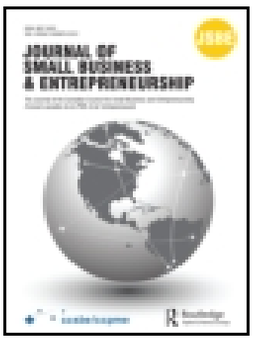

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Cutting-edge technologies for small business and innovation in the era of COVID-19 global health pandemic

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ABSTRACT

The adoption of cutting-edge technologies to steer business activities during community lockdown to contain the spread of the COVID-19 pandemic, even if involuntarily, provides evidence that technologies not only offer competitive advantages but also provides a means for survival, by improvising existing business models. In June 2019, we issued a call for papers to address the awareness, adoption, and implementation challenges of technologies that can drive businesses of all sizes in the fourth industrial revolution. We intended to identify as critical elements the "must-have" and a "nice to have" technologies for small businesses and innovation. Then the ongoing COVID-19 global health pandemic struck in December 2019, forcing the need for digitization of business activities and remote operations, which was considered a "nice to have" to immediately become a "critical to have" to survive in the ever increasingly uncertain business environment. This paper identifies the technologies, evaluates disruptive software platforms, and strategies needed for creating and managing small business innovation and highlighting the complexity of that process and the context within which this process takes place. We integrate this discussion alongside a summary of the articles included in the Special Issue. The current realities show that technologies that enable social business creation, customer relationship management systems, new communications channels, virtual reality technologies for remote operations, and the Internet of Things (IoT) are crucial to lowering the costs of doing business. Big data and predictive and visual analytics are critical enablers to aiding complex business decisions in the current challenging business climate.

RÉSUMÉ

L'adoption de technologies de pointe pour orienter les activités commerciales pendant le confinement de la communauté, décidé pour contenir la propagation de l'épidémie de COVID-19, même involontaire, fournit la preuve que les technologies offrent non seulement des avantages concurrentiels mais aussi un moyen de survie, en improvisant des modèles économiques existants. En juin 2019, nous avons lancé un appel à contributions pour traiter des défis liés à la sensibilisation, l'adoption et la mise en œuvre des technologies pouvant conduire les entreprises de toutes tailles vers la quatrième

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technologies de pointe; Internet des objets; plateformes logicielles perturbatrices; COVID-19; pandémie sanitaire mondiale; petites entreprises; quatriéme révolution industrielle

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révolution industrielle. Nous avions l'intention d'identifier comme éléments critiques les technologies « must-have » et « nice to have » pour les petites entreprises et l'innovation. C'est alors que la pandémie sanitaire mondiale de COVID-19 en cours a frappé en décembre 2019, forçant la nécessité d'une numérisation des activités commerciales et des opérations à distance, et ainsi, transformant immédiatement ce qui était considéré comme un « nice to have » en un « critical to have » afin de survivre dans l'environnement entrepreneurial de plus en plus incertain. Cet article identifie les technologies, évalue les plateformes logicielles perturbatrices et les stratégies nécessaires à la création et à la gestion de l'innovation dans les petites entreprises, ainsi qu'à la mise en évidence de la complexité de ce processus et du contexte dans lequel il se déroule. Nous intégrons cette discussion parallèlement à un résumé des articles inclus dans le numéro spécial. Les réalités actuelles montrent que les technologies qui permettent la création des entreprises sociales, les systèmes de gestion de la relation clientèle, les nouveaux canaux de communication, les technologies de réalité virtuelle pour les opérations à distance et l'Internet des objets (IoT) sont essentiels pour réduire les coûts des entreprises. Les grandes données et les analyses prédictives et visuelles sont des outils essentiels pour aider les entreprises à prendre des décisions complexes dans le difficile climat commercial actuel.

1. Introduction

The adoption of new technologies to enhance, change, or even disrupt business models, from operations and strategic perspective to gain competitive advantage is well established in the literature (Saebi, Foss, and Linder 2019; Makkonen, Johnston, and Javalgi 2016; Kim, So, and Je 2019). In June 2019, when we conceived the idea about this Special Issue, we least imagined a global health crisis that can quickly put the spotlight on the decisions to use and adopt certain technologies considered advanced and critical to the organizations' survival, as occurred during, and can continue after the COVID-19 pandemic. Beyond this significant event in time, businesses have and will continue to experience the development and deployment of new disruptive technologies into the various facets of business organizations at an operational and strategic levels.

The numerous benefits of adopting and implementing advanced technologies by businesses include the value creation additive capability (Smith and Correa 2005; Hitt and Brynjolfsson 1996), digitization of internal operations (Caldeira et al. 2012; Mukhopadhyay, Kekre, and Kalathur 1995), and the recent hype about the creation of social businesses, especially by small and medium scale business entrepreneurs (Turkina 2018). Furthermore, there are other trending technologies recently created for gradual implementation by organizations, such as 'Big Data' analytics, machine learning, Social Business Intelligence, Internet of Things (IoT), and blockchain technology (Arnold, Kiel, and Voigt 2016; Turkina 2018; Beck et al. 2017). The literature also considers these technologies critical enablers of new business models that can potentially disrupt existing strategic techniques, operations, and processes (Arnold, Kiel, and Voigt 2016; Palattella et al. 2016; Dijkman et al. 2015).

Small businesses confront different challenges and are typically constrained by limited resources (e.g., time, information and knowledge, and budget) that hinder the

fronting the adoption of latest technologies and restricting any first-mover advantages. Furthermore, when considering the concept of cutting-edge technologies, firms, irrespective of size, find it difficult to distinguish between a "must-have" and a "nice to have" technology that can enhance competitive advantage and fight the competitive forces in the marketplace (Laudon and Laudon 2019). When considering such context, some initial and critical questions naturally emerge for firms, particularly, regarding the decision-making process about the role of new, emergent, and cutting-edge technologies: What is the cost of the technology? What training will be required? Will the technology enable the business to use its existing processes and operations activities? These questions may seem irrelevant in big companies but are fundamental in a small organizational context. The problem such as, what exactly is this new technology? Or, relatedly, why are others using such technology, and should we also be using it? What are the possible post-implementation and change management challenges? One can conceive how small and large firms respectively go about answering these pertinent questions relating to the technology adoption models (Szajna 1996). The articles published in the Special Issue address some of the above items. For example, the article co-authored by Jihyeong Son and Linda S. Niehm- examines how small retailers in rural communities perceive the decision of adopting social media. Although a well-established technology for big organizations, most small businesses can view it as new.

The special issue initiated via the call of papers in June 2019 aimed to inspire new research on awareness, adoption, and challenges of the latest/new technologies for small businesses. This paper also presents a summary of five articles published in this special edition of the Journal of Small Business and Entrepreneurship, a Journal published by Routledge: Taylor & Francis, UK, on behalf of the Canadian Council for Small Businesses and Entrepreneurship.

The rest of the paper are arranged as follows: the next section discusses the framework for Small Business adoption of cutting-edge technologies and the challenges. In section three, we evaluate the involuntary and circumstantial forced adoption of advanced technologies during the community lockdown due to the outbreak of the COVID-19 global health pandemic. The fourth section summarizes the five (5) articles included in the Special Issue, while section five concludes the paper.

2. Framework for small business adoption of cutting-edge technologies

The institutional context within which firms operate can dictate how innovation permeates and can transform business models. The dynamic nature of that contextual landscape and eco-system such as the arrival of new competitors/new potential better partners or the implementation of new regulations and policies are often ignored in the literature, in particular, how this impacts on the decision-makers behavioral approach to innovation (Makkonen, Johnston, and Javalgi 2016).

Innovations that change the supportive eco-system are often framed as game-changing and hence beneficial to those firms that may not have benefited from or may have been constrained by stakeholders of the old eco-system (Adner 2006; Azzone and Noci 1998). In conjunction with the resourced based perspective which highlights the importance of resources and capabilities, this is particularly significant

for small firms where lower bargaining power compared to large firms does not allow them to fully access critical resources and capabilities (Campbell and Park 2017; Heider et al. 2020).

Understanding the complexity of the competitive landscape is crucial for firms when it comes to an understanding of the market and the customers that they intend to serve with an innovative offer. Identifying the unique value proposition of innovation and the attributes of differentiation remains a challenge for organizations. Firms need to produce new innovative offers and transform their operations to become and stay competitive. But there is a need to explore how the external factors that they may not have direct control over impact the value creation process of the innovations. On one hand, there is a need to better understand how these external institutional factors might constrain firms from taking their innovative ideas to the market.

On the other hand, there is need to help firms critically assess the viability and scalability of their innovative offers in the context of the high failure rate of innovations in the market. Early abandonment and rejection of potentially unviable creative ideas, which are rarely studied or given due attention in the literature, are beneficial too because these resources can be diverted to other business ventures rather than being spent on promoting these bound to fail projects.

3. Small business adoption of technologies during the COVID-19 pandemic

While businesses of all sizes worldwide were expecting a gradual awareness and adoption of the cutting-edge technologies to drive the fourth industrial revolution, a global health crisis caused by coronavirus disease (COVID-19) struck in December 2019, starting in Wuhan, China (Ting et al. 2020; Huang et al., 2020; Akpan et al. 2020; CDC, 2020). The outbreak of COVID-19, which caught the world unawares and unprepared, has caused significant havoc to business activities, with serious adverse effects on small businesses (Humphries, Neilson, and Ulyssea 2020). The disease, which was declared a global pandemic by the World Health Organization (WHO, 2019), has now infected 12.25 million persons and caused 554,722 deaths as of July 10, 2020 (ECDC, 2020). The frantic effort to curtail the human-to-human transmission of COVID-19 led to a lockdown of communities and closing businesses (Akpan et al. 2020). In the wave of this global health crisis and to avoid a total shut down of economic activities, the use of some technologies that were not considered essential by small businesses, such as virtual reality related technologies became crucial to avoid a complete shutdown of the global economy (Ting et al. 2020). Many businesses of all sizes have since implemented technologies such as virtual teams, Zoom virtual meetings, synchronous remote learning, and other technologies (Ting et al. 2020; Webster 2020). These technologies became the survival strategy during the lockdown of communities by different levels of government meant to contain the spread of the coronavirus disease, and enable the management of operations and projects remotely (Vaccaro et al. 2020) or conducting business meetings without physical contact among employees (Puddister and Small 2020; Vaccaro et al. 2020).

It is unimaginable how things would have been should the technologies currently in use by businesses during this COVID-19 global health pandemic were not as

pervasive as the world's ongoing experience. On the other hand, the epidemic and the resulting lockdown have accelerated, projected, and magnified the impact technology can have on some organizations' business models. Further, many small businesses have also been able to utilize new techniques to adapt and improvise their business models (Vaccaro et al. 2020; Puddister and Small 2020). Notable examples include personal training or tutoring and client advising using virtual video platforms such as Zoom (Puddister and Small 2020). Similarly, restaurants have become take away delivery restaurants producing food for delivery in what is known as "dark kitchens," backed by online meal ordering (Pantelidis 2010).

The use of technology during this pandemic has also enabled and fostered community and civic spirit. In the UK and USA, both small and medium scale firms, Universities, and 3 D enthusiasts used their printers to create personal protective equipment to alleviate the shortage of such material during the early stages of the pandemic (KSU, 2020). In the UK, the BBC refers to the improvised technologies and the items created as "citizen supply chain" (Kleinman 2020). Other practices associated with the use of information technology usually frowned upon, are suddenly seen as crucial to tackling the pandemic. Effective quarantining of citizens and the track and trace program in many countries rely on individuals giving much private information to the authorities. Moments like this, of course, inspire innovative ideas and technologies. A new app called "crowd less" uses information from users from their smartphone that allows users to become aware in advance of their intention to visit whether, for example, a particular store they want to visit is too crowded (Iddawela 2020).

Further, some technologies that were being tested or perceived to be "too cutting edge" before the lockdown suddenly have a new potential market due to the pandemic. One can think of service robots replacing humans to service customers in the context of social distancing. One's takeaway delivery by a drone may now not seem too futuristic after all.

4. A summary of articles in the special issue

This Special Issue includes five articles that address the small business awareness, adoption, and implementation challenges of cutting-edge technologies. The Section summarizes the accepted articles for this Issue. Each of the documents demonstrates cutting-edge technology in-action related to small businesses, entrepreneurship, and innovation. Figure 1 highlights the specific theme and keywords addressed by each paper and the relationship with small business and entrepreneurship based on network analysis (Akpan 2020; Akpan et al. 2020).

The first paper is authored by Jihyeong Son and Linda Niehm, entitled 'Using Social Media to Navigate Changing Rural Markets: The Case of Small Community Retail and Service Businesses.' The paper focused on three main aspects, including "social media" use by small business, "social capital" creation, and "innovating marketing" (see the three nodes on the top left corner of Figure 1). While for many, the social media use by organizations may seem to be pervasive, the above paper offers a useful reminder that this not the case. The authors provide an interesting perspective

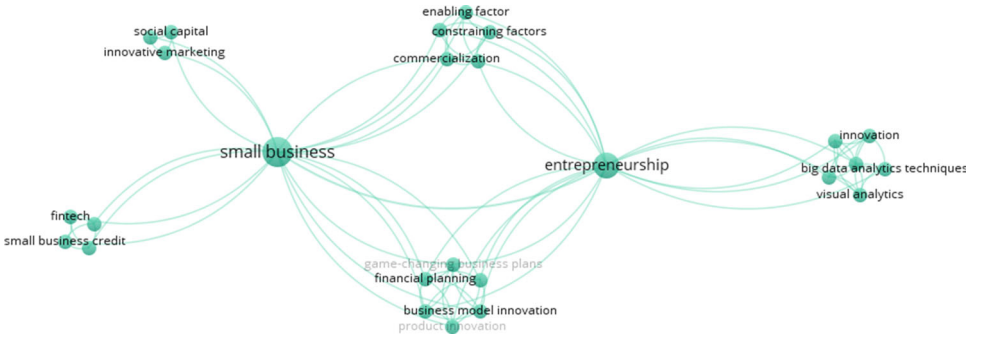

Figure 1. Network analysis of articles published in the special issue based on author keywords.

on the behavioral and affective processes of the adoption of social media by small rural retailers, triggered by the changing nature of their traditional customer base. The behavior of their customers is changing, and they are attracted to online shopping and other larger retail formats; almost suddenly, these retailers realize that they need to adapt. These small retailers are aware that other retailers have benefitted from social media but soon realize that it is not as simple as setting up a Facebook account. Furthermore, such interactions enabled to attract new customers. Despite the advantages, social media integration raises challenges for many small businesses because of operational, economic, infrastructural, legal, and regulatory, and psychological factors.

The paper by Lenore M. Palladino is entitled 'The Impacts of Fintech on Small Business Borrowing' centers on the conceptual analysis of "FinTech," "small business credit," and "small business loans," (see the lower-left corner in Figure 1). "FinTechs" and crowdfunding platforms are notable illustrative examples of innovations in the financial industry to reduce the barriers to accessing funding from the traditional lending models by small businesses and entrepreneurs. The paper investigates the impact of 'fintech' lending on the small business in terms of interest rates and the rate of credit approval. Further, the study examined loan-level data on consumer and small business loans from Fintech lenders and compared samples of small-business loans from regulated bank lenders. The results show that Fintech small business loans charge average annual interest rates three (3) percentage points higher than customer loans from the same lender and 4 to 7 percentage points higher than small business loans from regulated banking entities. The paper also offers a critical perspective on the accessible pathways to securing financial resources by small firms through "FinTechs" rather than via traditional banks. Lending through this medium can be more beneficial to new entrepreneurs and small businesses. However, there are some drawbacks, including a lack of proper regulation, which can lead to predatory lending by the providers of the financial resources. This paper suggests the need for regulatory clarity and additional supervision to protect small businesses from predatory non-bank lenders. Also, the majority of the FinTech firms tend to operate as less reputable small firms, which also calls for proper regulation.

The third article (Daneshjoovash, Jafari, and Khamseh 2020) is entitled 'Effective Commercialization of High-technology Entrepreneurial Ideas: A Meta-Synthetic

Exploration of the Literature.' The highlight of the paper based on the author's keywords are "Commercialization," "Entrepreneurial ideas," and "high-technology," and more (see the lower-left corner in Figure 1). The article explores the factors that constrain and enable firms' successes to market and commercialize their innovations. Through a review of the literature, the paper differentiates between internal and external factors that influence the practical commercialization of new ideas by entrepreneurs. Furthermore, they highlight that commercialization of new ideas is a process and a complex one that is often framed and perceived to be linear. Importantly, the authors identify the specific factors, external or internal or enabling and constraining, and the importance at different stages of the commercialization process.

The fourth paper authored by Anderson Kehbila, on the title "the entrepreneur's go-to-market innovation strategy: Towards a decision-analytic framework and a road mapping process to create radically successful businesses driving spectacular growth and profitability" identifies continuous innovations in the product offering, marketing strategies and a transformation in the business models and game-changers for entrepreneurs. As discussed earlier in this paper, cutting-edge technologies can be a catalyst for small business' growth. The article also discusses a decision-analytic framework for innovative marketing, management, and financial planning to avoid small business failure.

The final article in the Special Issue (Akpan 2020) demonstrates the use of visual analytics and 'big data' techniques, which are currently trending technologies that small businesses can employ to process high-volume social media-generated data. The 'big data' refers to a diverse, high-volume, and high-velocity information asset that requires new processing techniques to enhance knowledge discovery and generate insight for decision-making (Keim et al. 2008; Akpan, Shanker, and Razavi 2019). The 'big data' comes in different formats and structures. The forms of data include text, music, and video files. On the other hand, the compositions can be structured, semi-structured and unstructured, and require specialized tools and techniques, such as visual analytics (Akpan 2020) to process and transform into usable information for decision-making (Kohlhammer et al. 2011; Akpan and Shanker 2019; Daradkeh 2019). Utilizing these techniques, Akpan (2020) examines the scientometric evaluation of the scientific literature production based on the big data extracted from 535 articles published by the Journal of Small Business & Entrepreneurship.

5. Conclusion

The papers appearing in this special issue offer substantial contributions to the literature on the roles of cutting-edge or advanced technologies to enhance the operations activities, create competitive advantages, and enhance growth. However, the evidence from research and the results from the studies shows a clear indication of the slow pace at which small businesses adopt or are willing to implement state-of-the-art technologies beyond the regular use of the commonly used information technology infrastructure.

Besides, this editorial has gone further to evaluate instances where technologies that small businesses consider as "too advanced" in the past and under normal

circumstances can suddenly become essential when compelled by unusual situations and the need for survival such as during the coronavirus disease (COVID-19) outbreak. Notwithstanding the involuntary adoption of information technology/systems during the global health pandemic to survive the disruptions in the small business models as discussed, the implication remains that advanced technologies can offer significant benefits, and may not be too expensive after all as generally misconstrued. For example, the use of virtual reality platforms (Akpan and Shanker 2017; Akpan and Brooks 2012) appears affordable to small businesses improvised, such as using virtual teams and Zoom platforms for service offerings by small business meetings (Puddister and Small 2020). Neither did the improvising the 3 D printing to develop facial masks, nor other health-related supplies prove exorbitant for small firms as the traditional technology acceptance models often suggest (Kleinman 2020). Further studies need to continue emphasizing the roles of cutting-edge technologies as the world heads towards the fourth industrial revolution.

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Disclosure statement

No potential conflict of interest was reported by the author.

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