Innovative Technologies and Small-Medium Sized Enterprises in Times of Crisis

Nisreen Ameen1 · Jyoti Choudrie2 · Paul Jones3 · Amitabh Anand4,5

Published online: 9 November 2022
© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022.

1 Introduction

Small and medium size enterprises (SMEs) are often affected by various micro and macro level changes, including geo-political matters around them. COVID-19, a geo-political global pandemic, has brought unprecedented challenges to these businesses, in terms of employment, finances, risks and a shift in consumer behaviour and preferences (Simms et al., 2022). For example, a study conducted by the Bank of England, in which data was collected from two million SMEs based in the United Kingdom showed that COVID-19 and the public health interventions coincided with a 30-percentage point reduction in turnover growth for the average SME (Bank of England, 2021). Businesses and industries of all sizes have been severely impacted due to COVID-19 and are struggling to remain sustainable. Furthermore, the combined impact of Brexit, COVID-19 and the Ukrainian war has severely affected the European SME community. In response to this crisis, SMEs in different industries have utilised various possible resources to survive, including the use of different types of innovative technologies such as new types of mobile applications, virtual reality, artificial intelligence, big data and blockchain (Ameen & Willis, 2016; Soni et al., 2021). The use of these innovative technologies to help SMEs survive the unprecedented situation of COVID-19 is a complex phenomenon (Priyono et al., 2020).

At the onset of our call for the special issue, we were driven by the observation that despite that the existing literature is rich with studies on how SMEs use technology in various situations, the focus on the use of the latest technologies by SMEs in a time of a global health crisis remained limited. Hence, in this special issue, our team of Guest Editors attempted to understand how innovative technologies can be effectively utilised in various areas of the business in the context of SMEs and entrepreneurship in response to COVID-19. At the time of writing this editorial, many SMEs are focusing on post-COVID recovery by continuing to utilise the latest technologies for innovation in various areas for example, marketing, supply chain, accounting and human resources. In this editorial, we suggest areas for future research on SMEs’ use of innovative technologies during and post times of global crisis followed by an overview of the papers accepted in this special issue.

2 Opportunities for Future Research

While we believe this special issue has advanced research on SMEs’ use of innovative cutting-edge technologies in time of crisis, there are many open problems that are yet to be tackled in future research. We next highlight a few of them. Table 1 provides a list of our proposed questions for future research.

2.1 Enabling Resilience and Preparedness for Future Crisis

While research on SMEs’ use of technology during the pandemic has been growing rapidly recently, we believe more research is needed on how SMEs can prepare for sudden and unexpected changes or global crisis. The COVID-19 pandemic has shown that preparedness and resilience are key for SMEs success (Ozanne et al., 2022). However, true resilience helps organisations not just bounce back, but bounce forward. Future studies can explore how SMEs can develop resilience and preparedness through using innovative technologies and flexible business models. For example, future research can explore how SMEs go through the process of
selecting the right technology and develop the right attitude for it. In addition, SMEs can leverage big data; Internet of Things, artificial intelligence and digital twins for resilience in times of crisis (Giotopoulos et al., 2022). However, the challenge for SMEs is developing the right data strategy across the business, as well as standardising and sharing open data. Furthermore, there is a need for a better understanding of flexible SMEs business models and how data and digital technologies can enable these models to be better prepared for possible future crisis.

2.2 New Technologies, New Challenges

While the emergence of new technologies brings various benefits and challenges to businesses, SMEs are often faced with more challenges due to uncertainty and the general lack of resources (Ameen & Willis, 2016). Our special issue included papers focusing on the use of various technologies such as artificial intelligence, big data, blockchain and smart technologies among SMEs in times of crisis. Future studies can explore how SMEs can use these technologies effectively post the pandemic. Furthermore, the world is witnessing the emergence of new and promising technologies such as artificial intelligence, Metaverse, virtual influencers; and mixed and extended reality (Ameen et al., 2021b, 2022b; Koles et al., 2022). These technologies are expected to have a major impact on SMEs and the society. Future studies should explore the potential advantages and challenges associated with these technologies for SMEs in various industries and sectors. SMEs’ ability to embrace technological innovations will determine their likelihood of survival and future success.

2.3 Technology for Connecting with Customers in a Post COVID World

The pandemic has caused major changes to consumers behaviour and how they interact with technology and brands (Ameen et al., 2021a). For example, job losses and major health concerns during the pandemic led consumers to use various technologies when shopping for products and services offered by SMEs in different industries (Donthu & Gustafsson, 2020). While most of the pandemic restrictions have been lifted in 2022 in most countries, the effects of this major exogenous shock on consumer behaviour, specifically the young generation of consumers (Generation Z), and interactions with SMEs are expected to last for a long time (Ameen et al., 2022a; Miklian & Hoelscher, 2022). In addition, customers’ expectations of businesses have changed amid the pandemic. Customers expect firms, including SMEs, to act responsibly when offering technologies as part of the customer journey (Thukral & Ratten, 2021). Hence, future studies should explore novel ways for SMEs utilising technology to connect with customers in a post COVID world. For example, future studies can explore how SMEs, given their limited resources and capabilities, can ensure customers’ data security and privacy. This is a major challenge given the sharp increase in the number of cybersecurity attacks targeting SMEs since the beginning of the pandemic (Drydakis, 2022). Furthermore, SMEs are

| Table 1 Proposed questions for future research |
|-----------------------------------------------|
| **Enabling resilience and preparedness for future crisis** |
| • How can SMEs be better prepared for sudden and unexpected changes or global crisis? |
| • How can SMEs develop resilience and preparedness through using innovative technologies and flexible business models? |
| • What is the process SMEs go through when selecting the right technology and developing the right attitude for it? And what is the impact of this selection on business sustainability? |
| • How can data and digital technologies enable flexible business models to be better prepared for possible future crisis? |
| • What mechanisms should businesses adopt for survival in times of global crisis such as global pandemics, wars and Brexit? |
| **New technologies, new challenges** |
| • How can SMEs utilise new and promising technologies such as artificial intelligence, Metaverse, virtual influencers; and mixed and extended reality in various business areas? |
| • What are the main challenges associated with these technologies and how can businesses overcome them or minimise their impact? |
| • What are the potential advantages and challenges associated with these technologies for SMEs in various industries and sectors? |
| • What is the impact of SMEs speed in adopting new innovative technologies in some markets on SMEs in other markets with limited access to such technologies? |
| **Technology for connecting with customers in a post COVID world** |
| • What are the main effects of major exogenous shocks on consumer behaviour and interactions with innovative technologies and SMEs? |
| • How can SMEs utilise new innovative technologies to connect with customers in a post COVID world? |
| • How can SMEs ensure customers’ data security and privacy during their interactions with cutting-edge technologies? |
| • What are the implications of Generation Z consumers increased interests in using innovative technologies and shopping on SMEs’ processes and strategies? |
| **Young SME owners’ decision making of technology utilisation** |
| • How does the behaviour of Generation Z SME owners compare to earlier generations? And how does it impact SMEs performance and sustainability? |
| • What is the impact of Generation Z entrepreneurs characteristics on their leadership style and in turn, the success of SMEs? |
| • How do how young SME owners make decisions about technology in times of crisis? |
| • What is the impact of major economic crisis on Generation Z SME owners’ resilience? And how does this affect SMEs performance? |
increasingly offering chatbots to interact with their customers at various stages of the customer journey (Selamat & Windasari, 2021). However, ensuring the success of the interactions between customers and chatbots remains a challenge equally for SMEs as chatbot developers. Future studies can explore these areas.

2.4 Young SME Owners’ Decision Making of Technology Utilisation

The number of Generation Z entrepreneurs starting SMEs is increasing rapidly worldwide (Parker, 2022). This generation of entrepreneurs views the world differently and it has unique characteristics (Shah, 2022). This generation is classified as ‘Tech Native’ as members of this generation were born with technology (Ameen et al., 2022a). While they are more innovative than earlier generations, they are also more financially focused and risk averse (Collage Group, 2018). Future studies should explore characteristics of Generation Z entrepreneurs on their leadership style and the success of SMEs. In addition, future studies should explore how young SME owners make decisions about technology in times of crisis. Future studies can also explore how this segment of entrepreneurs use various technologies to achieve business and non-business-related goals. Also, future studies should explore the key lessons this generation of entrepreneurs has learned from the pandemic and how it impacted their behaviour and business strategy. Furthermore, in this time of economic crisis entrepreneurs’ resilience is critical. Business failure rates are likely to increase significantly in businesses which are energy intensive. Hence, future studies should explore how governments can effectively support such entrepreneurs either to maintain their existing businesses or to restart when economic conditions allow. Further research is required to explore this dynamic.

3 Papers in this Special Issue

As Guest Editors of the special issue ‘Innovative Technologies and Small-Medium Sized Enterprises in Times of Crisis’, we invited authors to submit papers on a range of topics within the theme of the special issue. We then organised a workshop hosted by the UK Academy of Information Systems (UKAIS) for authors with accepted abstracts where the work was discussed, and feedback was provided by all Guest Editors. This special issue comprises a total of eleven papers which focus on a vast range of topics within the context of our theme.

Some studies focused on how SMEs can leverage Information Communication Technologies (ICTs) in general to survive during the time of the COVID-19 crisis. Wendt et al. (2022) draw on the technology-organisation-environment framework and technology-affordances- and-constraints theory to investigate the adoption of ICTs as a crisis response strategy in ten SMEs in German business events (e.g., corporate events, conferences) industry. The authors found that introducing readily available ICTs (e.g., video-conferencing) has significant potential in addressing physical distancing in the short and medium term, while more sophisticated ICTs (e.g., virtual reality) are more likely to gain importance in the long term. Alraja et al. (2022) propose a holistic framework of sustainable performance by interrelating factors showing robust associations for achieving sustainable performance in SMEs. The authors found that green practices such as green training, green performance appraisal can lead to sustainable performance. Ameen et al. (2022c) draw on the 5 M model to investigate how mobile applications can support women entrepreneurs running SMEs in a developing country. The findings show that mobile applications provided these entrepreneurs innovative ways to overcome many of the economic and non-economic challenges they face in relation to running a business.

A few papers focused on how SMEs can successfully utilise blockchain technology in times of crisis. Sengupta et al. (2022) show how forms can help unorganised supply chains with economically disadvantaged suppliers by carefully redesigning the supply chain through the integration of satellite imagery and blockchain technology. With COVID-19 in the backdrop, the authors highlight how such technologies significantly improve supply chain resilience and at the same time contribute to income generation opportunities for poor fisher folks in developing nations. Jain et al. (2022) explore the role of blockchain technology in building a trustworthy yet collaborative environment in SME clusters through the principles of community self-governance. The authors developed a blockchain commons governance framework for the three main dimensions i.e., interaction, autonomy, and control.

Some of the papers in this special issue explored how SMEs can utilise big data analytics in times of crisis. Zamani et al. (2022) explore if and how business analytics can support the adaptation or innovation of SMEs’ business models within the context of extreme time pressure and turbulence. The results indicate that a start-up can leverage descriptive, mining, predictive and prescriptive analytics for addressing and responding to exogenous shocks and renewing its business model. However, the results also show that the effects of applying each type of analytics are different. Song et al. (2022) found that COVID-19 has positive moderating effects on the relationship between big data analytics management capability and value attributes of business models.

Given the significant challenges associated with the impact of COVID-19 on the sharing economy, Papagiannidis and Davlembayeva (2022) study consumers’ intention to stay in smart accommodations. The authors found that...
the integration of smart home technologies offers control over the stay experience, improves the entertainment experience, aesthetics and playfulness of using this technology. The study informed SMEs in the accommodation sharing sector about the positive implications of the use of smart home devices for driving customer demand. Serman and Sims (2022) explored the effects of blogs posted by SMEs in the hospitality sector to counter the detrimental effect of pandemic lockdowns. The authors found that trust and reputation have significant effects on credibility of posts shared by SMEs in the hospitality sector. In addition, the factor ‘unverified information sharing’ mediates the relationship between credibility and loyalty. Onjewu et al. (2022) examine the effects of e-commerce on resilience, direct exports and indirect exports among small manufacturing firms in Italy. The results showed that while e-commerce has a positive impact on direct exports, a negative influence is recorded on indirect exports. In addition, the authors found that e-commerce significantly increases resilience which, in turn, accelerates direct exports. However, resilience is found to have a trivial influence on indirect exporting. Furthermore, held as a constant, firm size had a significant and positive effect on direct and indirect exports.

Finally, Drydakis (2022) utilised the International Labor Organization’s SMEs COVID-19 pandemic business risks scale to determine whether artificial intelligence applications are associated with reduced business risks for SMEs. The study showed that artificial intelligence-enabled applications used for targeting consumers online, offer cash flow forecasting and they facilitate human resource activities which are associated with reduced business risks caused by the COVID-19 pandemic for SMEs. The study indicates that artificial intelligence enables SMEs to boost their dynamic capabilities by leveraging technology to meet new types of demand, move at speed to pivot business operations, boost efficiency and thus, reduce their business risks.

With this special issue, we hope that more researchers will find new avenues for interdisciplinary research combining the fields of Information Systems, entrepreneurship and marketing. We look forward to seeing a community working together to further knowledge discovery in this field.

Acknowledgements We sincerely thank the authors who submitted their abstracts to our workshop hosted by the UK Academy of Information Systems (UKAIS) and to this special issue. We also thank the UKAIS for supporting the workshop and for making it successful, and all the reviewers for this special issue for their time and efforts.

References

Alraja, M.N., Imran, R., Khashab, B.M. & Shah, M. (2022). Technological innovation, sustainable green practices and SMEs sustainable performance in times of crisis (COVID-19 pandemic). Information Systems Frontiers, 24(4). https://doi.org/10.1007/s10796-022-10250-z.

Ameen, N. A., & Willis, R. (2016). The use of mobile phones to support women’s entrepreneurship in the Arab countries. International Journal of Gender and Entrepreneurship, 8(4), 424–445. https://doi.org/10.1108/IJGE-10-2015-0037

Ameen, N., Hosany, S., & Tarhini, A. (2021b). Consumer interaction with cutting-edge technologies: Implications for future research. Computers in Human Behavior, 120, 106761. https://doi.org/10.1016/j.chb.2021.106761

Ameen, N., Cheah, J. H., & Kumar, S. (2022a). It’s all part of the customer journey: The impact of augmented reality, chatbots, and social media on the body image and self-esteem of Generation Z female consumers. Psychology & Marketing. https://doi.org/10.1002/mar.21715

Ameen, N., Sharma, G. D., Tarba, S., Rao, A., & Chopra, R. (2022c). Toward advancing theory on creativity in marketing and artificial intelligence. Psychology & Marketing. https://doi.org/10.1002/mar.21699

Ameen, N. Choudrie, J., Jones, P. & Anand, A. (2021a). Innovative Technologies and Small-Medium Sized Enterprises in Times of Crisis. Information Systems Frontiers. https://www.springer.com/journal/10796/updates/17599574. Accessed 2 October 2022.

Ameen, N., Madiche, N.O. & Anand, A. (2022). Between handholding and hand-held devices: Marketing through smartphone innovation and women’s entrepreneurship in post conflict economies in times of crisis. Information Systems Frontiers, 24(4). https://doi.org/10.1007/s10796-021-10198-6.

Bank of England (2021). Impacts of the Covid-19 crisis: evidence from 2 million UK SMEs. https://www.bankofengland.co.uk/working-paper/2021/impacts-of-the-covid-19-crisis-evidence-from-2-millions-uk-smes. Accessed 2 October 2022.

Collage Group (2018). Risk averse but tech savvy Gen Zs pose major challenge to financial institutions. https://www.collagegroup.com/2018/11/05/risk-averse-tech-savvy-gen-zs-pose-major-challenge-financial-institutions/. Accessed 2 October 2022.

Donthu, N. & Gustafsson, A. (2020). Effects of COVID-19 on business and research. Journal of Business Research, 117, 284–289. https://doi.org/10.1016/j.jbusres.2020.06.008

Drydakis, N. (2022). Artificial Intelligence and reduced SMEs’ business risks. A dynamic capabilities analysis during the COVID-19 pandemic. Information Systems Frontiers, 24(4). https://doi.org/10.1007/s10796-022-10249-6.

Giotopoulos, I., Kontolaimou, A., & Tsakanikas, A. (2022). Digital responses of SMEs to the COVID-19 crisis. International Journal of Entrepreneurial Behavior & Research. https://doi.org/10.1108/IEBJR-11-2021-0924

Jain, G., Shirivastava, A., Paul, J. & Batra, R. (2022). Blockchain for SME Clusters: An idea using the framework of Ostrom Commons Governance. Information Systems Frontiers, 24(4). . https://doi.org/10.1007/s10796-022-10288-z.

Koles, B., Audretz, A., Ameen, N. Mckenna, B., & Guidry Moulard, J. (2022). Virtual Influencers: A new frontier in interdisciplinary research. https://www.journals.elsevier.com/journal-of-business-research/call-for-papers/virtual-influencers-a-new-frontier-in-interdisciplinary-research. Accessed 2 October 2022.

Milikan, J., & Hoelscher, K. (2022). SMEs and exogenous shocks: A conceptual literature review and forward research agenda. International Small Business Journal, 40(2), 178–204. https://doi.org/10.1177/02662422211050796

Onjewu, E., Hussain, S. & Haddoud, M. (2022). The Interplay of E-commerce, Resilience and Exports in the Context of COVID-19. https://doi.org/10.1007/s10796-022-10342-w.

Ozanne, L. K., Chowdhury, M., Prayag, G., & Mollenkopf, D. A. (2022). SMEs navigating COVID-19: The influence of social capital and dynamic capabilities on organizational resilience.
**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Dr. Nisreen Ameen** is a Senior Lecturer in Digital Marketing at Royal Holloway, University of London and the Co-Director of the Digital Organisation and Society research centre. Nisreen is also currently serving as Vice President of the UK Academy of Information Systems (UKAIS). She is an Associate Editor for Information Technology and People, Computers in Human Behavior and the International Journal of Consumer Studies. Nisreen has also served as a Guest Editor for special issues in various top-ranked journals such as: Information Systems Frontiers, Computers in Human Behavior, Psychology and Marketing, Industrial Marketing Management, Journal of Business Research, The Service Industries Journal and International Journal of Consumer Studies. She is also a Guest Associate Editor for a special issue in Information Systems Journal. Nisreen’s research focuses on two main themes: first, consumer interactions with new-age technologies; and second, how organisations can use these technologies to provide better experiences, services and products. Within these main themes, her research interests include digital marketing and entrepreneurship, human-computer interaction consumer behaviour, and organisational use of consumer data. She also focuses on cross-national and cross-cultural research in developing, emerging and developed markets. She has expertise in qualitative and quantitative methods of data analysis; in particular, survey and experimental research. The multivariate modelling techniques she has used include Partial Least Squares-Structural Equation Modelling (PLS-SEM), scale development and scale validation, structural equation modelling (SEM), multiple regression, multivariate analysis of variance (MANOVA), and testing for mediation and moderation. Her research has been published in high-ranking journals such as British Journal of Management; International Journal of Entrepreneurial Behavior and Research; Psychology and Marketing; Information Technology and People; Information Systems Frontiers; Computers in Human Behavior; Information Systems Management; Information Technology for Development; the British Journal of Educational Technology; and the International Journal of Gender and Entrepreneurship.

**Professor Jyoti Choudrie** holds the position of Professor of Information Systems at University of Hertfordshire. She has extensive years’ experience specialising in investigating the social inclusion and adoption of Information and Communications Technologies on society’s ‘marginal groups’, the adoption, use and diffusion of innovative Information and Communication Technologies in Small to Medium Size Enterprises and large organizations. This is based upon the principles and mechanisms of variables taken from the theories of diffusion, adoption, usage and implementation in the social, organisational and government realms and how they can be brought to fruition using modern internet-related technologies; for instance, Broadband, Smartphones and online social networks to guide and improve individuals’ experiences of modern technology. This was achieved due to sponsored research funding schemes-Royal Academy of Engineering, Microsoft and Knowledge Transfer Partnerships and consultancy projects with organizations such as, British Telecom and AoL. To ensure that her expertise remains in the area, she has written for established journals such as, European Journal of Information Systems, Journal of Information Technology, and Journal of Business Research. She has published over 100 peer reviewed papers, commented in trade magazines such as, Computing and Computer Weekly and newspapers, Times Online, Guardian. She has been invited to comment on the radio about the issues of broadband adoption, the digital divide and policies and the impacts of technology on older adults.
Professor Paul Jones is Professor of Entrepreneurship and Innovation at the School of Management at Swansea University, UK. Professor Jones has worked in further and higher education for over 27 years at Carmarthenshire College, Glamorgan University (now University of South Wales), Plymouth University, Coventry University before joining Swansea University in 2018. He has published his work in leading international journals such as Entrepreneurship and Regional Development, Journal of Small Business Management, International Small Business Journal, Omega and the Journal of Business Research. Professor Jones is currently Editor in Chief of the International Journal of Entrepreneurial Behavior and Research and Associate Editor of the International Journal of Management Education. He is also Series Editor of Emerald Book Series Contemporary Issues in Entrepreneurship Research. Professor Jones has previously completed 18 special issues with Journals such as Information Technology and People, Management Decision and Journal of Small Business and Enterprise Development. He sits on the board of trustees for the Institute of Higher Education and is a Senior Fellow of the Higher Education Academy.

Dr Amitabh Anand is Associate Professor at Excelia Business School, La Rochelle, France. His research focuses primarily on organization studies, entrepreneurship, and international management. He has won several scholarships and awards for his research and peer review. His works have been published in Journal of Business Venturing, Information Systems Frontiers, Journal of Knowledge Management, Computers in Human Behaviour, Management International and Journal of Change Management. He is also an editorial board member of Management Decision, International Journal of Entrepreneurial Behaviour and Research and Journal of Entrepreneurship in Emerging Economies, and Guest Editor for Information Systems Frontiers.