



Kent Academic Repository

Papadopoulos, Thanos, Baltas, Konstantinos N. and Balta, Maria Elisavet (2020) *The use of Digital Technologies by Small and Medium Enterprises during COVID-19: implications for theory and practice*. International Journal of Information Management . ISSN 0268-4012.

Downloaded from

<https://kar.kent.ac.uk/82145/> The University of Kent's Academic Repository KAR

The version of record is available from

<https://doi.org/10.1016/j.ijinfomgt.2020.102192>

This document version

Author's Accepted Manuscript

DOI for this version

Licence for this version

CC BY-NC-ND (Attribution-NonCommercial-NoDerivatives)

Additional information

Versions of research works

Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in *Title of Journal*, Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

Enquiries

If you have questions about this document contact ResearchSupport@kent.ac.uk. Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our [Take Down policy](https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies) (available from <https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies>).

The use of Digital Technologies by Small and Medium Enterprises during COVID-19: implications for theory and practice

Abstract

Scholars have highlighted the role of Digital Technologies (DT) in enhancing productivity and performance in Small and Medium Enterprises (SMEs). However, there is limited evidence on the use of DT for dealing with the consequences of extreme events, such as COVID-19. We discuss this gap by (i) outlining potential research avenues and (ii) reflecting on the managerial implications of using DT within SMEs to deal with the repercussions of COVID-19 and securing business continuity.

Keywords: Digital technologies, business continuity, extreme disruptions, pandemic, COVID-19.

1. Introduction

Over the last century, global economies have been faced with recessions, caused by sudden changes in policy, oil prices, or even financial bubbles. In the case of COVID-19, however, scholars and practitioners have been discussing about a new threat, that is, 'global society shock'. If one was to compare the current crisis to the one of 2008, they would notice that the issue does not only relate to challenges related to the supply of the capital, but also on the supply chain and in particular the disruptions on the downstream and upstream of it. This was evident in the China, where factories shut down and the supply of products was diminished, especially with auto parts, components, and clothing. At the same time, lockdowns all over the world and the shutting down of industries such as hospitality, travel, and retail led to the significant closure of businesses all over the world and further disruptions, including the significant increase in unemployment that is expected in the months to come.

Nevertheless, consumers have been better off during the COVID-19 era. This is because spending has decreased because of the decrease in social activities, commuting, and increase in the number of people eating at home. Of course, the impact on the global economy has been tremendous. A report by Eurostat (2020) suggests that within the Eurozone GDP has fallen by 3.8% in the first quarter. This represents the sharpest drop since records were first compiled in 1995, ranging from -4.7% to -5.8% in Italy, Spain and France. The impact of COVID-19 on the US economy has even been more devastating, as it shrunk in the first quarter by 1.2%, its largest decline since the financial crisis (PWC, June 2020). In the UK economy the decline in outputs has been around 2%, although according to a report by the Office for National Statistics (ONS) the monthly GDP estimate declined by 10.4% for March and April 2020; this is the largest fall ever recorded (ONS, 2020).

At the same time governments across the globe are issuing policies and implementing action plans including restrictions (i.e. lockdowns of countries, temporary closure of physical operations of businesses) to prevent the spread of Covid-19 outbreak. Those restrictions have implications for sustainable operations of businesses including reduction of business activities, HR issues related to staffing and supply chain disruptions. Those restrictions have more severe effects on small-medium enterprises (SMEs) than on larger and global firms. In fact, SMEs are most vulnerable since they tend to have a lower capital reserve, fewer assets, and lower levels of productivity than larger firms (OECD, 2020). Moreover, small organisations and their leaders face challenges in times of crisis (Shane, 2011). At the same time, they explore new opportunities due to their size and flexibility (Davidsson, 2015; Shepherd & Williams, 2018) and develop emergent strategies for

sustainable business operations. In UK SMEs businesses in U.K account for 99.3% of all private sector businesses 47.8 per cent of private sector employment and 33.2 per cent of private sector turnover (Federation of Small Business 2014). Thus, SMEs have implications for the wider economies. So far, limited research has focused on the crises that SMEs experience and how the organisational actors interact during crises (Cucculelli and Peruzzi, 2020; Doern et al., 2016; Mayr et al., 2017; Ogawa and Tanaka, 2013). More specifically, existing research has overlooked the identification of appropriate actions and strategies taken by leaders in times of crisis and the effectiveness of those strategies based on the firm's capabilities (Bundy et al., 2017; Kunc and Bhandari, 2011) mainly in the context of SMEs (Appelbaum et al., 2012; Gruber et al., 2015; Randall, 2018).

To deal with the repercussions of extreme events and hence COVID-19, SMEs use, *inter alia*, Digital technologies (DT). These include, for instance, mobile and collaborative technologies and the Internet of thing with next-generation telecommunication networks (e.g., 5G), big-data analytics, artificial intelligence (AI) that uses deep learning, and blockchain technology. DT's digitalise and crosslink the value creation process. There is evidence in the literature that the appropriate strategic adoption of DT can lead to enhanced competitiveness, productivity, and performance (Bruque and Moyano, 2007; Dibrell et al., 2008; Kleis et al., 2011; Chan et al., 2018). At the same time, companies should be able to have the appropriate capabilities, culture, and talent in the organisation to experiment and conceptualise how DT will affect current and future business process and models (Kane et al., 2015). Yet, there is very limited evidence on the use of DT for dealing with the consequences of extreme events, such as COVID-19.

In this paper we discuss and reflect on the deployment of DT by SMEs to secure business continuity, dealing with the ramifications of COVID-19. Section 2 discusses the adoption of DT's from SMEs to deal with extreme disruptions and global societal shocks, such as COVID-19. We then outline potential research avenues and reflect on the managerial implications of using DT within SMEs to deal with the repercussions of COVID-19 and securing business continuity. In the last section our we present our conclusions.

2. Digital Technologies and business continuity during extreme disruptions and COVID-19

Extreme disruptions are events that interrupt the regular flow of goods or services within a system (Blackhurst et al., 2011) such as pandemics. Extreme disruptions have devastating effects for business and supply chain performance (Papadopoulos et al., 2017), and hence SME efficiency, profitability, and survival. Their effects are multiplied and exacerbated as manufacturing, services, and commerce are globally connected (Hughes et al., 2019; Senyo et al., 2019).

Driven by the fact that the safety of SMEs is crucial for the global economy (Storey, 2016), it is important for SMEs to have in place plans for securing business continuity, defined as "identifying and managing the risks which threaten to disrupt essential processes and associated services, mitigating the effects of these risks, and ensuring that recovery of a process or service is achievable without significant disruption to the enterprise"(Gibb and Buchanan, 2006). To this end, SMEs use technology and hence DTs. There are two main schools of thought to business continuity using DTs: firstly, ensuring the DT enabled processes and services are up and running (continuity); and secondly, having in place appropriate mechanisms through support systems that ensure key business processes and staff interactions can be conducted digitally while processes and data are backed up. The first school of thought emphasises that DT directly enables business continuity through the continuous provision of computing infrastructure, differentiating between 'technology-in-normal-use' and 'technology-in-incident'. The second school of thought emphasises that although DTs are at the epicentre of today's organisations (and hence SMEs), it

is people who deal with the challenges of business continuity (Niemimaa, 2015). Both schools aim at helping SMEs stay connected and facilitate their working situation but may have negative effects on user and data privacy (the right to prevent the disclosure of personal information to others) (Vial, 2019). For instance, with the advent of COVID-19 in the UK, organizations had to adapt to use DT by governments' response to COVID-19. But platforms used, for instance, for videoconferencing can allow hosts to analyse their participants' attentiveness in real time, record participants' voice, chats, faces, and their home surroundings.

Despite the significance of using DTs for securing business continuity during extreme disruptions (and hence COVID-19), there is limited or no guidance for SMEs and IS managers on how to prepare organisations for such disruptions. Past contributions are confined in the subfields of security, IT-enabled operations, and IT strategy (Butler & Gray, 2006; Niemimaa, 2015). Furthermore, how could SMEs organise their work based on DTs as a response to possible incidents (and in this case, to COVID-19)?

3. Implications for research and practice

In this section, we outline potential research avenues and reflect on the managerial implications for SMEs that use DTs to deal with the ramifications of COVID -19.

3.1 Implications for research

The deployment of DT by SMEs to secure business continuity requires strategic rethinking of their business processes. It will be important for scholars to understand the implications DT deployment on work, organising, and performance. To assist in this thinking, the socio-technical systems approach (Mumford, 2003; Trist, 1963) has in the past been successful to design manufacturing and service organisation processes. Such an approach (i) perceives systems (and in our case, DT) as systems that interact with the external context through its interdependent subsystems, that is, the social and the technical; and (ii) bridges the gap between the two schools of thought previously mentioned, the one focusing on the relationships between people who deal with challenges in business continuity (social), and the one focusing on the infrastructure (technical). A further development of the socio-technical approach in studying the deployment of DTs would be the sociomateriality turn in DT, which unearths the perception of DT, work, and organizations being separate (Orlikowski and Scott 2008) by (i) accepting that the social and material should not be separated (ibid) or by (ii) arguing on the imbrication of the social and technical, which may be distinct but should be perceived as being mutually interlocked in order to be achieving outcomes effectively (Leonardi 2012, 2013; CecezKecmanovic et al. 2014; Anagnostopoulos et al., 2018). These lenses could help researchers understand the role of DT in developing an ecosystem that encourages entrepreneurial thinking, transforming the challenges of COVID-19 to opportunities for enhancing performance and creating societal impact.

Aligning DT to the SME's business strategy to deal with the ramifications of COVID-19 constitutes another research avenue. In UK, 51% of SMEs consider DT as necessary to ensure their future competitiveness, and two fifth of management view DT as their top priority. Within IT management research strategic IT alignment constitutes an important topic, studied over more than four decades (King 1978; Wu et al. 2015; Sabherwal et al., 2019). There is, however, dissensus regarding the value of strategic IT alignment (Sabherwal et al., 2019): on one hand, scholars argue on the positive influence of strategic IT (and in our case, DT) alignment on firm performance (Gerow et al. 2014); but on the other hand, scholars argue that alignment may lead to stagnation, competitive disadvantage (Tallon and Pinsonneault 2011) and decline in performance (Tallon 2008). DT alignment can be either a 'state of congruence', reflecting whether DT strategy is at par with the overall business strategy, or a capability, reflecting the SMEs' DT investments (Byrd et al.

2006; Preston and Karahanna, 2009; Sabherwal et al., 2019). Therefore, is DT alignment value enhancing? Should SMEs pursue DT alignment during COVID-19? Does a direct link between DT deployment and enhancing performance during COVID-19 exist? Or does DT alignment (as a capability) leverages the DT investments?

Scholars have long studied the role of DT as a capability following the Resource-Based View (RBV) perspective. The RBV argues that an organization's resources can be physical, human, or organizational and valuable, rare, inimitable, and non-substitutable (Barney, 1991). Companies, and hence SMEs, can gain sustainable competitive advantage through DT if they possess these types of resources. However, this link may be very difficult to establish especially in great disruptions, and extreme events, such as COVID-19. To resolve this issue, dynamic capabilities theory (Teece et al., 1997; Teece, 2007; Teece, 2018; Teece et al., 2016) could explain why SMEs adjust their resources to sustain their competitive advantage in a constantly changing context (Eisenhardt and Martin, 2000). Securing a competitive advantage will depend on how the resources can be configured and reconfigured (new configurations of updated ones) to create capabilities (ibid). Therefore, it is through 'sensing', 'seizing' and 'orchestrating' (Teece, 2018) of resources and capabilities that SMEs would need to initiate to secure business continuity in uncertain environments, such as COVID-19.

Finally, it would be fruitful for researchers to use the concept of 'organisational ambidexterity' (O'Reilly and Tushman, 2013) to investigate the deployment of DT by SMEs to deal with COVID-19 issues. Organisational ambidexterity refers to the ability of an organisation to use their resources and capabilities in a way that they can help in managing today's business demands (exploitation orientation) while being ready to adapt to environmental and contextual changes (exploration orientation). Some scholars argue that because of virus outbreak companies should focus only on exploration *or* exploitation (Cao et al., 2009; Gulati and Puranam, 2009) with a particular preference on exploitation; whereas others raise questions with regards to relevance of ambidexterity within the SME literature as it may be easier for larger companies to become ambidextrous given that they have, *inter alia*, greater and more diverse resources (O'Reilly and Tushman, 2013). Indeed, there have been many studies on how large companies become ambidextrous but in terms of SMEs, they are lagging behind (Lubatkin et al., 2006). It is suggested that ambidexterity is a dynamic capability that can help SMEs develop sensing, seizing and transforming activities for SMEs and deal with the COVID-19 issues. But how and why should SMEs concentrate their efforts on either explorative or exploitative activities, rather than on both to survive the ramifications of COVID-19?

3.2 Implications for practice

The challenge of user and data privacy is of utmost importance for managers in all industries. To deal with this challenge, SMEs would need to establish policies for the collection, sharing, and analysis of data. The collection of personal information should be prohibited unless necessary; in this case the absolute minimum of data should be gathered, under the consent of the subject. Within the EU, data policies are governed by the EU General Data Protection Regulation (GDPR) that brings the necessary freedom to organisations to drive all aspects of their business operations. Challenges are also related to the UK leaving the EU at the end of 2020 and in particular the impact on the flow of information and data protection obligations of entities which transfer personal data to the UK (including for instance Northern Ireland). Other examples include the Toronto Declaration referring to data and Artificial Intelligence, as well as the Access Now's recommendations for citizen rights to data privacy following COVID-19.

At the SME level, appropriate systems and support staff should be in place to ensure that infrastructure is always available, ensuring smooth operation of all business operations (within the

digital platforms of the SMEs used). Post-COVID-19, SMEs would need to (re-) think on how to revitalise their strategies incorporating crises scenarios and business continuity plans while looking at increasing revenues using alternative/additional sale channels. Maintaining customers virtually is not an easy task as the provision of a substandard service will harm the companies irreversibly.

Due to Covid-19 organisations face numerous challenges and uncertainties therefore, organisational actors will have to develop multiple scenarios for future strategic actions. Scenario building apart from providing managers with awareness on their different strategic choices according to their capabilities and mission purpose goals; scenarios considered as tools to trigger and accelerate process of organisational learning. In the current situation, businesses review their purpose in the society and adopt a stakeholder approach where their role is to assist those that they have been affected and their families. Hence, SMEs need to take a proactive, integrated approach that will improve the everyday life of the local, national and global communities. In the era of pandemic crises, organisation leaders are asked to take complex decisions and adopt

The use of DT in extreme disruptions may help people stay connected and facilitate their smart working situation but may also be related to potential infringements of stakeholder privacy (the right to prevent the disclosure of personal information to others) (Flyverbom et al., 2019; Vial et al., 2019). 30% of UK SMEs and 13% of Irish SMEs highlight IT security and privacy as potential issues when it comes to DT deployment. Practitioners, hence, should investigate how DT changes the SMEs' modes of working and what the implications of this change for user and data privacy are. Lessons derived using DT by SMEs to support business continuity during COVID-19 need to be sought by practitioners and managers.

4. Conclusions

In this paper we set off to understand the implications of the use of DT for securing business continuity during extreme disruptions and global society shocks. We argued towards the use of a socio-technical approach by SMEs when it comes to their DT strategies to deal challenges related to their organisation of work based on DTs as a response to COVID-19 while maintaining their activities. We also provided the implications of the use of DT for practice. We hope that our reflections will constitute food for thought for scholars and practitioners to further explore the use of DT in SMEs to secure business continuity during COVID-19.

References

- Anagnostopoulos, D., Papadopoulos, T., Stamati, T., and Balta, M.E. (2018). Policy and Information Systems Implementation: the Greek Property Tax Information System Case. *Information Systems Frontiers*, <https://doi.org/10.1007/s10796-018-9887-y>
- Appelbaum, S.H., Keller, S., Alvarez, H. and Bédard, C. (2012). Organizational crisis: lessons from Lehman Brothers and Paulson & Company. *International Journal of Commerce and Management* 22(4), 286-305.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management* 17(1), 99-120.
- Blackhurst, J., Dunn, K. S., and Craighead, C. W. (2011). An Empirically Derived Framework of Global Supply Resiliency. *Journal of Business Logistics* 32(4), 374-391.

- Bruque, S., and Moyano, J. (2007). Organisational determinants of information technology adoption and implementation in SMEs: The case of family and cooperative firms. *Technovation* 27(5), 241-253.
- Bundy, J., Pfarrer, M. D., Short, C. E., and Coombs, T. (2017). Crises and Crisis Management: Integration, Interpretation, and Research Development. *Journal of Management* 43(6), 1661-1692.
- Butler, B. S., and Gray, P. H. (2006). Reliability, mindfulness, and information systems. *MIS Quarterly* 30(2), 211-224
- Byrd, T. A., Lewis, B. R., and Bryan, R. W. (2006). The Leveraging Influence of Strategic Alignment on IT Investment: An Empirical Examination. *Information & Management* 43(3), 308-321.
- Cecez-Kecmanovic, Galliers, R. D., Henfridsson, O., Newell, S., and Vidgen, R. (2014). The Sociomateriality of Information Systems: Current Status, Future Directions. *MIS Quarterly* 38(3), 809-830.
- Chan, C. M. L., Teoh, S. Y., Yeow, A., and Pan, G. (2018). Agility in responding to disruptive digital innovation: Case study of an SME. *Information Systems Journal* 29(2), 436-455.
- Cucculelli, M., and Peruzzi, V. (2020). Innovation over the industry life-cycle. Does ownership matter? *Research Policy* 49(1), 103878
- Davidsson, P. (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A reconceptualization. *Journal of Business Venturing* 30(5), 674-695.
- Dibrell, C., Davis, P. S., and Craig, J. (2008). Fueling Innovation through Information Technology in SMEs. *Journal of Small Business Management* 46(2), 203-218.
- Doern, R., Williams, N., and Vorley, T. (2016). Entrepreneurship and crises: business as usual? *Entrepreneurship & Regional Development* 258(5-6), 471-475.
- Eisenhardt, K. M., and Martin, J. A. (2000). Dynamic Capabilities: What Are They? *Strategic Management Journal* 21(10-11), 1105-1121.
- Eurostat (2020). Eurostat news release. April 2020. Available at: <https://ec.europa.eu/eurostat/documents/2995521/10294708/2-30042020-BP-EN.pdf/526405c5-289c-30f5-068a-d907b7d663e6> (Accessed: 18-06-2020)
- Federation of Small Business, 2014. Small Business Statistics, [online]. Available from: <http://www.fsb.org.uk/stats> [Accessed on 19-06-2020].
- Flyverbom, M., Deibert, D., and Matten, D. (2019). The Governance of Digital Technology, Big Data, and the Internet: New Roles and Responsibilities for Business. *Business and Society* 58(1), 3-19.
- Gedajlovic, Q., E., Zhang, H. (2009). Unpacking organizational ambidexterity: dimensions, contingencies, and synergistic effects. *Organization Science* 20(4), 781-796.
- Gibb, F., and Buchanan, S. (2006). A framework for business continuity management. *International Journal of Information Management* 26(2), 128-141.
- Gerow, J. E., Grover, V., Thatcher, J., and Roth, P. L. (2014). Looking Toward the Future of IT-Business Strategic Alignment through the Past: A Meta-Analysis. *MIS Quarterly* 38(4), 1059-1085.

- Gulati, R., and Puranam, P. (2009). Renewal through reorganization: the value of inconsistencies between formal and informal organization. *Organization Science* 20(2), 422-440.
- Gruber, M., Kim, S. M., and Brinckmann, J. (2015). What is an Attractive Business Opportunity? An Empirical Study of Opportunity Evaluation Decisions by Technologists, Managers, and Entrepreneurs. *Strategic Entrepreneurship Journal* 9(3), 205-225.
- Hughes, L., Dwivendi, Y. K., Mishra, S. K., Rana, N. P., Raghavan, V., and Akella, V. (2019). Blockchain research, practice and policy: Applications, benefits, limitations, emerging research themes and research agenda. *International Journal of Information Management* 49, 114-129.
- Kane, G. C., Palmer, D., Philips, A N., Kiron D., and Buckley, N. (2015). Strategy, not technology, drives digital transformation: Becoming a Digitally Mature Enterprise. *MIT Sloan Management Review (Special Report on digital business)*.
- King, W. R. (1978). Strategic Planning for Management Information Systems. *MIS Quarterly* 2(1), 27-37.
- Kleis, L., Chwelos, P., Ramirez, R. V., and Cockburn, I. (2011). Information Technology and Intangible Output: The Impact of IT Investment on Innovation Productivity. *Information Systems Research* 23(1), 42-59.
- Kunc, M., and Bhandari, R. (2011) Strategic development processes during economic and financial crisis. *Management Decision* 49(8), 1343-1353.
- Leonardi, P. 2012. "Materiality, Sociomateriality, and Socio-Technical Systems: What Do These Terms Mean? How Are They Different?," in *Materiality and Organizing: Social Interaction in a Technological World*, P. M. Leonardi, B. A. Nardi, and J. Kallinikos (Eds.), Oxford, UK: Oxford University Press, 25-48.
- Leonardi, P. 2013. Theoretical Foundations for the Study of Sociomateriality. *Information and Organization* 23, 59-76.
- Mayr, S., Mitter, C., and Aichmayr, A. (2017). Corporate Crisis and Sustainable Reorganization: Evidence from Bankrupt Austrian SMEs. *Journal of Small Business Management* 55(1), 108-127.
- Mumford, E. (2003). *Redesigning Human Systems*. Hershey, PA: Information Science Publishing.
- Niemimaa, M. (2015). Interdisciplinary Review of Business Continuity from an Information Systems Perspective: Toward an Integrative Framework. *Communications of the Association for Information Systems* 37(4). Available at: <http://aisel.aisnet.org/cais/vol37/iss1/4>
- OECD (2020). Coronavirus (COVID-19). SME Policy responses. Available at: https://read.oecd-ilibrary.org/view/?ref=119_119680-di6h3qgi4x&title=Covid-19_SME_Policy_Responses (Accessed 15-06-2020).
- Ogawa, K., and Tanaka, T. (2013). The global financial crisis and small- and medium-sized enterprises in Japan: how did they cope with the crisis? *Small Business Economics* 41, 401-417.
- Office for National Statistics (ONS) (2020). GDP monthly estimate, UK: April 2020. Available at: <https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpmonthlyestimateuk/april2020> (Accessed 15-06-2020).
- O'Reilly, C. A., Tushman, M. L. (2013). Organizational ambidexterity: past, present, and future. *Academy of Management perspectives* 27(4), 324-338.

- Orlikowski, W. J., and Scott, S. V. (2008) Sociomateriality: Challenging the Separation of Technology, Work and Organization. *The Academy of Management Annals* 2(1), 433-474,
- Papadopoulos, T., Gunasekaran, A., Dubey, R., Altay, N., Childe, S., and Fosso-Wamba, S. 2017. "The role of Big Data in explaining disaster resilience for sustainability." *Journal of Cleaner Production*, 142, 1108-1118
- Preston, D. S., and Karahanna, E. (2009). Antecedents of IS Strategic Alignment: A Nomological Network, *Information Systems Research* 20(2), 159-179.
- PWC (2020). COVID-19. UK Economic Update. Available at: <https://www.pwc.co.uk/premium/covid-19/uk-economic-update-covid-19.pdf> (Accessed 15-06-2020)
- Randall, W. (2018). Leadership, strategy, and management. A qualitative study of crisis survival. Unpublished PhD Thesis. Capella University.
- Sabherwal, R., Sabherwal, S., Havakhor, T., and Steelman, Z. (2019). How does strategic alignment affect firm performance? the roles of information technology investment and environmental uncertainty. *MIS Quarterly* 43(2), 453-474.
- Senyo, P. K., Liu, K., and Effah, J. (2019). Digital business ecosystem: Literature review and a framework for future research. *International Journal of Information Management* 47, 52-64.
- Shane, S. (2011). The great recession's effect on entrepreneurship. Economic commentary. Available at: <https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/economic-commentary-archives/2011-economic-commentaries/ec-201104-the-great-recessions-effect-on-entrepreneurship.aspx> (accessed 18-06-2020)
- Shepherd, D. A., & Williams, T. A. (2018). *Spontaneous venturing: An entrepreneurial approach to alleviating suffering in the aftermath of a disaster*. MIT Press.
- Storey, D. J. (2016). *Understanding the small business sector. Routledge library editions: small business*. Routledge: Milton Park, Abingdon, Oxon.
- Tallon, P. P. (2008). Inside the Adaptive Enterprise: An Information Technology Capabilities Perspective on Business Process Agility. *Information Technology and Management* 9(1), 21-36.
- Tallon, P. P., and Pinsonneault, A. (2011). Competing Perspectives on the Link between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model. *MIS Quarterly* 35(2), 463-484.
- Teece, D. J., Pisano, G., and Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal* 18(7), 509-533.
- Teece, D. (2007). Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal* 28(13), 1319-1350.
- Teece, D. (2018). Business models and dynamic capabilities. *Long Range Planning* 51(1), 40-49.
- Teece, D., Peteraf, M., and Leih, S. (2016). Dynamic capabilities and organizational agility: risk, uncertainty, and strategy in the innovation economy. *California Management Review* 58(4), 13-35
- Trist, E. L. (1963). *Organizational choice: capabilities of groups at the coal face under changing technologies: The loss, re-discovery & transformation of a work tradition*. London: Tavistock Publications.

- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems* 28(2), 118-144.
- Wu, S. P., Straub, D. W., and Liang, T. (2015). How Information Technology Governance Mechanisms and Strategic Alignment Influence Organizational Performance: Insights from a Matched Survey of Business and IT Managers. *MIS Quarterly* 39 (2), 497-518.