

BUSINESS CONTINUITY IN SOUTH AFRICA DURING COVID-19 PANDEMIC: DIGITAL TECHNOLOGY PERSPECTIVE

Thirunesha Naidu¹, Prof Muhammad Ehsanul Hoque*,^{2,3}

¹MANCOSA Graduate School of Business, 16 Samora Machel St, Durban Central, Durban, 4001, SOUTH AFRICA Email: publications@mancosa.co.za

²MANCOSA Graduate School of Business, 16 Samora Machel St, Durban Central, Durban, 4001, SOUTH AFRICA

³Research Associate, Department of Public Health, Sefako Makgatho Health Science University Pretoria, South Africa

Email: muhammad.hoque@mancosa.co.za, muhammad.ehsanul@gmail.com

Abstract

South Africa, like many other countries globally, implemented a lockdown in an attempt to contain the spread of the coronavirus which has had an adverse effect on business operations and sustainability. Minimal information is available concerning the impact of digital technology utilisation on business continuity during such a pandemic. Therefore, this study aimed to determine the impact of digital technology on business continuity during this period at a South African Testing, Inspection and Certification (TIC) company. A cross-sectional study was conducted among 59 employees and data were collected using an online anonymous questionnaire for the different types of digital technology used pre-pandemic and during the pandemic, as well as its impact on interactions and work expectations. Results revealed that the company used virtual meetings, cloud storage, electronic job systems, telecommunications, messaging applications, business intelligence solutions, big data analytics, and online training. There were moderate positive relationships found between the types of technology and business continuity during the pandemic. Areas for continual improvement were reported as network connectivity, communication, and training. It is recommended that post-COVID-19, companies need to continually evaluate the use of digital technology to further reduce the time spent by employees on manual processes thereby improving productivity to provide better customer service and enhance competitive advantage.

Keywords: Disruption, manual process, productivity, competitive advantage, customer service

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INTRODUCTION

The global COVID-19 pandemic lockdown disrupted business operations as many companies had to close or only provide essential goods and services. Such disruptions should have been identified during a business continuity planning process. However, without the consideration of appropriate digital technology, companies would have had no choice but to remain closed if their business continuity plans failed to meet the requirements promulgated regarding social distancing and working from home.

In South Africa, the government initially announced a 21-day national lockdown from 26 March 2020 which was extended into 2021 with categorised lockdown levels of 5, 4 and 3. [1] As a result of the lockdown restrictions, many companies had to remain closed as their product or service offerings were classified as non-essential.

Digital technology has developed over the years with many innovations improving the way we live, communicate and work. [2] In the business world, the implementation of such innovations has been predominantly at larger or newer organisations or e-commerce companies as resources are required to design, implement, and maintain tailored digital technology solutions.

Companies such as Testing, Inspection and Certification (TIC) providers could operate during the lockdown as their services support the essential petroleum, agricultural and chemical industry supply chains. However, any company granted permission to operate during the lockdown had to comply with the requirements as promulgated by the South African Government. [1] One such requirement was the limited floor area capacity at some business premises, so companies were encouraged to allow their employees to work from home to ensure social distancing.

During the lockdown, businesses had to rely on the use of digital technology for their employees that had to work from home due to restrictions at the business's premises. The digital technology considered for use as part of business continuity plans would have further impacted business operations during the lockdown if these were not appropriate for employees working from home to interact with employees working from the office.

TIC companies have been digitising their processes pre-pandemic to retain their market share as in this industry, companies can no longer rely merely on their accreditations, their track record and reputation with non-TIC companies also contesting for a market share. [3] Very little is known about the use of digital technology for business continuity during events such as the COVID-19 pandemic at this TIC company in South Africa. Therefore, the objective of this study was to identify the use of different digital technology and their impact on business continuity during the COVID-19 pandemic at a TIC company.

LITERATURE REVIEW

Disruptions to business are not always preventable, so proper planning is vital to mitigate the risk and minimise the damage to operations after an interruptive disaster and get back to business quickly. A business continuity plan is established when a company faces disruption and needs to quickly recover to maintain operations. During the business continuity planning, all processes and the associated potential risks should be identified for which protocols are determined to be followed when a disruption occurs. [2] During the global COVID-19 pandemic, without the consideration of appropriate digital technology during the business continuity planning process, the employees would not have been able to work from home effectively and thus this would have further impacted operations.

South African researchers found that 46.3% of South African companies surveyed indicated that their workforce could meet their demands as compared to the 43.0% that indicated that their workforce would not meet their demands two weeks into the national lockdown. [4] Most of the respondents of this study indicated that their ability to meet work expectations for turnaround times was achievable

by receiving the correct information on time and being able to interact and communicate with work groups and access systems by using the current work tools available during the COVID-19 pandemic. This observation agrees with the research literature. The same South African researchers indicated that most of the companies surveyed there had indicated that more than 80% of their workforce were still working at work instead of remotely. [4] Since 46% of the respondents of this study indicated that they had worked from home either on a full-time basis or intermittently during the pandemic, this agrees with the research literature.

A differentiation was made between technology-in-normal-use as the technology routinely used by organisations and technology-in-incident as the technology available for use during an incident. [5] The author also concluded that technology-in-normal-use and technology-in-incident should be holistically considered when preparing for incidents and supporting continuity as these are closely connected. More than half of the respondents indicated that they had started using virtual meetings, telecommunication channels, and messaging applications, during the COVID-19 pandemic. The work tools were available for use before the pandemic and the respondents indicated that most of the work tools listed were in use before the COVID-19 pandemic, which agrees with the research literature.

The study revealed that most of the work expectations for turnaround times, interacting, reporting and information flow were timeously achieved during the COVID-19 pandemic and based on the responses, this agrees with the literature review. The responses also indicated that most of the work tools i.e. virtual meetings, cloud storage, electronic job systems, telecommunications, messaging applications and online training were useful during the COVID-19 pandemic which agrees with the research literature, except for big-data analytics and business intelligence solutions. Since 58% of respondents in the survey indicated that they had started using telecommunications during the pandemic, with 61% of the respondents rating that the use of telecommunications was useful, this agrees with the research literature.

Limited and costly infrastructure, digital literacy, intermittent electricity supply, and the availability of ICT facilities, have been cited as problems that illustrate the digital divide and recommendations have been made that, in addition to investment in ICT facilities and infrastructure, training programs must be aligned by addressing technophobia and the general reluctance to use digital tools. [6] More than half of the respondents from this study (63%) flagged network connectivity and (51%) communication as areas of improvement. The aspects of training (47%), work tools (37%) and hardware (25%) were also flagged by the respondents. This agrees with the research literature. Based on the statistical analysis, positive relationships exist between the use of digital technologies and their usefulness for business continuity which indicates that technophobia or a general reluctance to use digital tools is not evident in this case.

RESEARCH METHODOLOGY

The choice of research design was quantitative as the purpose of the research was explanatory. The questionnaire survey supported the positivist philosophy. [13] The target population were the employees of the TIC company who were based throughout South Africa at the major ports and near customer sites and both working from the office and home during the COVID-19 pandemic. The total number of employees on the company payroll at the start of the pandemic in March 2020 was 232. The sampling frame selected were all the employees at the company excluding executive management as directors are not directly involved in business operations. The census sampling technique was used as the population was the same as the sample for the study.

To answer the research questions, the survey questionnaire comprised four sections: demographics, business continuity, digital technology, and continual improvement, with 14 questions in total. The questions asked were related to the types of digital technology that were used prior to and during the

pandemic as part of the business continuity plan. The insights from employees, both working at the office and from home, on the effectiveness and efficiency of the digital technology available in meeting their work demands, were used to explain if the technology played a role in business continuity during the pandemic. The challenges faced by the employees and their insights on digital technology were used as a basis to recommend improvements in the use of digital technology for business continuity plans for pandemics. The data collated from the survey questionnaire responses were analysed using both descriptive and inferential statistics to address the research questions.

Ethical considerations

An ethical certificate was obtained from the Mancosa ethics committee. The collection of primary data from participants was governed by good ethical practices of non-maleficence, beneficence, autonomy, and justice. These key principles were considered throughout the research process. The research study was conducted that ensured permission was obtained, participants were given informed consent, no harm came to the participants, and confidentiality and anonymity were maintained during the study.

RESULTS AND DISCUSSION

The survey questionnaires were administered to all employees on the company payroll which was 236 at the time of distribution. A total of 59 responses were received which is a response rate of 25%. It was found that 32% from testing, 10% from inspection, 34% from administrative and 24% from managerial roles at the company. Regarding working experience in the company, 50% were working between 6 and 20 years. More than a quarter (27%) indicated that their role in the company required interactions with people from within their department, this was followed by 26% interaction with customers. About half (44%) indicated that they did not work from home during the COVID-19 pandemic.

Table 1: Distribution of roles, experiences, interaction during the pandemic and working from home

| Variables | | Percent |
|---------------------|-------------------------------------|---------|
| Role in the company | Testing | 32% |
| | Inspection | 10% |
| | Administrative | 34% |
| | Management | 24% |
| Years of experience | < 1 year | 2% |
| | 1-5 years | 34% |
| | 6-10 years | 25% |
| | 11-19 years | 25% |
| | > 20 years | 14% |
| Interactions | Within department | 27% |
| | With customers | 26% |
| | Other departments | 24% |
| | Suppliers | 19% |
| | Consultants / professional services | 4% |
| During pandemic | Did not work from home | 44% |
| | Worked intermittently from home | 29% |

Business continuity

Sixty-one per cent indicated that they were aware that the company had a business continuity plan prior to the COVID-19 pandemic whilst 29% indicated they were not aware of the business continuity plan and not aware of the business continuity plan.

Seventy-eight per cent indicated that they were made aware of the business continuity plan implemented for the COVID-19 pandemic. Whilst 10% indicated that they were not made aware of the implemented changes and 12% of the respondents were uncertain regarding the changes implemented for the lockdown. Of the 61% of respondents who indicated they were aware of the company business continuity plan pre-pandemic, 91% of them also indicated that they were also made aware of the changes implemented for working during the lockdown. Of the 27% of respondents who indicated they had worked from home during the pandemic, 75% said that they were aware of the business continuity plans implemented.

The impact on work processes with the use of technology to communicate, colleagues working from home or remotely, the flow of information within the company and between the company and customers, suppliers and other parties and the use of technology to generate and distribute reports are illustrated in the Figure 1 below:

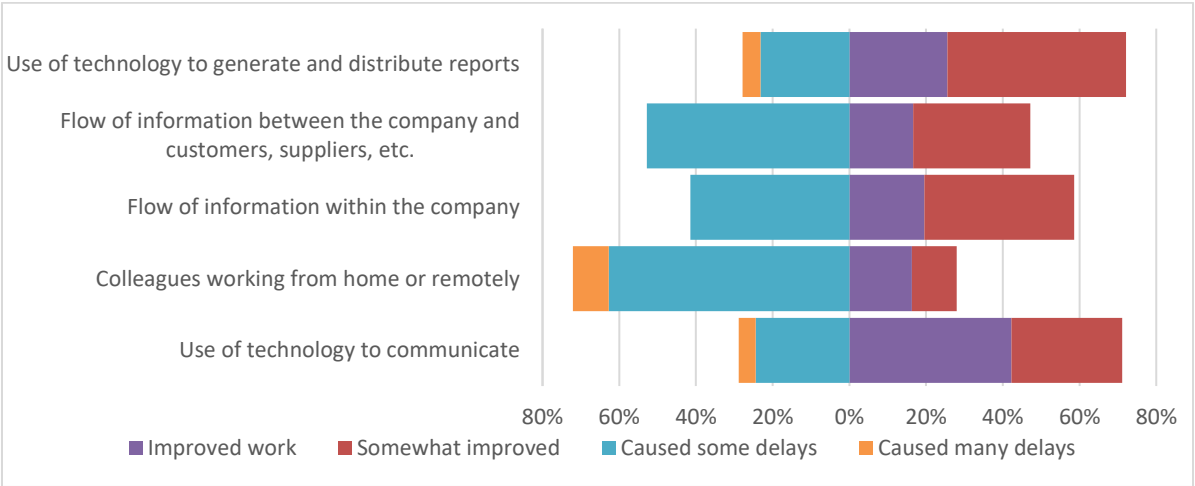


Figure 1: Impact on work processes

The findings reported here concur with that of the study who found that globally employee productivity was significantly influenced by flexible work arrangements and was not directly impacted by information technology used for flexible work arrangements. [14]

Some of the digital technologies available for use by businesses include mobile and collaborative technologies, the internet-of-things with next-generation telecommunication networks, big-data analytics, artificial intelligence for deep learning, blockchain technology and business intelligence solutions. [12]

Digital technology

Forty-four per cent of the respondents indicated that telecommunication channels were used prior to the COVID-19 pandemic, 44.1% said this applied to messaging applications, and 37.3% to electronic job systems. Virtual meeting platforms (50.8%), online training (41.4%) and cloud storage (30.5%) were mostly used when required. Business intelligence solutions were never used by 28.8% of (Figure 2) the respondents with 15.3% indicating that they did not have access to these solutions.

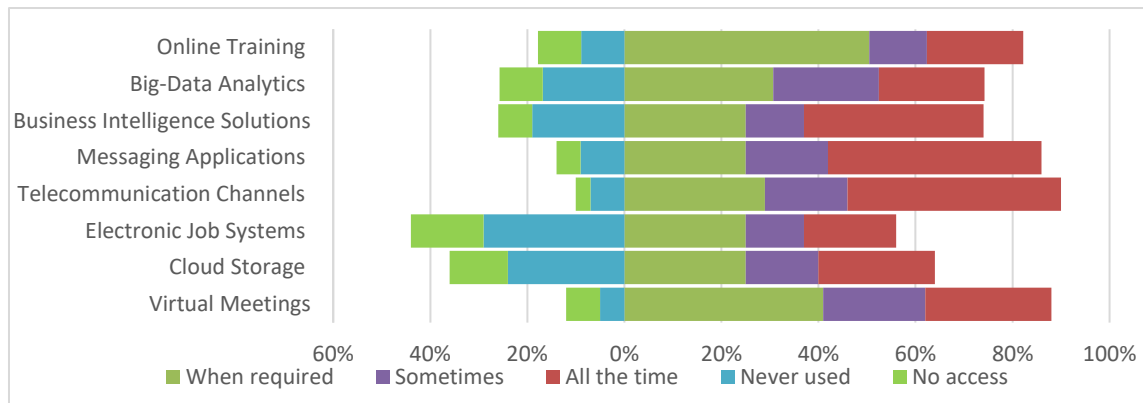


Figure 2: Use of work tools pre-pandemic

Despite the advantages of using digital technologies, a study indicated that its use was limited to temporary office setups during a disruption. [10] This, however, is not the case as the results indicate that most of the work tools listed were in use prior to the COVID-19 pandemic. With the changes implemented for working during the lockdown, 72% of the respondents indicated that they had started using virtual meetings, 64% had started using messaging channels and 58% had started using telecommunication channels. Online training was used by 53% of the respondents and cloud storage was used by 51% of the respondents (Figure 3).

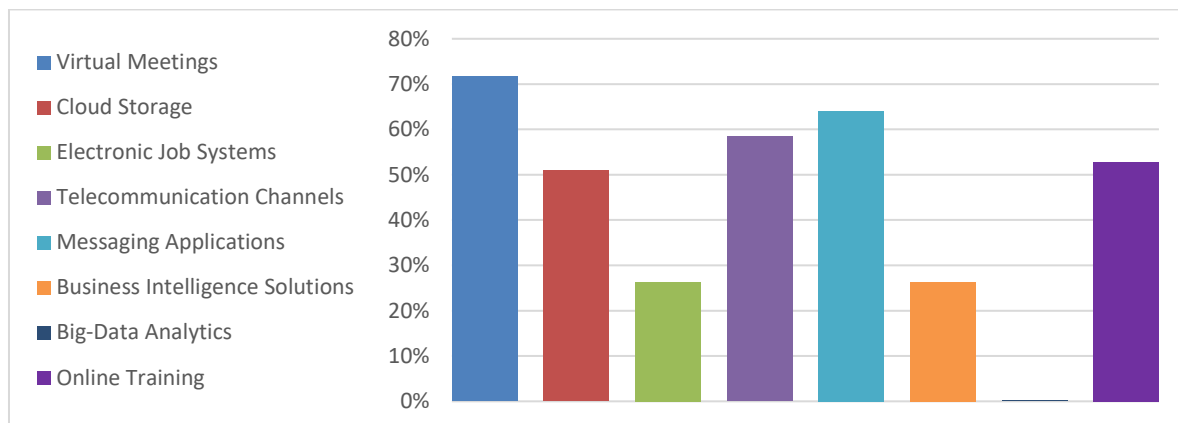


Figure 3: Work tools used during the pandemic

The types of digital technology listed above were available for use at the start of the lockdown. A study also found that technology used routinely, and technology available for use, should be holistically considered when planning for business continuity. [5] Businesses that had not invested in technology struggled during the unprecedented COVID-19 lockdown in comparison with those businesses that had invested in technology for business continuity. [16]

Except for electronic job systems, business intelligence solutions and big-data analytics, most respondents indicated they had worked from home and started using work tools during the COVID-19 pandemic. The results indicate that most of the work tools listed were useful during the COVID-19 pandemic except for big-data analytics and business intelligence solutions. Remote working, enhanced network connectivity, and increased operational efficiency have been reported as being some of the advantages of using digital technologies. [15]

The data from this study revealed that there was no relationship between the use of electronic job systems and their usefulness for business continuity during the COVID-19 pandemic but one between the use of telecommunication channels and their usefulness for business continuity during the COVID-19.

pandemic. The use of telecommunications to stay connected increased during the COVID-19 pandemic. [12] This was attributed to the lockdown measures introduced for social distancing, quarantining and remote working. The increase in use was both by individuals and businesses.

There is a relationship between the use of big-data analytics and their usefulness for business continuity during the COVID-19 pandemic but no relationship between the use of online training and their usefulness for business continuity during the COVID-19 pandemic. The findings conform with that of the research study regarding the practicality of digital technologies. [12] These findings also contribute to a better understanding of the use of digital technologies to deal with disruptive events or disasters such as COVID-19, to which it is indicated that there was limited evidence available in the literature. [12]

Continual improvement

More than half of the participants (53%) indicated that they were able to meet work expectations most of the time. The results indicated that most of the work expectations listed were timeously achieved during the COVID-19 pandemic based on the responses. The findings conform with that of [4] who found that the majority of the South African companies were able to meet their work demands during the lockdown.

With the business continuity plan implemented and the use of digital technology during the COVID-19 pandemic, 63% of the respondents flagged network connectivity as an area for improvement, while 51% flagged communication and 47% flagged training as areas for improvement. Only 34% of the respondents flagged work tools and 37% flagged working remotely as areas for improvement. The findings conform with that of research that recommended improvement areas regarding the availability of ICT facilities and infrastructure and continued investment in ICT facilities and infrastructure as well as training programs to address the digital divide. [6]

The risk of cyber security and data fraud due to a sustained shift in working patterns (50%) was noted as a leading technological risk. Respondents were encouraged to comment on the use of digital technology and its impact on business continuity during the COVID-19 pandemic. Frequent phrases used included digital technology and business (11%), working from home (7%), lockdown and communication (6%), people and company business continuity (4%), customers (3%) and travel costs, network connectivity and cyber security (2%).

Results showed a significant association between the use of virtual meetings and their usefulness for business continuity during the COVID-19 pandemic ($X^2=17.479$, $p<0.01$). There was a relationship between the use of cloud storage and its usefulness for business continuity during the COVID-19 pandemic ($X^2=14.9709$, $p=0.005$). The results for virtual meetings and cloud storage conform with that of two sets of researchers who indicated that the use of virtual meetings and cloud storage are required to enable employees to work remotely. [7] [8] Virtual meetings enable employees to communicate with others and cloud storage to store and share documents with their colleagues.

A significant association was found between the use of telecommunication channels and its usefulness for business continuity during the COVID-19 pandemic ($X^2=9.263$, $p=0.026$). The use of telecommunications to stay connected increased during the COVID-19 pandemic. [9] This was attributed to the lockdown measures introduced for social distancing, quarantining and remote working. The increase in use was both by individuals and businesses.

It was found that a significant association existed between the use of business intelligence solutions and their usefulness for business continuity during the COVID-19 pandemic ($X^2=27.262$, $p<0.01$). The results for business intelligence solutions conform with that of two sets of researchers who indicated that business intelligence solutions are required to enable remote working employees to optimise their productivity and maximise output to meet demands or expectations. [7] [8]

The use of cloud computing, mobile telecommunications, big-data, and other technologies to integrate systems, such as IoT could improve efficiencies, increase customer interactions, and optimize supply chain operations by allowing industries to work smarter. [9] It has also been revealed that with the use of BI&A to get value from data, organisations can better position themselves to make fact-based decisions. [10] The findings conform with that of [9] and [10] regarding the usefulness of digital technologies. These findings also contribute to a better understanding of the use of digital technologies to deal with disruptive events or disasters such as COVID-19, to which [11] indicated that there was limited evidence available in the literature.

A Spearman's rho correlation was used to test the strength of the relationship between the variables (Table 2). A moderate positive correlation exists between the use of virtual meetings and their usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(59) = .535, p < .001$). There was a moderate positive correlation exists between the use of cloud storage and its usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(59) = .449, p < .001$). There was a weak positive correlation exists between the use of electronic job systems and their usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(58) = .298, p = .023$). There was a weak positive correlation exists between the use of telecommunicates and its usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(59) = .367, p = .004$). There was a weak positive correlation exists between the use of messaging applications and their usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(59) = .284, p = .03$). There was a strong positive correlation exists between the use of business intelligence solutions and their usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(57) = .614, p < .001$). There was a moderate positive correlation exists between the use of big-data analytics and their usefulness for business continuity during the COVID-19 pandemic, which was statistically significant ($r_s(56) = .583, p < .001$). There was a weak positive correlation exists between the use of online training and its usefulness for business continuity during the COVID-19 pandemic, which was not statistically significant ($r_s(58) = .243, p = .066$).

Table 2: Pearson correlation output

| | | Correlations | | | | | | | |
|---------|-------------------------|--------------|-----------|------------|-----------|-----------|------------|------------|-----------|
| | | VM USEFUL | CS USEFUL | EJS USEFUL | TC USEFUL | MA USEFUL | BIS USEFUL | BDA USEFUL | OT USEFUL |
| VM USE | Correlation Coefficient | .535** | .399** | -0.216 | .360** | .424** | .275* | 0.242 | .320* |
| | Sig. (2-tailed) | <.001 | 0.002 | 0.103 | 0.005 | <.001 | 0.039 | 0.073 | 0.014 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| CS USE | Correlation Coefficient | .375** | .449** | -0.055 | 0.193 | .294* | .338* | .282* | .272* |
| | Sig. (2-tailed) | 0.003 | <.001 | 0.682 | 0.142 | 0.024 | 0.01 | 0.035 | 0.039 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| EJS USE | Correlation Coefficient | 0.077 | 0.091 | .298* | 0.164 | 0.085 | 0.242 | 0.175 | 0.23 |
| | Sig. (2-tailed) | 0.563 | 0.492 | 0.023 | 0.215 | 0.525 | 0.07 | 0.197 | 0.082 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| TC USE | Correlation Coefficient | 0.174 | 0.038 | 0.147 | .367** | 0.127 | 0.135 | 0.077 | .323* |
| | Sig. (2-tailed) | 0.187 | 0.776 | 0.27 | 0.004 | 0.339 | 0.315 | 0.573 | 0.013 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| MA USE | Correlation Coefficient | .327* | 0.117 | 0.032 | .355** | .284* | 0.171 | 0.184 | .321* |
| | Sig. (2-tailed) | 0.011 | 0.378 | 0.81 | 0.006 | 0.03 | 0.205 | 0.174 | 0.014 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| BIS USE | Correlation Coefficient | 0.219 | 0.235 | 0.073 | .364** | 0.192 | .614** | .278* | .443** |
| | Sig. (2-tailed) | 0.096 | 0.073 | 0.589 | 0.005 | 0.145 | <.001 | 0.038 | <.001 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| BDA USE | Correlation Coefficient | 0.217 | 0.139 | 0.11 | .386** | 0.213 | .377** | .583** | .472** |
| | Sig. (2-tailed) | 0.099 | 0.294 | 0.409 | 0.003 | 0.105 | 0.004 | <.001 | <.001 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |
| OT USE | Correlation Coefficient | 0.099 | 0.026 | .294* | 0.17 | 0.091 | .320* | 0.102 | 0.243 |
| | Sig. (2-tailed) | 0.454 | 0.845 | 0.025 | 0.197 | 0.493 | 0.015 | 0.454 | 0.066 |
| | N | 59 | 59 | 58 | 59 | 59 | 57 | 56 | 58 |

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Conclusion

Various technologies such as virtual meetings, cloud storage and big-data analytics were used by TIC during COVID-19 for business continuity. The use of digital technologies and their usefulness together with business intelligence solutions were important for business continuity. and their usefulness for business continuity during the COVID-19 pandemic.

Recommendations

The study aimed to contribute to a better understanding regarding the use of digital technology and its impact on business continuity. Based on the findings, the followings are recommended:

- Evaluate where digital technologies are available for use depending on the different roles in the company i.e. testing, inspection, administrative or managerial as some respondents indicated that work tools such as electronic job systems and cloud storage were not used despite being available. Technology-in-normal-use and technology-in-incident should be holistically considered when preparing for incidents and supporting continuity as these are closely connected.
- Create awareness regarding the benefits of using available big-data analytics and business intelligence solutions as work tools as, along with the provision of training, the company can further enable its employees to increase their productivity and improve efficiencies.
- Continually evaluate the use of digital technologies to keep current with the accelerated pace of innovative digital transformation, future risks, and cyber security with shifts in working patterns.
- The business continuity plan should be reviewed holistically with digital technologies and should be tested to build resilience, improve responses to disruptions and continue with operations following a disruption. A continual evaluation of the business continuity plan will also enable newer

employees to become familiar with the key resources available to support the company's essential business functions.

- The immediate focus of business at the start of the COVID-19 pandemic was business continuity. However, companies should now look for opportunities to develop and integrate new products and services as the unprecedented nature of the pandemic has changed the way we live, and work.

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