies in approaches with feasibility to be explored in the future.

Key-words: Virtual Communities. Virtual Organization. Cooperation Networks. Systematic Review.

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Entendendo a Configuração de Estudos Sobre Organizações Virtuais: uma Síntese de Temas para Pesquisas Futuras

RESUMO

A utilização das novas tecnologias tornou possível agilizar negócios e transações, reforçar os modelos de cooperação, as alianças estratégicas e as redes internas e externas às empresas, além de propiciar competitividade, inovação e exploração de novos mercados. Nesse contexto, a organização virtual tornou-se um importante tema de pesquisa. Porém, dada a complexidade do tema, diversas áreas têm estudado as organizações virtuais sob diferentes aspectos, o que pode dificultar o direcionamento e a contribuição de pesquisas relativas ao tema. Com o objetivo de identificar e avaliar a produção bibliográfica dos últimos anos, foi possível entender a configuração recente de pesquisa para servir como fonte para futuras oportunidades de pesquisa. Assim, a partir de revisão sistemática da literatura, foi criada uma classificação para analisar as características dos eventos e das revistas científicas, nas quais essas referências foram publicadas. Apesar do método sistemático utilizado para a busca das referências, este trabalho não pode ser considerado exaustivo e foi realizado com o intuito de explorar e descrever os temas de estudo sobre cooperação e inovação nas organizações virtuais. Notou-se que, independentemente do canal (evento, revista), a maioria das referências diz respeito, primeiro, a Computação ou Sistemas e, em segundo lugar, a Gestão ou Produção, duas vertentes de estudos com oportunidades para futuras pesquisas. Pesquisadores do tema ou novos interessados podem, assim, compreender a configuração dos estudos em linhas passíveis de ser exploradas futuramente.

Palavras-chave: Comunidades Virtuais. Organizações Virtuais. Redes de Cooperação. Revisão Sistemática.

1 INTRODUCTION

There is a new digital economy, which has intense spread of the new information and communication technologies (ICTs) and that influences business strategies and organizational structures. Large companies can master all the value chain phases, as they have great competitive advantage, thereby an alternative for small and medium sized companies to increase their bargaining power would be to create a cooperation network as a strategic network aiming at to organize the production and manage their value chain.

Many of the concepts related to these networks are not new in the literature, but there are other concepts that are worth mentioning, such as the virtual companies or organizations concept that use these new technologies to improve their competitiveness and explore new market opportunities. Being one specific form of cooperation, these organizations become an important topic of study, besides being an important concept for studies that are based on coordination mechanisms, on the degree of centralization, and on this network formalization (Amato Neto, 2005).

Because it is a transversal theme, it has been studied in various knowledge fields and has received importance in recent years. Riemer and Vehring (2012) made a classification from a literature review for exploring different concepts of virtual organization. In the study, they identified three types of virtual organization, which contribute to a better understanding of the conceptual basis for future researches.

There are a lot of reasons for creating a virtual company, in particular the possibility to take advantage of new business opportunities, so this kind of company can be associated with a visionary entrepreneur. But there are also strategic reasons for the different types of companies to adopt this model, which involves sharing capabilities and risks and, thus, breaking the domestic borders (global production networks).

The virtual company, seen from an institutional point of view, combines the best competences of independent companies, but brings with it control difficulties. However, from a functional point of view, the vital

characteristic would be the ability to concentrate the core competencies coordinated by the ICTs, which strengthen the cooperation models and flexible companies. A company with virtual organization structure is one of the forms of cooperation and consists of an opportunistic alliance according to the competences value of each entity. Thus, for its success, it stands out the existence of qualified partners and the means to identifying the competences of each one (Amato Neto, 2005).

In this context, the rationale of this study is given by the importance of virtual organizations for the identification of new business opportunities, since these organizational forms enable a dynamic competition with life cycles of the shorter products and the individualization of production and the flexibility, providing great competitive advantages as well as agility in the communication process (Amato Neto, 2000; 2005).

Given the complexity of the subject, several areas have studied the virtual organizations under different aspects which may hinder the direction and the researches contribution relating to the theme. The objective of this study was to identify and evaluate the bibliographic production of recent years and, with it, understand its configuration in order to serve as a source for future research opportunities. Besides this introduction, this study is structured in three other sections. Section 2 details the methodology used, followed by section 3, which presents the results analysis and the discussion; and, finally, the final considerations and findings are presented in the last section.

2 METHODOLOGY

The accomplishment of a systematic review aims to identify and evaluate the bibliographic production of the past few years on a specific theme and, therefore, understand its configuration to, after surveying and summarizing the information found in the literature, to serve as a source for future researches opportunities. Accordingly, studies involving review can provide an overview of a topic. There are different types of studies that perform literature and scientific productions reviews, some of them

presenting very close nomenclatures and objectives. According to Vosgerau and Romanowski (2014), revisions can be classified as:

1) studies reviewing for mapping: bibliographical survey, literature review, bibliographical review, state of the art, narrative review and bibliometric study. In these cases there is no detailed and specific criterion for performing and, in general, it deals with the indexes measurement on the identified production;
2) studies reviewing for assessment and synthesis: systematic review, integrative meta-analysis review, meta-summarization and synthesis of qualitative evidence. Most of these studies follow the directions (patterns) defined by reference centers, such as the *UK Cochrane Centre* (http://ukcc.cochrane.org). There are two dominant views for the results systematization: the view of integration and aggregation (generate, validate models) and the view of interpretation of the evidence found in the results (generate models).

Briefly, the steps to accomplish a systematic review, described below, are: planning, execution and analysis.

The planning involves decisions about the source of references that will be searched (for example: Scopus, ISI, Scielo, etc.); about what the search criteria will be (keyword in the reference titles or in the author); what the inclusion and exclusion criteria for the searches will be (for example, the area of publication and the quality score of the scientific journal); which the collection period will be; which the initial hypotheses will be and what information collected and analyzed will be.

In the execution, stage in which the collection occurs, it is recommended to conduct pre-tests (pilot study) of the collection and only then to carry out the final collection. In general, at least two people can be considered in this references assessment process in order to minimize the possible selection bias. The execution of this stage with more than one person may depend on the number of search sources and on the amount of inclusion and exclusion criteria.

Finally, in the analysis, it can be considered a descriptive and interpretative study or to carry out a deeper study in an attempt to integrate and devise a general model about the topic. In the second case, a greater dedication is required from the researcher so that the model to be created reflects the developments of the literature in a coherent way.

For this study, it was opted to use an explicit and systematic method to identify, select and analyze the studies to be included in the final review and in the theme analysis. As a source of search references, it was chosen the ISI Web of Science platform, which is today one of the largest consultation sources of references for scientific literature.

As references identification criteria, it was considered the following key words in the search for the title: *"Virtual Organization"* and the British variation *"Virtual Organisation"* in combination with *"Cooperation"* or *"Collaboration"* or *"Innovation"*. The period of the publications considered for the search was five years, covering the years between 2010 and 2014. In addition to the probable duplications, after checking the results found in the pre-test (pilot), it was decided to consider as an exclusion criterion the references published in events (congresses, *workshops* and symposia). Thus, the final analysis was accomplished in the references that resulted in articles.

Lastly, this current study approach is intended to be further developed in order to integrate and draw up a more general model on the topic, which requires greater dedication of the researcher so that the model to be created consistently reflects the literature developments. The date on which the search keywords were held was December 15, 2014.

3 ANALYSIS OF RESULTS AND DISCUSSION

The pursuits by the references made in December 2014 resulted in 105 identified references, this total is summarized in Table 1 according to the keywords. From these references, it was disregarded eight, three of which were excluded because they were patent descriptions and five, because they were identified in more than one of the searches. These five duplications were obtained as from the following pursuits: three references

as from *"Organization"* combined with *"Cooperation"* and with *"Collaboration"*; an article with *"Organization"* in combination with *"Innovation"* and with *"Collaboration"* and, lastly, another article with *"Collaboration"* coming from the combinations with *"Organization"* and *"Organisation"*.

Table 1: Distribution of references by keyword

	Collaboration	***Cooperation***	***Innovation***	***Total***
Virtual Organization	66	19	4	89
Virtual Organisation	13	2	1	16
Total	79	21	5	105

Source: Research data

Considering the exclusion criteria in the 97 references, it was observed that 61% (59) were published in conference proceedings and the others in academic journals.

Initially, it follows a quick rundown on the events in which the 59 references have been published, for finally examine the other 38 articles and propose the desired setting.

The events were classified into five types according to the theme. The themes and their description are presented below.

1. Computing: Computing in general, Computer Engineering, Electrical Engineering, other technologies and their applications.
2. Systems: *Software* and Applications.
3. Management and Production: Business, Information Management, *E-Business*, Administration and Economics, Production.
4. Virtual Organizations.
5. Other: Communication, Infrastructure.

In Table 2, a summary is displayed about the number of events and the number of published references for each defined group; different years were represented as different events. It is noticed that, in general, the references were published in events on Systems or Computing (34 references in 28 events), and only eight refer to events on Management or Production. The five events classified as Virtual Organizations are related to

the *Working Conference on Virtual Enterprises* and presented higher relative number of references in the years surveyed (13 references).

Table 2: Number of events and references according to the classification

Classification	Number of events	Number of references
Systems	15	19
Computing	13	15
Management or Production	8	8
Virtual Organizations	5	13
Others	4	4
Total	45	59

Source: Research data

Considering the analysis of the published articles, 38 articles were identified in 29 journals; 123 different authors participated in the elaboration of these articles and it was observed, on average, four authors per publication. The articles have an average of 16 pages without major changes in these figures in the observed period (Table 3). Regarding the authors and their dedication to the subject, it was observed that two of them had higher production in the analyzed period of five years with three different articles published, and nine other authors participated in the publication of two articles. In addition, Table 3 also describes the evolution of the articles over the years considered in the study and shows a peak of 13 articles published in 2011.

Table 3: Distribution of the number of articles, of authors and of pages over the years considered

Year	Articles	Authors (average)	Authors (maximum)	Pages (average)
2010	9	3	6	19
2011	13	4	15	16
2012	7	3	5	16
2013	7	3	6	14
2014	2	6	6	17
Total	38	4	15	16

Source: Research data

Finally, an analysis of these articles citations shows that the 38 articles were cited 97 times, however, taking into account the citations per year, the articles had an average of one citation per year.

Below, it is described in further details these 38 scientific papers; the interest was focused on the information about scientific journals and in the subjects studied.

Initially it was observed the number of articles published in scientific journals. It is noticed, at the most, the publication of three articles in the same journal, a fact that occurred in two journals: the *Production Planning & Control* and the *Journal of Intelligent Manufacturing*. Five other journals appear in the sequence with two published articles, and the remaining 22 journals presented just one article each. This shows that the theme can be considered as a general theme because it was published in a dispersed manner in various journals, despite a certain continuity of articles published in journals on Production.

Below, the classification used for the events was tailored so that it was also used to rank scientific journals. The description shows the necessary adjustments.

1. Computing: Computing in general, Engineering and Electronic.
2. Systems: Software and Applications.
3. Management and Production: Quality and Business Management, Human Resources, Production, Manufacturing, Transportation.
4. Other: Simulation, Earth Sciences and Parasitology.

Regarding the amount of journals and the number of articles published for each theme defined, it is noticed, from Table 4, that most of the references were published in journals on Systems or Computing (19 articles in 17 journals). Despite the supremacy in the number of journals on Systems, the journals about Management or Production show higher number of articles when comparing the number of journals (14 articles in eight journals which represent almost two articles per journal). Finally, it is observed that it was not found any specific publication about Virtual Organizations.

Table 4: Number of events and references according to the classification

Classification	Number of journals	Number of articles
Systems	13	15
Computing	4	4
Management or Production	8	14
Others	4	5
Total	29	38

Source: Research data

It was observed in relation to the themes studied that five articles were published in journals on specific themes such as Simulation or Sciences (of the Earth or Parasitology). These articles were classified as "others", in view of the slightest interest on them for this study.

The remaining items will be described as follows in accordance with the classification made with the journals. Thus, two items were created: Direction (Trend) of Systems or Computing, with 19 articles, and Direction (Trend) of Management or Production, with 14 articles.

3.1 DIRECTION (TREND) OF SYSTEMS OR COMPUTING

The importance of the virtual organizations is recognized in the Systems area, which was explained by Riemer & Vehring (2012) by the very definition of virtual organization, which emerged to describe the changes in the organizational structures and of value creation supported by the ICTs. The authors proposed a classification from a literature review that identified three types of virtual organization and contributed to better understanding the conceptual basis for future researches. The first type would be the *Internal Virtual Organization*, which emerged from new communication technologies around the internal virtualization based on the distributed collaboration in virtual teams. The second type, the *Network Virtual Organization*, describes a network of smaller companies grouped according to their core competencies in collaborative projects of short term, created from information systems across organizations. Finally, the third type, *Outsourcing Virtual Organization*, refers to a hierarchical network of

suppliers so that the focal company outsources a significant part of its value creation, which came from the last decades *outsourcing* trend.

Thus, the Information Systems community has been influential in the research of this phenomenon. This importance was also shown by Afsarmanesh, Camarinha-Matos and Msanjila (2011), who present a range of models, methodologies and tools conceived and developed to support the management and for the successful operation of the virtual organizations. Apart from these articles that presented more extensive reviews, the studies identified in this group were divided into the following items in order to facilitate the analysis of the themes: systems development, security and diversified themes.

3.1.1 Systems Development

In this topic, the authors of the following studies describe systems not only to form the virtual team and verify their effectiveness with a systematic method of selection of internal and external human resources (Wi, Oh & Jung, 2011), but also for supporting the decision making in projects (Scherer & Schapke, 2011). The authors also developed systems for different types of virtual organizations, as a virtual community of research (dispersed group of researchers).

Other authors focused their attention in the infrastructure necessary for the creation of a common virtual environment (Andronico et al., 2011). It was also observed an experimental system that enabled remote collaboration among media professionals, increasing the efficiency and reducing costs (Brock, Daniels, Morris & Otto, 2011).

Finally, a study shows the importance of managing the systems architecture in order to minimize the possibility of the ICTs bring restrictions for new cooperation, as companies are supported by information and communication technologies (Kangilaski, 2010). Also on systems architecture, Ul Haq, Paschke, Schikuta & Boley (2013) present an architecture that allows the services provision and monitoring among virtual organizations in the chain, in order to validate an SLA hierarchical structure among partners.

3.1.2 Development of systems and diversified themes

The cooperation represents a major challenge to the virtual organizations security that share resources dynamically and autonomously. Thus, several works study and propose models to make the cooperation more reliable, whether in services, by the development of some technologies and discussion of their efficiency (Gao & Lv, 2012; Li, Huai Hu & Zhu, 2010), or more specifically, access control models - interoperability - (Gouglidis & Mavridis 2012), including distributed environments (Merlo, 2013). It increases thus the data protection against unauthorized access and prevents the transmission of unnecessary messages on the chain (Surendran, Purusothaman & Balachandar, 2011; Torres, Molto, Segrelles, Blanquer & Hernandez, 2012).

The other articles deal with the results of studies and diversified researches, among them, a study on creating a *software* platform and its adaptations by a virtual dynamic organization that meets the specific demands (Marsden, 2013); an assessment of the factors on the members collaboration and knowledge capacity, which affect the performance of a project (Wi & Jung, 2010); an analysis of the views among peers by the participants of open source *software* communities to foster effective collaboration (Bosu et al, 2014.); and an analysis of the factors influencing the long-term sustainability of free *software* projects (Chengalur-Smith, Sidorova & Daniel, 2010).

Lastly, in his article, Concha, Espadas, Romero & Molina (2010) provide an overview of the benefits and the evolution implications of an open technology platform with a set of electronic solutions to support the collaborative business processes among the small and medium-sized enterprises, thinking the *software* as a service.

3.2 DIRECTION (TREND) OF MANAGEMENT OR PRODUCTION

In the articles classified in Management or Production, there is more relevance to aspects of the configuration and history of the virtual organizations formation, of the adoption and IT management, of the

management of human resources, knowledge and innovation, of the application of the concepts in specific areas such as the fashion industry. It is also noticed greater application of statistical techniques to reach the conclusions.

Initially, the formation of virtual organizations is highlighted. Due to the advances in information and communication technology, companies need to deal with this fast changing environment and cooperate with other companies. Thus, the concept confidence was assessed in order to minimize the risk and ensure the success. For the creation of a virtual organization, Mun, Shin & Jung (2011) proposed a confidence model oriented to targets for the partner selection process. A study that resulted in some interesting variations in the typical models of cooperation network and virtual organization was the case study of Noran (2013), who described a collaboration network and a virtual organization formation in the higher education sector.

Other specific field of application was the fashion industry (Shamsuzzoha et al, 2013; Carneiro et al, 2014), whose studies are described at the end of this section.

However, in the creation process of virtual organization, the negotiation among partners is essential, being extremely important to have an environment where all potential partners can meet and negotiate. From this viewpoint, a negotiation assistant was proposed by Oliveira, Camarinah-Matos and Pouly (2010).

Many of the studies raised in this section study the virtual organization over time, in a historical perspective, describing the principles for its creation and operation and the effects of the choices with regard to the conception and implementation (Noran, 2013), or describing alliances with emphasis on risk and cooperation sharing through a process of participants selection for the team formation (Cocks et al., 2011). Lastly, Romero and Molina (2010) presented a reference model with a set of management activities and supporting tools to ensure that a virtual organization can fulfill all tasks required to achieve its goals. It is about a methodology that systematically addresses a set of steps to establish the

management and execution functionalities throughout the life cycle of the virtual organizations.

After analysis and description of the articles that study the virtual organizations formation, a significant amount of them stands out in relation to the great challenge of sharing knowledge in the collaboration networks, an essential aspect to improve the productivity and the quality of decisions made by the organizations in the network. This aspect of knowledge management was the most studied within the virtual organizations in the articles of this section. To support the effective knowledge sharing, in some articles, it is resorted to tools and methods that identify and follow the knowledge evolution, such as the services of collaboration moderator who perform complex knowledge collaborations (Swarnkar, Choudhary, Harding, Das & Young, 2012). A moderator is a system based on the knowledge that supports collaborative work through awareness of the priorities and needs of other team members (Palmer, Harding, Swarnkar, Das & Young, 2013). Also regarding the shared knowledge moderation among virtual organizations, the moderator service requires a semantic system of knowledge based on rules in order to allow the semantic integration of heterogeneous data. In this sense, Lin, Harding and Tsai (2012) conducted a case study to illustrate the proposed model feasibility.

Lastly, regarding the importance of the capital stock, it was analyzed the perspective of how the individual identifies himself with the Organization, with a focus on virtual organizations where the dispersion of individuals can prevent face to face interactions. (Davenport & Daellenbach, 2011). In addition, with the help of IT in constant evolution, the human resources management has entered the age of *electronic HRM* (e-HRM) with characteristics based on intranet (Lin, 2011).

For strengthening the processes, including those of innovation, there is the need to adopt IT, crucial competence to build and maintain organizational competitive advantages (Lin, 2011). Thus, in order to investigate the innovation management, it is recommended to consider a multilevel analysis, both at the individual level and at the organizational level. Lin (2012) analyzed the relationship intensity between the individual creativity and the organizational innovation besides identifying and

assessing the impact of the virtual organization structure on the interaction between the individual creativity and the organizational innovation.

With regard to the application of the concepts of virtual organizations in a specific area, it can be highlighted the fashion industry, described and analyzed based on the concepts of virtual organizations and in an ICT platform to support the non-hierarchical cooperation between small and medium-sized companies (Carneiro et al., 2014). However Shamsuzzoha et al. (2013) showed that small and medium-sized companies require cost-effective solutions with services based on an open source platform, for example.

Regarding the use of statistical techniques, the studies included techniques already widespread, such as linear regression for analyzing the relationship between several variables. For example, Davenport and Daellenbach (2011) evaluate how the process of capital stock formation impacts the identification of individuals with the company. Other studies employ more advanced techniques such as data mining, hierarchical regression and structural equations.

Data mining was carried out in order to analyze hidden data patterns and relationships in the moderation process (Palmer et al., 2013). Hierarchical regression was considered in a study that demonstrated the relationship between the IT adoption and the organizational innovation and, in another article, about the relationship between the creativity of the employees and organizational innovation, respectively (Lin, 2011; Lin, 2012). Finally, the structural equation modeling raised 13 sources of risk in order to create and test the dimensions resulting from risks related to the network in a virtual organization, based on information collected from a questionnaire (Alawamleh & Popplewell, 2011)

4 FINAL REMARKS AND CONCLUSIONS

The use of new technologies made it possible to streamline businesses and transactions models and also to strengthen the cooperation models, strategic alliances and internal and external networks for businesses and, thus, gain competitiveness, innovate and explore new

markets. Being so, the virtual organization has become an important research subject. However, given the complexity of themes that can be studied under different aspects, in the present study, the purpose was to identify and evaluate the recent bibliographical production and propose a configuration to serve as a source for future research opportunities, facilitating the focus and the contribution of researches related to the theme.

A similar classification was created for analyzing the characteristics for both, events and for scientific journals, in which the references on the theme were disseminated and, from it, it was presented a recent analysis and the publications configuration about the virtual organizations. It is noticed that, regardless of such channel (event or journal), most references are related to Computer or Systems and secondly to the Management or Production, showing that most of the raised studies are focused on the means (tool) or on the infrastructure, and in smaller number, in the management structures and in the other processes involved. In addition, it was observed other references published in various areas of knowledge, both, in events such as communication, as well as for complete articles in journals on Simulation, Earth Sciences and Parasitology.

It is noteworthy that it was identified, from the analysis of references, a specific event on Virtual Organizations, which can serve as an important channel for dissemination of studies on the theme virtual organizations, given that there was a relatively larger number of published references in the years surveyed.

On the full articles, on two occasions the same journal published three articles, which shows a continuity of interest in the theme, but the significant majority of journals published only one article on the subject. The dispersed publication on a common theme may indicate the need for researchers to find the best channel for communicating their researches advancements, namely the need to find interlocutors for their researches advancement in the theme.

To summarize the themes of studies, it was created two branches of studies, Systems or Computing and Management or Production: while a branch deals mainly with systems and security development, the second

deals with aspects of the configuration and history of the virtual organizations formation. There are also other more analytical subthemes, such as the adoption analysis and the IT management, analysis concerning the management of human resources, knowledge and innovation. In the second branch, it was used larger amount of statistical techniques to achieve their goals and validate their hypotheses.

Despite the fact that virtual organizations are a topic studied in several areas, some convergence themes can be considered as the risks of using virtual environments, subtheme covered by both branches: in the first, from a point of view with greater focus on ensuring the means for the information security, and in the second from a perspective related to the knowledge management and the trust among users.

Thus, this study carried out a synthesis of the themes studied over the past five years from the classification and from the references analysis regarding their publication in events or scientific journals. Despite the systematic method used for the pursuit of the references, this study cannot be considered exhaustive and was conducted in order to explore and describe the subjects of study cooperation and innovation in the virtual organizations, being possible to understand the theme configuration in two areas of studies in order to serve as opportunities for further researches, especially in systems or computing and management or production. Theme researchers or new interested researchers can understand the configuration of the studies in approaches capable of being explored in the future.

REFERÊNCIAS

Afsarmanesh, H., Camarinha-Matos, L. M., & Msanjila, S. S. (2011). Models, methodologies, and tools supporting establishment and management of second-generation VBEs. IEEE Transactions on Systems, Man, and Cybernetics Part C: Applications and Reviews, 41(5), 692-710.

Alawamleh, M., & Popplewell, K. (2011). Interpretive structural modelling of risk sources in a virtual organisation. International Journal of Production Research, 49(20), 6041-6063.

Amato Neto, J. (2000). Redes de cooperação produtiva e clusters regionais: oportunidades para as pequenas e médias empresas. São Paulo: Atlas.

Amato Neto, J. (Org.). (2005). Redes entre organizações: domínio do conhecimento e da eficácia operacional. São Paulo: Atlas.

Andronico, G., Ardizzone, V., Barbera, R., Becker, B., Bruno, R., Calanducci, A., Carvalho, D., Ciuffo, L., Fargetta, M., Giorgio, E., La Rocca, G., Masoni, A., Paganoni, M., Ruggieri, F., & Scardaci, D. (2011). E-Infrastructures for e-science: a global view. Journal of Grid Computing, 9(2), 155-184.

Bosu, A., Carver, J., Guadagno, R., Bassett, B., Mccallum, D., & Hochstein, L. (2014, August). Peer impressions in open source organizations: a survey. Journal of Systems and Software, 94, 4-15.

Brock, N., Daniels, M., Morris, S., & Otto, P. (2011). A collaborative computing model for audio post-production. Future Generation Computer Systems - The International Journal of Grid Computing and e-Science, 27(7), 935-943.

Carneiro, L., Shamsuzzoha, A. H. M., Almeida, R., Azevedo, A., Fornasiero, R., & Ferreira, P. S. (2014). Reference model for collaborative manufacturing of customised products: applications in the fashion industry. Production Planning & Control, 25(13-14), 1135-1155.

Chengalur-Smith, I., Sidorova, A., & Daniel, S. (2010). Sustainability of free/libre open source projects: a longitudinal study. Journal of the Association for Information Systems, 11(Special Issue), 657-683.

Cocks, G., Scott, J., Pearce, T., Hazebroek, M., Fisher, P., & Wilson, R. (2011). Delivery of low-volume road in Pilbara region of Western Australia by Alliance contracting. Transportation Research Record, 1, 203-210.

Concha, D., Espadas, J., Romero, D., & Molina, A. (2010). The e-HUB evolution: from a custom software architecture to a software-as-a-service implementation. Computers in Industry, 61(2), 145-151.

Davenport, S., & Daellenbach, U. (2011, March). 'Belonging' to a virtual research centre: exploring the influence of social capital formation processes on member identification in a virtual organization. British Journal of Management, 22(1), 54-76.

Gao, J., & Lv, H. (2012, September). Institution-governed cross-domain agent service cooperation: a model for trusted and autonomic service cooperation. Applied Intelligence, 37(2), 223-238.

Gouglidis, A., & Mavridis, I. (2012, June). domRBAC: an access control model for modern collaborative systems. Computers & Security, 31(4), 540-556.

Kangilaski, T. (2010). Enterprise architecture management in virtual organization. The Journal of Information Technology and Architecture, 7(3), 211-219.

Li, J., Huai, J., Hu, C., & Zhu, Y. (2010, September). A secure collaboration service for dynamic virtual organizations. Information Sciences, 180(17), 3086-3107.

Lin, H. K., Harding, J. A., & Tsai, W. C. (2012). A rule-based knowledge system on semantic web for collaboration moderator services. International Journal of Production Research, 50(3), 805-816.

Lin, L.-H. (2011). Electronic human resource management and organizational innovation: the roles of information technology and virtual organizational structure. International Journal of Human Resource management, 22(2), 235-257.

Lin, L.-H. (2012). Process and product innovation in virtual organisations: an investigation of Taiwanese information firms. Total Quality Management & Business Excellence, 23(9-10), 1061-1074.

Marsden, J. (2013, March). Stigmergic self-organization and the improvisation of Ushahidi. Cognitive Systems Research, 21, 52-64.

Merlo, A. (2013, February). Secure cooperative access control on grid. Future Generation Computer Systems - The International Journal of Grid Computing and e-Science, 29(2), 497-508.

Mun, J., Shin, M., & Jung, M. (2011, June). A goal-oriented trust model for virtual organization creation. Journal of Intelligent Manufacturing, 22(3), 345-354.

Noran, O. (2013). Collaborative networks in the tertiary education industry sector: a case study. International Journal of Computer Integrated Manufacturing, 26(1-2), 29-40.

Oliveira, A. I., Camarinah-Matos, L. M., & Pouly, M. (2010). Agreement negotiation support in virtual organisation creation-an illustrative case. Production Planning & Control, 21(2), 160-180.

Palmer, C., Harding, J. A., Swarnkar, R., Das, B. P., & Young, R. I. M. (2013). Generating rules from data mining for collaboration moderator services. Journal of Intelligent Manufacturing, 24(2), 313-330.

Riemer, K., & Vehring, N. (2012). Virtual or vague? A literature review exposing conceptual differences in defining virtual organizations in IS research. Electronic Markets, 22(4), 267-282.

Romero, D., & Molina, A. (2010). Virtual organisation breeding environments toolkit: reference model, management framework and instantiation methodology. Production Planning & Control, 21(2), 181-217.

Scherer, R. J., & Schapke, S.-E. (2011, October). A distributed multi-model-based management information system for simulation and decision-making on construction projects. Advanced Engineering Informatics, 25(1), 582-599.

Shamsuzzoha, A., Kankaanpaa, T., Carneiro, L. M., Almeida, R., Chiodi, A., & Fornasiero, R. (2013). Dynamic and collaborative business networks in the fashion industry. International Journal of Computer Integrated Manufacturing, 26(1-2), 125-139.

Surendran, D., Purusothaman, T., & Balachandar, R. A. (2011, July). Performance analysis of a resource aggregator in a grid of grids environment. Computer Systems Science and Engineering, 26(4).

Swarnkar, R., Choudhary, A. K., Harding, J. A., Das, B. P., & Young, R. I. (2012, October). A framework for collaboration moderator services to support knowledge based collaboration. Journal of Intelligent Manufacturing, 23(5), 2003-2023.

Torres, E., Molto, G., Segrelles, D., Blanquer, I., & Hernandez, V. (2012). A replicated information system to enable dynamic collaborations in the grid. Concurrency and Computation-Practice & Experience, 24(14), 1668–1683.

Ul Haq, I., Paschke, A., Schikuta, E., & Boley, H. (2013). Rule-based validation of SLA choreographies. Journal of Supercomputing, 63(1), 24-45.

Vosgerau, D. S. R., & Romanowski, J. P. (2014). Estudos de revisão: implicações conceituais e metodológicas. Revista Diálogo Educacional, 14(41), 165-189.

Wi, H., & Jung, M. (2010). Modeling and analysis of project performance factors in an extended project-oriented virtual organization (EProVO). Expert Systems with Applications, 37(2), 1143-1151.

Wi, H., Oh, S., & Jung, M. (2011, July). Virtual organization for open innovation: semantic web based inter-organizational team formation. Expert Systems with Applications, 38(7), 8466-8476.