

Impact of Innovation and Covid-19 on Performance of Listed Firms of Pakistan:**Challenges and Implications of New Practice****First Author: Ayesha Seerat****Ayeshaseerat07@gmail.com****(International Islamic University, Islamabad).****Second Author: Hamna Arshad****hanikhan42814@gmail.com****(International Islamic University, Islamabad).****Third Author: Sumaiya Javed****samiajaved65@gmail.com****(International Islamic University, Islamabad).**

Impact of Innovation and Covid-19 on Performance of Listed Firms of Pakistan: Challenges and Implications of New Practice

Abstract

The current study aims to analyze the relationship between innovation and covid-19 on the financial performance of the listed firms in Pakistan. The other purpose of the current study is to analyze the challenges and implications of the covid-19 on the performance of the firms. The researcher analyses how the performance of the firms is affected due to innovation and covid-19 in the pandemic situation. This study is new in terms of the variables used in the study. This study used the innovation in which two proxies are used i.e. Research and development and patent count. Secondly, it takes the covid-19 and to analyze the performance of the firms through the ROA and ROE. Most researchers used the pandemic situation to analyze the macroeconomic as well as the tourism industry because these two factors are more affected due to the pandemic situation. But in the current study, the researcher analyses the innovation and the covid-19 on the financial performance of the listed firms of Pakistan. This study used secondary data for the analyses. Data has been collected from the annual reports of the firms. For the covid-19 cases, the data has been collected from the World Health Organization. For the research and development, patent count, ROA and ROE the annual reports of the firms are used. The result of the current study shows that the Research and development of the firms affected the ROA of the firms but not the ROE of the firms. The patent count has affected both the ROA as well as the ROE of the firms. Covid-19 affected negatively the financial performance of listed firms in Pakistan. The limitations and future directions are important to improve the work of researchers as well as improve the quality of the research paper. Limitations of the study are also given by the researcher for future work. The study focuses on the pandemic situation and it shows how the innovation of the companies affects the performance of the companies. So, it provides the information to the managers as well as the policymakers to think about the innovation more as compared to using the previous methods of the sale.

Keywords: Innovation, Covid-19, Performance of listed firms, Patent counts, Research and development.

1. Introduction

Covid-19 is a global pandemic because it affects predominantly, but the previous pandemic focused on specific areas (He & Harris, 2020). For this reason, it's difficult for health professionals to travel from one place to another region in the world. It focused on the country's national interest rather than the global one (Hall et al., 2020). Many developed countries had a significant outbreak, and they needed the help of the developing countries. This reverse situation is very surprising, and it provides an increased level of internalization, which no one has seen in

the past. Therefore covid-19 situation provides a unique opportunity for businesses to increase their level of business through innovation in the product line (Kirk & Rifkin, 2020).

Under the covid-19 situation, the needs of customers are changed because this pandemic situation affects the overall world industry. To attract new customers, businesses need innovation or creativity in the product so that the sales volume increases. One example is Salesforce; many software companies provide software licenses and support free requests for 90 days to attract new customers. They also offer them options such as the opt-in and opt-out of the service that the customers might enjoy in the extended free trial period.

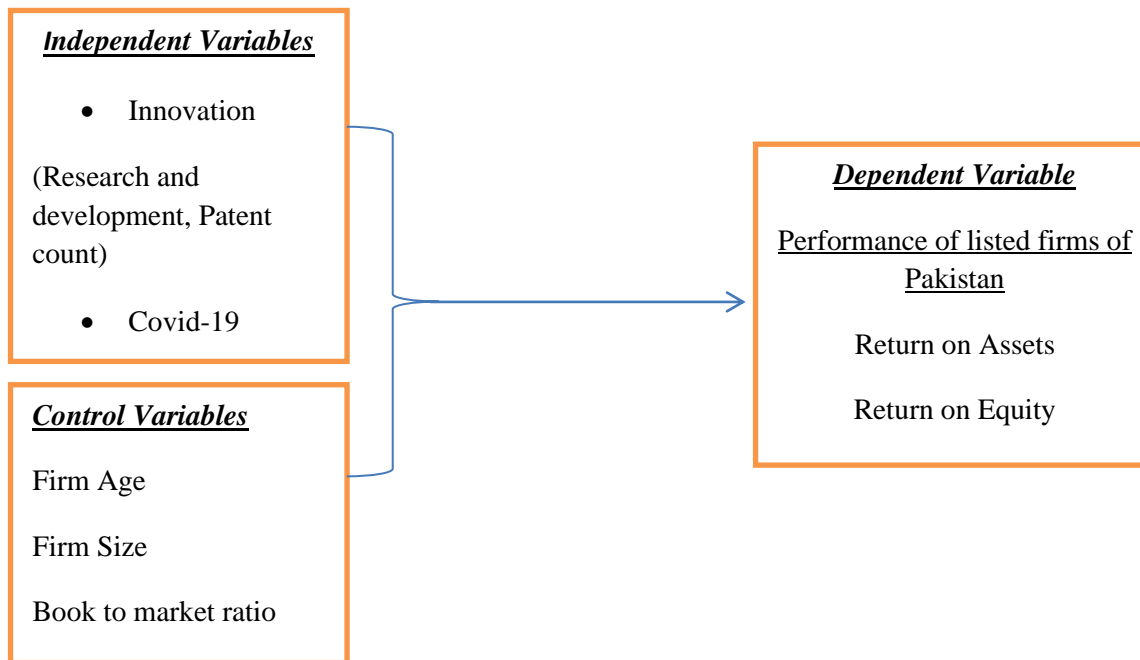
World Health Organization, on March 11, 2020, declared the covid-19 as a pandemic because it severely impacted management education. The change due to covid-19 has been analyzed through the spatial dimensions of the territory, place and space of work (Brinks & Ibert, 2020). There are different methods used by the countries to remove the conflict between online and offline business practices as a result of the pandemic situation. It means that the impact of covid-19 is high or low depending upon the situation of the environment in which the firms had been performing their businesses. Thus, as a result, the policymakers have issued for the implementations of the innovation techniques (Donthu & Gustafsson, 2020).

The word "innovation" has been derived from the Latin word "innovates", which means "to change or to renovate". In other words, innovation means something new in the existing product and services or the creation and introduction of new techniques and products and services in the firm, which attract the customer. Oslo Manual (1997) defined four categories of innovations, i.e. product innovation, process innovation, organizational innovation and marketing innovation.

The use of new technology to add value for the customer is called disruptive innovation. This disruptive innovation process is highly risky as well as expensive, so it's preferable for those companies which have resources and abilities to invest in the new technology (Ahmad, 2019). New technologies have a greater chance of failure; that's why it's not applicable or common in small industries. However, according to the rule of finance, the higher the risk the greater the chance of return from the investment. The best example of disruptive innovation is Apple Company which always uses new technologies and target new customer and market because their nature of business needs innovation and new technology more frequently (Qianbing, 2010).

The current model of the study has been extracted from the gap of Ying et. al., (2020); they examined how innovation has an effect on entrepreneurial activities during the pandemic situation. They also called this pandemic situation a blessing for entrepreneurs. They suggest that in future the researcher analyses the innovation with different variables so that it should be examined how the pandemic situation affects the future of the country. The other gap is taken from Ratten (2021) in which the researcher analyses that the covid-19 becomes a competitive advantage for business strategies. But the researcher provides the gap that how businesses improve their competitive advantage during the pandemic situation. In the current research paper

innovation, covid-19 is the independent variable, performance of the listed firms of Pakistan is taken as the dependent variable. Firm age, firm size and the book-to-market ratio are control variables used in the current study.



2. Literature Review

There are two dimensions which are necessary to understand the impact of covid-19 on business. Firstly, it should be analyzed how the covid-19 affects the value chain of businesses. For some businesses, this change is extensive because customers stop buying the product, change or transfer to alternative channels of purchase. Completely new customers are very rare during the covid-19 pandemic. For businesses, the whole system is disturbed due to the lockdown condition, political conflicts between the nations and closed borders. It's possible during the pandemic situation that businesses are affected through both sides, i.e. from the international level as well as at the national level.

The covid-19 pandemic is a curse for humanity, but it could be a blessing for society because it changes our attitude towards the sustainable growth and economic development of the country. Companies and governments should work hard for innovation as well as for entrepreneurial activities so that they can help in the battle against Covid-19 as well as sustainable ways of living for society. The world has more innovation and knowledge about the covid-19 and should apply these strategies, capabilities and tactics for the well-being of society.

Mostly in the world during the pandemic situation, the attention has been on innovation and entrepreneurial activities. Among the different crises, i.e. political crisis, national crisis, economic crisis; health crisis, are the worse for the world to deal with it and it affects

international trade and the lifestyle of the society. The uncertainty due to the covid-19 provided an opportunity for innovation in the company's products. There is an increased awareness about how to use the innovation which is caused by the covid-19 and how to use this opportunity.

Challenges and Practices during the Covid-19

Covid-19 is a disease which is caused by the SARS-COV-2 virus which is first reported in Wuhan, China (Cortez & Johnston, 2020). It was considered the new pathogen which is initially identified in December 2019 that spread all over the world in 2020. It is considered a severe respiratory disease which is transmitted through droplets (Heyden et. al., 2020). World Health Organization initially declared covid-19 as a public health emergency but later on March 11, 2020, it was considered a pandemic which affects the world. To reduce the spread of covid-19 the governments at the national and international level follow social distancing. These techniques led to the reaction of the individual to work from home, and telecommuting became the norm for individuals (Kuckertz et. al., 2020). These further result in the reduction of person-to-person contacts and increased reliance on digital technology.

Due to the pandemic situation in the world, the lifestyle has been changed abruptly. Digital technologies in human life become the norm so that every single human works on digital media from their house. Since the emergence of Covid-19, it affects most sectors of the global economy. Regions of the world and countries have been affected at different rates of intensity depending upon the steps that the governments have taken to control the pandemic situation. As a result, economic and social challenges have emerged, which affect people all over the world. The physical and human contract has decreased, and the social contract has also been decreasing at an extreme level.

In history, there have been several other pandemic situations, but this covid-19 is unique in the sense because it affects the society at a significant rate. Covid-19 is neither predictable or nor avoidable so it becomes a disaster for the world (Hao et. al., 2020). The impact of covid-19 changes the structural change in the firms as well as in the world because the covid-19 is uncertain so the changes of it are also sudden in nature. The extreme change in the economy creates the digital world for the consumers. Due to the need of the current time the online system of business were quickest and evident (Jamal & Budke, 2020). Media consumption pattern has also been changed due to switching of working and living from home (Ratten & Jones, 2020).

Policy makers should choose the policies or choose the alternatives which are based on the evaluation of the existing guidelines. They also figure out that which policies have been choosing and time frame of the policies are also choose. Limited availability of the resources during the covid-19, it's important for the companies or the policy makers to think about the resources. Public goods are few in number which are available for the public so, decision should be taken that when, how and where the product have been sold and resources have been allocated. This would help the policy makers for implementing their policies in a significant way.

All the policies which the policymakers create depend upon the location and time. What is required in the specific time frame should be considered for policy development. Context matter of the policy is very important for the policymakers. Based upon the new lifestyle practices the context of the policies should be socially driven. Community and workplace are included in the social context of the policies.

3. Methodology

Secondary data has been used for the current study. Data has been collected from the annual reports of the listed firms of the companies in the PSX. Data has been collected from November 2019 to September 2021. Data on Covid-19 has been collected from the World Health Organization which shows the total number of cases in Pakistan. The following table shows the formulas of the variables used in the study.

Table 1 Formulae of the Variables Used in the Study

Nature of the Variables	Name of the Variables	Formulas
Independent Variables	<u>Innovation</u>	
	Patent Count	$PC_{i,t} = \text{Log Patent Count}_{i,t}$
	Research & Development	$R\&D_{i,t} = \frac{\text{Annual R\&D}}{\text{Annual Revenue}_{i,t}}$
Dependent Variables	Covid-19	Total number of cases
	Return on Assets	$ROA_{i,t} = \frac{\text{Net Operating Income}}{\text{Average Total Assets}}$
	Return on Equity	$ROE_{i,t} = \frac{\text{Income before extraordinary items}}{\text{Book Value of Equity}}$
Control Variables	Firm Size	$FS_{i,t} = \text{LN Total Assets}_{i,t}$
	Firm Age	Difference between creation of firm's year and current year
	Market to Book ratio	$M/B_{i,t} = \frac{(\text{Market Value of Equity})}{(\text{Book Value of Equity})}$

Econometric Equation

Current study analyses the relationship between the innovation and covid-19 and the financial performance of the listed firms of Pakistan. Following econometric equation has been used for the analysis;

$$ROA_{i,t} = \beta_0 + \beta_1 PC_{i,t} + \beta_2 R \& D_{i,t} + \beta_3 Covid - 19_{i,t} + \beta_4 FS_{i,t} + \beta_5 FA_{i,t} + \beta_6 MB_{i,t} + \epsilon_{i,t} \quad (1)$$

$$ROE_{i,t} = \beta_0 + \beta_1 PC_{i,t} + \beta_2 R \& D_{i,t} + \beta_3 Covid - 19_{i,t} + \beta_4 FS_{i,t} + \beta_5 FA_{i,t} + \beta_6 MB_{i,t} + \epsilon_{i,t} \quad (2)$$

ROA stands for the return on assets; ROE stands for the return on equity; PC stands for patent count of the firms; R & D stands for the Research and development of the firms during some particular time period; Covid-19 shows the number of cases during selected time period in Pakistan; FS stands for the firm size; FA stands for the firm age; MB stands for market to book ratio; and ϵ stands for error term; I stands for the number of firms; t stands for the time period of the firms.

4. Analysis and Discussion

In the current study, the researcher analyses the relationship between the covid-19 and innovation with the financial performance of the listed firms in Pakistan. There are total 443 listed firms in PSX. Secondary data has been collected from the annual reports of the listed firms. A panel data analysis has been done for the study. The analysis of the study has been shown in the following tables.

Table 2: Descriptive Statistics

Name of the Variables	Mean	Std. Deviation	Maximum	Minimum
Research and Development	0.276339	0.253864	0.996273	0.205287
Patent Count	0.60916	0.228251	1.714286	0.071429
Covid-19	0.276339	0.253864	0.996273	0.00271
Return on Assets	0.315338	0.114087	9.935885	0.00011
Return on Equity	0.161488	0.298211	9.946459	0.04005
Firm Size	6.884168	1.194772	9.679276	3.200577
Firm Age	17.13843	2.557275	23.72856	12.69656
Market to Book ratio	0.723661	0.253864	0.999729	0.003727

Above table shows the descriptive statistics of the listed firms of Pakistan. Result of the study shows that the Research and development have on average 27.63% influences to the listed firms of Pakistan due to the covid-19 factor. Patent count shows the 60.91% of average count due to the covid-19; innovation shows 64.53% of average return due to the covid-19; covid-19 shows on average it affects 27.63% of performance of the listed firms of Pakistan; ROA shows on average 31.53% of return during the covid-19 time period; ROE shows 16.14% return through the invested capital during the covid-19; firm size on average increases 6.88 times in pandemic time; firm age shows average 17.14 and market to book ratio shows on average return is 72.36%.

Table 3 shows the correlation matrix of the listed firms of Pakistan. Correlation shows the relationship between the variables and the sign of the variables show the direction of the relationship between them.

Table 3 : Correlation Matrix

Name of the Variables	R & D	PC	Covid-19	ROA	ROE	FS	FA	M to B
R & D	1							
PC	-0.0962	1						
Covid-19	-0.0653	-0.0244	1					
ROA	-0.0199	0.0797	0.01817	1				
ROE	0.09908	-0.1837	0.02712	-0.05052	1			
FS	0.10665	0.0601	-0.17024	0.14111	-0.0245	1		
FA	0.08918	-0.2970	-0.01142	0.00596	0.13105	-0.0061	1	
M to B	0.01264	-0.0332	-0.00592	-0.03109	0.42092	-0.1089	-0.0640	1

NOTE: R & D stands for Research and development, PC stands for the patent count of the company, Covid-19 stands for the number of cases in Pakistan, FS stands for the firm size, FA stands for the firm age and M to B stands for the market to book ratio, ROA stands for return on assets, ROE stands for return on equity.

Table 4 shows the impact covid-19 and innovation on the performance of listed firms in Pakistan. The performance of the firms has been measured through the ROA and ROE; so the two models have been generated. Model 1 shows the relationship between innovation and covid-19 and with the return on assets of the firms. Model 2 shows the relationship between innovation and the covid-19 and the return on equity of the listed firms in Pakistan. During the covid-19 time period research and development of the companies are negatively related to the ROA of the firms but it significantly affected the performance of the firms, but it insignificantly related to the ROE of the firms.

Patent counts of the firms are taken as the proxy of the innovation. The result shows that the PC of the firms are positively and significantly related to the performance of the firms. Covid-19 shows a negative and is significantly related to the ROA of the firms but it is insignificantly related to the ROE of the firms. It means that the in time period of pandemic the ROA of the firms are affected as compared to the equity of the firms.

The firm size of the firms is insignificantly related to the financial performance of the firms in both models of the firms. Firm age is negatively and significantly related to the ROA but it is insignificantly related to the ROE in model 2. It means that in the pandemic situation, the age of the firms does not matter for the performance of the firms. Market book ratio is negatively and significantly related to the ROA of the firms but it does not have an effect on the ROE. The R-square of the model shows how much the independent variable explains the dependent variables; in model 1 77.63% of IV explains the DV but in model 2 45.15% of IV explains the DV.

Table 4: Regression Analysis

Model 1: Impact of Covid-19 and Innovation of Performance of listed firms of Pakistan (ROA) **Model 2: Impact of Covid-19 and Innovation of Performance of listed firms of Pakistan (ROE)**

Variables	Coefficient	Std. Err	t-Stats	P-value	Coefficient	Std. Err	t-Stats	P-value
R & D	-0.38393	0.19593	-1.9595	0.0507**	-1.1056	0.58951	-1.8755	0.0614
PC	0.00297	0.00068	4.37121	0.0000***	5.82978	1.68070	3.46864	0.0006**
Covid-19	-0.37131	0.08869	-4.1864	0.0000***	-0.1940	0.26624	-0.7288	0.4665
FS	-0.04270	0.04647	-0.9189	0.3586	-0.0913	0.13982	-0.6533	0.5139
FA	-0.46180	0.18964	-2.4351	0.0152*	-0.0010	0.03284	-0.0318	0.9746
M to B	-0.38800	0.08601	-4.5110	0.0000***	0.00488	0.05830	0.08375	0.9333
C	0.00299	0.00068	4.37675	0.0000***	5.33568	2.29149	2.32847	0.0203**
R-Square		0.776336				0.451503		
D-W Sats.		2.1834				2.626		
No. of firms		433				433		

NOTE: R & D stands for Research and development, PC stands for the patent count of the company, Covid-19 stands for the number of cases in Pakistan, FS stands for the firm size, FA stands for the firm age and M to B stands for the market to book ratio.

5. Discussion and Conclusion

In the current study, the researcher analyses the relationship between innovation and Covid-19 on the performance of the listed firms in Pakistan. To measure the performance of the firms two proxies are used i.e. ROA and ROE. For measuring the innovation of the firms two proxies are used i.e. Research and development and patent count of the firms. The effects of the crisis are long time and complex in nature (Ansell & Boin, 2019). Covid-19 effects are unpredictable in nature and have very low probability. According to the researchers Doernert. al., (2019) the crisis is classified as an extremely unexpected or unpredictable event with more or a gradual impact on the everyday life of the individual. The crisis also divides into major or minor, internal or external, technical or economic in nature, and social, people or organizational crisis. This shows that the crises are categorized as ecological disasters or economic disasters (Buchanan & Denyer, 2013). However, crises are ranked as severe to inconsequential depending upon the influence on human life in the same way or another way (Eggers, 2020). The result of the study shows that the listed firms of Pakistan increase their profit in a pandemic situation when they focus on Research and development and used their available resources and create new or innovative ways to cope with the pandemic situation (Faulkner, 2001).

Innovation of the firms depends upon the nature of the business, board characteristics, nature of the business and the family members on the board of the firm. To manage the pressure of the financial institution as well as to manage the investors, the board of directors plays an important role. In the current time period, investors probably invest in those projects which have more short-term profit opportunities as compared to long-term profit opportunities (Jiraporn, 2018). However, the top authority brings a positive attitude into the organization (Honore, 2015). Depending upon the nature of the business the innovation has several types. Developing a new product by using the existing technologies in the business is called incremental innovation.

However, companies should introduce unique features, designs and styles of products to the customers so that the profit margin increases (Cremers, 2017). To engage more customers this type of innovation is the most common type of innovation which is also recommended by the higher authorities. Hence, it's very difficult for the firm to attract new customer with the existing technologies but if the firms have a high level of relevance which allow the customer to avail their specific services then it should increase the profit margin.

According to the result of the study the Research and development of the study is negatively related to the ROA of the firms because the pandemic situation shut down all the activities necessary for the business. PC significantly affects the performance of the firms. The worldwide spread of pandemic create the online world and high emergence of technology so, the firms should use the Research and development of the firms to develop the product according to the time frame and according to the demand of the customers. Research and development of the companies and the patent count increase the profit margin as well as the innovation attracts new customers for the firms.

Every paper according to the nature of the variables used in the study has some limitations. Limitations of the study increase the chance of improvement in the study. The current study has some limitations i.e. firstly there are more factors which can affect the performance of the listed firms these are the GDP, new project implementations, government policies and so on. But in the current study, the researcher only takes the two independent variables which affect the performance of the firms. Secondly, the researcher takes only listed firms of Pakistan and the pandemic situation is a global situation. So, in future, the researcher analyses the innovation and covid-19 of the European as well as the Asian companies so that the results are generalized.

The current study is important in terms of practical implication and managerial implications. The study focuses on the pandemic situation and it shows how the innovation of the companies affects the performance of the companies. So, it provides the information to the managers as well as the policymakers to think about the innovation more as compared to use the previous methods of the sale. The current study focuses on the research and development, patent count as well as innovation of the product so that the customers of the firms are retained and the new customers are attracted for the business.

References

- Ahmed, T., Chandran, V. G. R., Klobas, J. E., Lin~ an, F., &Kokkalis, P. (2020). Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy. *International Journal of Management in Education*, 18(1), 10–32.
- Ansell, C., &Boin, A. (2019). Taming deep uncertainty: The potential of pragmatist principles for understanding and improving strategic crisis management. *Administration & Society*, 51(7), 1079–1112.
- Brinks, V., &Ibert, O. (2020). From coronavirus to coronacrisis: The value of an analytical and geographical understanding of crisis. *TijdschriftvoorEconomische en SocialeGeografie*, 1–13.
- Buchanan, D. A., &Denyer, D. (2013). Researching tomorrow's crisis: Methodological innovations and wider implications. *International Journal of Management Reviews*, 15(2), 205–224.
- Cortez, R., & Johnston, W. (2020). The coronavirus crisis in B2B settings: Crisis uniqueness and managerial implications based on social exchange theory. *Industrial Marketing Management*. <https://doi.org/10.1016/j.indmarman.2020.05.004> (in press).
- Doern, R., Williams, N., &Vorley, T. (2019). Special issue on entrepreneurship and crises: Business as usual? An introduction and review of the literature. *Entrepreneurship & Regional Development*, 31(5–6), 400–412.
- Donthu, N., &Gustafsson, A. (2020). Effects of COVID-19 on business and Research. *Journal of Business Research*, 117(1), 284–289.
- Eggers, F. (2020). Masters of disasters? Challenges and opportunities for SMEs in times of crisis. *Journal of Business Research*, 116(1), 199–208.
- Faulkner, B. (2001). Towards a framework for tourism disaster management. *Tourism Management*, 22(2), 135–147.
- Hall, C. M., Scott, D., &Gossling, S. (2020). Pandemics, transformations and tourism: Be careful what you wish for. *Tourism Geographies* (in press).
- Hao, F., Xiao, Q., & Chon, K. (2020). COVID-19 and China's hotel industry: Impacts, a disaster management framework, and post-pandemic agenda. *International Journal of Hospitality Management*, 90, 102636.
- He, H., & Harris, L. (2020). The impact of COVID-19 pandemic on corporate social responsibility and marketing philosophy. *Journal of Business Research*. <https://doi.org/10.1016/j.jbusres.2020.05.030> (in press).
- Heyden, M., Wilden, R., & Wise, C. (2020). Navigating crisis from the backseat? How top managers can support radical change initiatives by middle managers. *Industrial Marketing Management*, 88, 305–313
- Jamal, T., &Budke, C. (2020). Tourism in a world with pandemics: Localglobal responsibility and action. *Journal of Tourism Futures*, In Press



- Kirk, C. P., & Rifkin, S. (2020). I'll trade you diamonds for toilet paper: Consumer reacting, coping and adapting behaviors in the COVID-19 pandemic. *Journal of Business Research*. <https://doi.org/10.1016/j.jbusres.2020.05.028> (in press).
- Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Reyes, C. A. M., Prochotta, A. & Berger, E. S. (2020). Startups in times of crisis—a rapid response to the COVID-19 pandemic. *Journal of Business Venturing Insights*, In Press
- Li-Ying, Jason; Nell, Phillip. (2020). Navigating opportunities for innovation and entrepreneurship under COVID-19. *California Management Review*
- Ratten, V., & Jones, P. (2020). New challenges in sport entrepreneurship for value creation. *International Entrepreneurship and Management Journal*, 16(3), 961–980.
- Vanessa Ratten, Paul Jones, *The International Journal of Management Education*, <https://doi.org/10.1016/j.ijme.2020.100432>