

Business Continuity in Network Organizations – A Literature Review

Completed Research Paper

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Abstract

In today's globalized markets, organizations have to work together in IT based inter-organizational networks embedded in business ecosystems. As every member relies on the ecosystem, the network and on other network members, the likelihood of disruptions and business discontinuity rises. Therefore, new methods and concepts of business continuity in network organizations have to be found. This paper addresses the research gap between network organizations and business continuity by integrating these two research streams. Based on a systematic literature review of 23 papers from journals and conferences, 30 challenges of network organizations are linked to business continuity concepts, if available. A business continuity coordinator as a new role in the network is introduced. Future research topics are highlighted.

Keywords

Business continuity, network organizations, literature review, business continuity coordinator.

Introduction

In today's globalized markets, larger enterprises have to maintain activities in various countries. "In today's volatile and global markets only those who can adapt to changed environmental conditions can prevail against competitors" (Mueller et al. 2013). Not only single companies are affected, but also networks of organizations embedded in business ecosystems. Companies working tightly coupled are referred to as network organizations. Organizations and networks need methods to keep their businesses running in challenging environments. At the same time, a continuous rise of new IT innovations and IT trends (e.g. cloud computing or BYOD) may be observed. Innovations have a great potential to support business, but force organizations to think about their dependency on IT and to develop plans and alternatives in case IT innovations fail. Enterprises enrolled in a network organization experience additional challenges as they depend on the sustainability and reliability of the network.

In this new environment, business continuity is an important field when it comes to disaster recovery and disaster preparedness. Not limited to traditional single businesses, continuing business in a changing and more and more challenging and complex environment is of utmost importance to reach business goals and gain a competitive advantage, as well as to survive in globalized markets. In network organizations, this becomes even more important, as a company is relying on other members of the network. Therefore not only a single company can fail and be replaced at the market, but a whole network of interconnected companies could. As a consequence, we see a growing need to understand which concepts of business continuity are applicable or have still to be developed for network organizations. In today's IS field of research, this is not a highly researched field.

Hence, the focus of this paper is to analyze the main needs and requirements of network organizations for business continuity and to apply methods, ideas and approaches from business continuity towards these requirements if possible, and if not, to highlight further research topics in the field. The following questions form the basis for this research:

1. What are the main needs and requirement of network organization for business continuity?

2. Which methods, concepts, ideas and approaches can be used to address the needs and requirements of network organizations?
3. What are future research topics in business continuity for network organizations?

To address these questions, a systematic literature review has been conducted. The literature review focuses on academic contribution from top IS journals and conferences to understand how much attention business continuity has drawn in the IS community. It provides an extract of relevant points in the IS area, while connecting two research areas and consequently, presenting further potential fields of IS research.

The remainder of this paper is structured as follows. The next section gives a theoretical background and defines network organizations as well as business continuity. Section Three presents the methodology for this review. Section Four will detail the challenges and requirements identified. The following section links the challenges to methods and approaches from the business continuity field. Research gaps are also discussed in this section. The paper concludes by summarizing the limitations of our findings and the main results.

Theoretical background

In this section, network organization and business continuity will be defined. The need to link both research areas is described.

Network Organization

Due to the rapidly emerging specialization of organizations, "[...] business firms and other organizations in the public and private sectors increasingly operate as part of highly distributed ecosystems" (Grant and Tan 2013). This means that companies around the globe are increasingly working together and forming network organizations. In general, network organizations are complex sociotechnical systems (Bonen 1981) embedded in business ecosystems (Moore 1996). Based on that phenomenon, multiplicity of terms, definitions and concepts for network organizations can be found in literature and practice, ranging from short term virtual organizations, medium term business nets, supply networks and inter-organizational networks (Trkman and Desouza 2012) to long term strategic webs or strategic/cooperative alliances (Holland and Lockett 1998). In general, a network organization consists of two or more different legal entities or companies (Vervest et al. 2004), which are linked via communication, cooperation and collaboration ties, "forming innovative networks of value creation" (Fleisch et al. 2000). In today's globalized markets, the "different legal entities are often geographically dispersed and international in their outlooks" (Holland and Lockett 1998). Therefore, network organizations need lateral or horizontal patterns of exchange (Powell 1990) as well as shared norms of trustworthy behavior (Liebeskind et al. 1996). For an easier understanding, we refer in this paper to the term "network organization" or "inter-organizational network", but include all forms of network organizations in our research perspective.

Business Continuity

In an era of organizations' focus on core competencies and specialization, the relevance of business continuity is increasing. "An estimated 80 percent of companies without a well-conceived and tested business continuity plan go out of business within two years of a major disaster" (Braun and Martz 2007). Organizations with a sustainable business continuity plan or strategy can continue to operate in the ecosystem and might improve their position in the ecosystem (King 2013). In this paper, business continuity is understood as "activities to identify the risks and vulnerabilities of the organization, select risks to which a contingency plan should be developed and make plans in order to prepare for the possibility that a risk materializes, with the aim to minimize damage resulting from the actualization of a risk factor" (Kamioka and Tapanainen 2013). Business continuity consists of four major tasks: 1. risk identification, 2. risk assessments, 3. risk ranking and 4. risk management (Chapman et al. 2002; Gilbert and Gibs 2000; Morton 2002).

Today, companies rely more and more on IT. This "reliance on IT has led to a shift in focus from disaster recovery to business continuity management, IT and business resilience planning, requiring data to be active and online no matter what" (King 2013). New IT-enabled innovation and trends like outsourcing

(Miranda and Kavan 2005), enterprise 2.0 (McAfee 2006), e-commerce (Ranganathan and Lertpittayapoom 2002) or cloud computing (Armbrust et al. 2010) illustrate the need for new concepts for business continuity (Luftman and Derksen 2012). Current research from IS to answer this need is limited. In addition, the rise of network organizations raises new research questions in the field of business continuity. Lateral or horizontal patterns of exchange as well as shared norms of trustworthy behavior regarding business continuity in network organizations have to be found. Traditional concepts, which are applicable to a single organization, have to be empowered or modified to cope with the challenges of network organizations.

Methodology

We conducted a systematic literature review to find beneficial concepts of business continuity for network organizations. In this section, we illustrate our research methods and highlight our approach to answer the research questions given in the first section.

Journal / Conference	Number of relevant papers (Network organization)	Number of relevant papers (Business continuity)
European Journal of Information Systems	3	-
Information Systems Journal	-	-
Information Systems Research	-	-
Journal of AIS	-	1
Journal of Information Technology	4	-
Journal of MIS	1	-
Journal of Strategic Information System	1	-
MIS Quarterly	1	-
Americas Conference on Information Systems	1	1
European Conference on Information Systems	2	-
Hawaii International Conference on System Sciences	5	3
International Conference on Information Systems	-	-

Table 1. Sources and number of relevant papers

The literature review process was structured by vom Brocke et al. (2009) and each step was supported by methods and concepts suggested by Webster and Watson (2002). During the first stages (the conceptualization of the literature review) we conducted a nonsystematic literature search via Web of Science and Google Scholar to get an overview about the IS research of business continuity in network organization. As a first result, not enough significant literature could be found. It seemed that both research areas have not been linked so far. We decided to conduct two independent systematic literature searches, one regarding the stream of network organizations, and the second regarding business continuity. For the Network organization stream, keywords such as “network organization”, “networked organization” and “inter-organizational network” were defined. For the second stream, the keyword “business continuity” was used. The search was limited to articles from the top IS journals according to the senior scholars’ basket of journals provided by the Association for Information Systems, to locate relevant literature. In addition, the conferences “AMCIS”, “HICSS”, “ECIS” and “ICIS” were searched as

well to include current trends and ideas. Choosing only top IS journals and conferences allowed an assessment how much attention business continuity and network organization have drawn in the IS community. A selection of 23 most relevant papers from both streams was extracted via reading abstract and conclusion. The results of the search are shown in Table 1. The papers have been analyzed by highlighting concepts of network organizations, which are directly linked to challenges of network organizations. Selected papers from the business continuity stream must include an extra-organizational perspective to support the answering of the research questions.

After reviewing and analyzing the relevant papers, a variety of requirements and challenges was identified. These were then classified into six categories and 30 subcategories. A new subcategory was established if the topic of the subcategory was not mentioned in a previous paper. Every subcategory represents a distinct challenge for network organizations. In an inductive approach, we used the method of clustering (Rico 1983) to categorize the subcategories to make them manageable and to obtain an overview of specific requirements for network organizations (Tables 2 to 7).

Challenges of Network Organizations

In the following, challenges of network organizations are presented. If possible, a matching Business Continuity concept was mapped towards the specific challenge. The challenges are grouped by six categories; Governance, Actors in Network Organizations, Information Systems, Information, Processes and Products.

Governance

In all phases of a network organization, governance is an essential task (Table 2). As entities usually enter or exit the network organization on a voluntary basis, it is of importance that members of the network can rely on each other in case of any disruptions or failures. "Tightly coupled networks may exhibit lock-in effects that are difficult and costly to untangle", but "[...] participants enter or leave on their own volition" (Grant and Tan 2013). Knowledge sharing, specification of rules, fuzzy agreements, intellectual property rights, control and cooperation are helpful concepts to support governance in network organizations. Fuzzy agreements can be exemplified by the establishment of trust. "Trust is the willingness to take a risk or to accept the vulnerability towards others in an interaction" (Riemer and Klein 2008). Trust is one of the most vital requirements for network organizations. Trust however, is a dynamic concept, which changes over time. Behavior towards an economic partner is a function of subjective trust, risk, experience and the importance of the outcome (Holland and Lockett 1998). Knowledge sharing, as well as shared information systems, are one of the key elements of trust. "Knowledge creation is a social process undertaken by individuals that generally begins with a process of sharing tacit knowledge" (Riemer and Klein 2008). However, it can be stated, that "firms withhold some of the knowledge to avoid the possibility of being replaced" (Trkman and Desouza 2011). The specification of rules within the network organization is an often discussed topic. It can be linked to fuzzy or informal agreements and legal contracts. "Common knowledge [...] defines rules for interaction and processes for social learning" (Miranda and Kavan 2005) and links rules, knowledge sharing and social interactivities. Rules are also needed for the business culture and the working together environment between different members of the network. To be able to retain its core competencies, a member of the network needs to keep its intellectual property rights. Especially, when information is freely shared and distributed among the network, a member could be replaced by another member, if intellectual property rights are mistreated.

Challenge	Source	Sample	Business Continuity concept
Entry and exit to network organizations	Jarvenpaa and Blake 1994	"Success of these organizations will come from the ability to couple to, and decouple from, the network[...]" (Jarvenpaa and Blake 1994)	
Cost	van Liere et al. 2004	"[...]firm to maintain more links with more companies at much lower costs than before" (van Liere et al. 2004)	Balance of benefits and costs (Braun and Martz 2007)
Knowledge sharing	Braun and Martz 2007 Jarvenpaa and Blake 1994	"Knowledge, unlike most resources, increases in value as it is shared." (Jarvenpaa and Blake 1994)	Business continuity coordinator (Nelson 2006)
Specification of rules	Miranda and Kavan 2005	"Common knowledge [...] defines rules for interaction and processes for social learning" (Miranda and Kavan 2005)	Creation of a business continuity process (Braun and Martz 2007)
Fuzzy agreements	Poon and Swatman 1996	"[...] the relationship between members of some networks is based on short term contractual and informal agreement." (Poon and Swatman 1996)	
Intellectual property rights	Miranda and Kavan 2005	"The knowledge and knowing capability' accessible to parties to the [...] relationship." (Miranda and Kavan 2005)	
Control	Riemer and Klein 2008 Trkman and Desouza 2012	"Some firms bring their business partners completely into the design of process, while [...] some firms have strict controls." (Trkman and Desouza 2012)	
Cooperation / Coordination	Kumar et al. 1996	"Coordination consists of protocols, tasks, and decision mechanisms designed to achieve concerted actions between independent units" (Kumar et al. 1996)	
Legal issues	Holland and Lockett 1998 Miranda and Kavan 2005	"[...] no contract can fully cover exigencies that emerge during fulfillment." (Miranda and Kavan 2005)	

Table 2. "Governance" challenges of network organizations and matching business continuity concepts

Actors in Network Organizations

Actors in network organizations and their soft skills on all operational levels, such as top-level managements, as well as operational managements and employees, which do the day-to-day work, are important for the continuity of the network organization (Grant and Tan 2013). Nine subcategories could be identified in this category (Table 3). Decision making, especially within top-level management, a common business culture, adaption, degree of vision, communication, leadership, personal relations, human capital of a company and top management support are the key points mentioned in the literature.

Challenge	Source	Sample	Business Continuity concept
Decision making	Braun and Martz, 2007	"Decisions are based on [...] own point of reference and personal experiences". (Braun and Martz, 2007)"	
Common business culture	Kumar et al 1996	"Cultural integration, which requires people involved to have communication skills and cultural awareness to bridge their differences." (Kumar et al. 1996)	Creating a risk aware culture (Braun and Martz 2007)
Adaptation	Hovorka and Larsen 2006	"[...] increase an organization's agility or capability to sense and respond to predictable or unpredictable events." (Hovorka and Larsen 2006)	
Degree of harmony and vision	Katzy 1998	"[...] open an honest sharing of views, expectations, ethics, and values" (Katzy 1998)	
Communication	Holland and Lockett 1998	"It is clear that telecommunication links are vital to support virtual forms of organizations [...]." (Holland and Lockett 1998)	
Leadership	Janneck and Staar 2010	"[...] inter-organizational networks are typically characterized by a lack of formal hierarchies and roles and have no formal structure of leadership" (Janneck and Staar 2010)	
Personal relations	Janneck and Staar 2010	"[...] personal relations between network members (or representatives of member enterprises, respectively) play a vital role" (Janneck and Staar 2010)	Rewarding network members who identify errors (Braun and Martz 2007) Systems supporting social relationships (Day et al. 2009)
Human capital	Grant and Tan 2013	"[...] understanding the role of human agents in shaping the outcome of IT governance through either resistance of proactive effort or both is essential" (Grant and Tan 2013)	
Top management support	Kumar et al. 1996	"strategic integration, which involves continuing contact among top leaders to discuss broad goals and changes" (Kumar et al. 1996)	Balance of benefits and costs (Braun and Martz 2007) Inclusion of top management (Braun and Martz 2007)

Table 3. "Actors in Network Organizations" challenges of network organizations and matching business continuity concepts

Decision making is an important factor when it comes to an event which requires rash and rapid decisions to keep business running within the network. Hereby, decisions are based on "[...] own point of reference and personal experiences" (Braun and Martz 2007), where individuals adjust their decisions based on their perceived impacts" or on "[...] the perceived risk of uncertain situations" (Braun and Martz 2007).

In addition, a common business culture “promotes cooperation by being open to change and by basing cooperation between business partners on a relationship on trust instead of mutual checks” (Fleisch et al. 2000). A common business culture can be linked to a degree of harmony and vision. The common business culture is essential for employees from different firms working together within inter-organizational teams. There are “two sets of coordination mechanisms: document based-coordination via standards and schedules/plans, and interaction-based coordination via teamwork and mutual adjustment” (Miranda and Kavan 2005). Employees working together can find and improve solutions to deal with a disruptive event. A common business culture also “provides a basis for mutual understanding” (Miranda and Kavan 2005) and communication. Interorganizational teams can contribute their knowledge and experiences from different cultures, environments and companies to deal with disruptive events. Disruptions can be resolved more effectively than in teams of a single organization. Human capital is closely connected to interpersonal networks as well as to decision making and leadership. It is important to have the right people with the right skills and trainings to keep up a continuous business in case of a disruptive event. Human agents are the key factor for the ability of network-organizations to adapt to new opportunities and challenges. Top management support is another important soft skill in network organizations. “Top management participation is necessary for agreement on initialized authority systems and dispute resolution mechanisms” (Miranda and Kavan 2005). Without top management support, a member of the network cannot fully function within the network.

Information Systems

Challenge	Source	Sample	Business Continuity concept
Standardization	Buxmann and Gebauer 1999	"[...] open standards help avoid getting locked into partners" (Buxmann and Gebauer 1999)	Usage of established standards (e.g. EDI) (Poon and Swatman 1996)
Accessibility	Wong et al. 2007	"When the volume of traffic is so high that it is unmanageable, an e-Business may become inaccessible and thus suffer a discontinuity" (Wong et al. 2007)	Clustering of information systems and improving bandwidth (Wong et al. 2007)
Scalability	Wong et al. 2007	"Scalability has been identified in the information systems literature as one of the most prominent risk factors for discontinuity" (Wong et al. 2007)	Clustering of information systems and improving bandwidth (Wong et al. 2007)
Security mechanisms	Trkman and Desouza 2012	"Whenever two or more different organizations share knowledge, the possibility of a security breach arises" (Trkman and Desouza 2012)	Conducting and analyzing routine tests (Braun and Martz 2007)
Safety mechanisms	King 2013	"Backup strategies are a vital component of disaster recovery planning as they can greatly reduce the time for recovery" (King 2013)	Diversification of locations (Braun and Martz 2007)
Infrastructure	Mueller et al. 2013	"[...] flexible integration of technical infrastructure to reach a temporary business goal" (Mueller et al. 2013)	

Table 4. “Information Systems” challenges of network organizations and matching business continuity concepts

"Advanced information and communication systems define the boundaries of these new organizations and serve as their nervous systems" (Jarvenpaa and Blake 1994). Relevant for network organizations are standardization of interfaces and data, accessibility, scalability, security and safety mechanisms as well as infrastructure (Table 4). "Standardization requires less frequent decisions and smaller volume of

communications during a specific period of operations than does planning [...]" (Kumar et al. 1996). In network-organizations, shared IS systems can be directly related to trust. However, "the importance of shared information systems is not recognized" (Holland and Lockett 1998). An example of a shared information system is the Electronic Data Interchange (EDI). Keeping up standardization is an important factor for sustain continuity in business. Ensuring a connection towards the partners within the network is also essential. Without connectivity, communication and coordination among partners would not be possible in case of a disruptive event. Accessibility is an additional key factor, when taking businesses and cloud based services into account. Together with availability and quality of service, information security is highly important for network organization's business goals (King 2013). Recent events, such as the "TEMPORA", "PRISM" or "HEARTBLEED" discovery show the high requirements to protect companies and networks of attackers from outside or even inside the network. Safety includes backup strategies, as well as a fully tested and maintained business continuity plan or disaster recovery plan. The infrastructure of network organizations, i.e. servers, routers, hard drives etc. can be directly linked to safety mechanisms. In comparison to regular businesses, network organizations face additional challenges. Backup strategies need to be adjusted to satisfy requirements from different members. Security mechanisms and infrastructure have to be harmonized to handle complexity and reduce vulnerabilities. Accessibility is also more important within a network then it is for regular businesses.

Information

Challenge	Source	Sample	Business Continuity concept
Information flow	Poon and Swatman, 1996	"Exchange knowledge and information is crucial in today's business world" (Poon and Swatman, 1996)	Establishment of alternative routes and channels (Day et al. 2009)
Equal access to information	Miranda and Kavan 2005	"[...] not all members of a [...] network have equal access to resources within the network; rather, access is a function of one's position - location or status - within a network." (Miranda and Kavan 2005)	Acceptance of incongruent data (Day et al. 2009)

Table 5. "Information" challenges of network organizations and matching business continuity concepts

Without a continuous information flow, organizations relying on information from other partners of the network, are barely able to maintain normal business operations (King 2013). Information flow and equal access to information for all members of the network belong to this category (Table 5).

During extreme events, the information flow has to be kept alive allowing the provision of real-time information. Real-time information becomes especially important in a disruptive event, because outdated information can lead to defective, non-restorable decisions. Quick information flow can be necessary to solve a problem or to provide support to an affected member of the network. This is at least as important for network organizations as it is for regular businesses. With only limited access to information, misinterpretations occur. Within a network-organization equal access to information is an important issue. Unequal knowledge distribution between members of the network can lead to a "short-term, gain-taking mentality" which "can result in opportunistic behavior by one or more participants in the collaboration" (Kumar et al. 1996). This short-term, gain-taking mentality and opportunistic behavior can then escalate into a situation where one member of the network forces the other members to unacceptable behavior. This gain-taking mentality is not that important for regular businesses, as these are not as tightly coupled to other businesses as are businesses within a network.

Process

Challenge	Source	Sample	Business Continuity concept
Transparency	Holland and Lockett 1998	"[...] economic partners with existing knowledge of each other's operation will be able to form virtual organizations much quicker and easier than those who with no or prior knowledge of each other." (Holland and Lockett, 1998)	
Modularization	Fleisch et al. 2000 van Liere et al. 2004	"[...] processes can be quickly and inexpensively establish and conduct a relationship of coordination with corresponding processes." (Fleisch et al. 2000)	

Table 6. "Process" challenges of network organizations and matching business continuity concepts

Transparency and modularization are two core challenges for network organizations (Table 6). Considering different business functions and reusability of similar or identical functions of a process within a network (Fleisch et al. 2000), modularization is an important concept. Transparency of business processes helps companies within the network to quickly and inexpensively adapt, change and improve business processes between different members of the network. Transparency of business processes can help to build trust. In case of a disruptive event, knowledge about the business processes of a network partner can help to limit damage to one's own company as well as to the network. The modularization can, in this case, be helpful to keep other business processes or parts of a business process up and running. "Business networks require modularization of the products, the processes, as well as the value chain of interconnected business partners in order to be effective" (van Liere et al. 2004). It can be stated that modularization of today's networks is one of the factors leading to effectiveness of the network organization.

Product

Challenge	Source	Sample	Business Continuity concept
Modularization	Fleisch et al. 2000 Ranganathan and Lertpittayapoom 2002	"[...] products and services can be altered quickly and inexpensively for specific partners or be integrated into other products" (Fleisch et al. 2000)	
Mass customization	Jarvenpaa and Blake 1994	"The network organization pursues the strategy of mass customization--which combines strategies of differentiation with those of low cost" (Jarvenpaa and Blake 1994)	Support for entering new markets (Nelson 2006)

Table 7. "Product" challenges of network organizations and matching business continuity concepts

The concept of modularization, which has already been highlighted for processes, can also be adapted for products and services (Table 7). In today's globalized markets, companies often exchange, share or co-develop (Ranganathan and Lertpittayapoom 2002) products. In case of a disruptive event, modularization of products reduces the complexity of rerouting the specific production stages. "The network organization pursues the strategy of mass customization--which combines strategies of differentiation with those of low cost" (Jarvenpaa and Blake 1994). To match customers' needs, companies today build products out of modularized intermediate products and material. This helps to give the customer the feeling, that the product they purchase is a customized one, even though it is a customization which gets produced on regular basis. This means, that in case of a disruptive event, this mass customization strategy is helpful, as

only a certain group of customers might be affected. This method however, does apply to regular businesses as well. In Network Organizations, this might be an interesting aspect, as different members of the network might be responsible for different production. However one advantage is that in case one product line is not able to produce anymore, the other product lines still remain intact and only part of the customer base will be affected by a shortage or unavailability of a certain product or service.

Business Continuity in Network Organizations

In this section, the challenges of network organizations are linked to business continuity concepts described in the literature (see Tables 2-7). Future research possibilities are also described.

Given the reviewed literature, it can be stated that the business continuity topic has drawn only little attention in the IS research community. Four papers are based on case studies or quantitative questionnaires in an attempt to understand how business continuity can support businesses in ever-changing environments. Only one paper (Poon and Swatman 1996) addresses network organizations explicitly. This means that most of the concepts described below are developed for single organizations. Nevertheless, concepts introduced for single organizations can be transferred to form lateral or horizontal patterns of exchange as well as shared norms of trustworthy behavior in network organizations.

The establishment of a formal business continuity manager as a coordinator (Nelson 2006) can support network organization to establish a formalized knowledge sharing process. The coordinator has to develop a business continuity management process (Braun and Martz, 2007) in which all tasks of business continuity are covered and shared across the network members. This network's business continuity management process has to be aligned with the business continuity practices of each member organization. Ensuring a sustainable process, the top management of every member as well as of the network itself has to be included in each task, especially if disruptions have occurred (Braun and Martz, 2007). The inclusion of the top management also avoids putting the balance of costs and efforts into question, because benefits of business continuity are hard to calculate (Braun and Martz, 2007). One possible benefit of established business continuity management is the support when entering new markets (Nelson 2006). Failures and disruptions can be identified and handled proactively. The business continuity manager has the responsibility to create a risk aware culture in the network organizations. Concepts like rewarding network members who identify errors (Braun and Martz, 2007) or systems supporting social relationships (Day et al. 2009) can facilitate the cultural change.

For information systems a number of proactive mechanisms can be used to support network organizations during disruptions. Implemented and established standards help to reduce the complexity of information exchange (Poon and Swatman 1996). Clustered systems and improved bandwidth avoid inaccessible and inflexible IS systems (Wong et al. 2007). Fully redundant backup sites should be available in case of disruptions in data centers. Redundant infrastructure in general is an important aspect to keep business running in case of failures and downtimes. Routine tests can examine the security mechanisms of the systems, whereas the diversification of locations ensures the continuity of the network (Braun and Martz, 2007).

Especially during disruptions, flow of information is essential. Sharing too little information can lead to a crisis which could be difficult for one or more members of the network or damage trust. Sharing too much or false information could be used to additionally harm another member of the network. For the affected companies, this could then lead to a loss of market strength and a replacement at the market. If business continuity is required, a first step could be to "identify information flow impediments (i.e. inaccessibility, inconsistent data and information formats, inadequate stream of information, low information priority, source identification difficulty, storage media misalignment, unreliability and unwillingness)" (Day et al 2009). A proactive implementation of alternative routes and channels supports risk identification, assessment, ranking and management, because the likelihood of a breakdown of all routes and channels is lowered. Especially when a quick reaction to a crisis is necessary, incongruent data has to be accepted to provide indications for possible solutions (Day et al. 2009).

Nevertheless, more investigation should be done in the field of the business continuity in network organizations. More business continuity concepts have to be developed explicitly for network organizations. As one example, emergent and evolving behavior in network organizations (e.g. trust establishment, coordination, organizational learning) has a vital role in network organizations (Morisse et al. 2014). Especially during crisis and extreme events, the amount of emergent and evolving behavior

grows. Future research has to include emergent and evolving behavior in business continuity concepts. So far, no accepted business continuity process in network organizations has been found. Based on the idea of a business continuity manager, a shared process across all members has to be developed. It is also an open question, (1) how a coordinator is integrated in the network organization and (2) what control rights the coordinator has as well as (3) how network member can be disciplined. New technologies like social media and cloud computing can support business continuity in network organizations. A good example is cloud computing, allowing the fast restoration of locally corrupted data. Information can be shared faster and via different communication channels, enabling an easier and quicker response to disruptions in the network. A stronger consideration of new technological innovations and their impact on business continuity in network organizations should be given. Visualization concepts supporting business continuity in networks are lacking. The exemplification of oftentimes hidden disruptions and errors fosters a common culture and understanding enabling a quicker response. New members of a network can build up trust more easily and can integrate obligatory business continuity concepts faster. Innovative new concepts such as sociotechnical mapping are necessary to close this research gap.

Business Continuity, however, is not limited to the IS field of research. It might be worthwhile exploring other fields of research, such as business, engineering or disaster management. Nevertheless, Business Continuity is often a practical approach, which has not been considered in this review. For future research, best practices from companies as well as frameworks and standards (e.g. ITIL or ISO standards) should be taken into account as well. This could lead to a fruitful enrichment of practice as well as academic. For further research, it might be also reasonable to analyze business continuity from a more sociotechnical perspective.

Conclusion

As a conclusion we argue based on the literature review that business continuity in network organizations is a necessary task for sustainable networks, but concepts are not researched in detail. In particular, business continuity has drawn only limited attention in the IS community. To address these shortcomings, this paper presents requirements and challenges from network organizations found in literature and establishes a link between these challenges to concepts from business continuity. 23 papers from the eight top journals and proceedings of four conferences were analyzed to localize important requirements and challenges. A whole of 30 requirements were identified and then categorized into six categories. Methods from business continuity can be adopted in business continuity in network organizations. In particular, the establishment of a business continuity coordinator is a promising idea. Nevertheless, not all requirements have a corresponding concept. Although this literature review is limited to the top journals and conferences in the IS research fields, it provides summarization and identification of open research gaps. The research questions, given in the first section, have been answered.

Nevertheless, the literature review was limited to top IS journals and conferences. Other authors and publications, which have already researched this field from a practical or academic perspective, have not been included in this literature review. Therefore, it remains open whether including more journals and conferences as well as best practices from praxis will further enhance the set of challenges as well as adequate business continuity concepts. Synonyms for network organizations and business continuity have not been used for the literature search. Their inclusion might lead to more fruitful and expansive results. The categories and subcategories used in this literature review have been developed in an inductive approach. The categories and subcategories lack theoretical foundation and should be reworked to improve transparency of the research process, reliability, and traceability. Furthermore, the evaluation of the searched literature is based on subjective interpretations.

As a main result, this systematic literature review provides an overview and summarization of business continuity in network organizations. It provides an appropriate step to establish business continuity in network organizations and also, a starting point for future research.

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