Research Article

Technology as a Source of Business Survival during the Covid-19 Pandemic: A Case Study of Selected Businesses in Bulawayo

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Abstract: The study focused on technology as a source of business survival during the Covid-19 pandemic. The study focused on Bulawayo businesses. Questionnaires were used as the primary data collection instruments. These were supplemented by interviews where there were no questionnaire responses. Descriptive Statistics and Chi-squared tests were used to analyse data. The majority of the businesses surveyed used mainly Social media and Zoom platforms to facilitate business survival during Covid-19. Contactless payments, Microsoft Teams and Teleconferencing were used to a moderate extent. Many businesses wished they could have adopted more advanced technologies like Big Data Analytics, Internet of Things, Artificial Intelligence, Machine Learning and Block Chain had the financial resources permitted them to do so. The perceived usefulness of these technologies was high according to the Technology Acceptance Model but adoption was hindered by the cost element as highlighted by the Task-Technology Fit Model Model. Businesses linked tasks with the best technology that could perform the task in line with the Task-Technology Fit Model. Lack of adequate ICT infrastructure, lack of electricity, slow downloading speed, unavailability of capital, lack of skilled labour, lack of technical support and knowledge were identified as the major challenges in the use of new technologies. The measures to facilitate the smooth adoption of technology were hinged on tackling the identified challenges. In general businesses should invest more and allocate generous amounts towards acquiring new technologies (including, preferably 5-G Technology) and training of employees on new technical skills. Businesses should backup power supply through installation of solar power. In particular SMEs should network widely and make their business models more amenable to technological disruption in order to survive crises such as the Covid-19 pandemic.

Keywords: Technology, Covid-19 Pandemic, Advanced Technologies, Challenges, New Technologies, Technological Disruption.

INTRODUCTION AND BACKGROUND TO THE PROBLEM

Technology has always been fronted as key in ensuring the survival of businesses. It is becoming increasingly important for firms to disrupt themselves technologically in order to survive in a global and highly competitive environment. With the advent of Covid-19, the adoption of technology as a survival tool has grown in terms of breath and depth. Governments across the globe and Zimbabwe included, in a move to capture and contain the spread of Covid-19, closed down their national borders while restricting internal mobility. The lockdown measures were mostly adopted to curb the spread of the corona virus while managing the symptoms of the infected. These measures reconfigured the way in which business is conducted, with various new technologies being deployed. This study sought to determine the extent to which businesses in Bulawayo employed technology as a source of business survival during the Covid-19 pandemic.

On December 30, 2019, in Wuhan, China, a patient tested positive for Corona virus that fell in the family of the Betacorona virus 2 (Covid-19) (Peng et al, 2020). The virus began to spread across several cities around the globe such that by April 2020, the global tally had reached 1,118,884 with 59 236 deaths. USA, Italy, Spain, Germany, France and China were leading the statistics in that order (World Health Organisation, 2019). In Africa, South Africa presented the highest number of Covid-19 cases (Government of South Africa, 2020). South Africa remained the top with more cases of infections in 2021, which stood at 1.76 million, followed by Morocco with 524 475 (Galal, 2021). In Zimbabwe, the first case of Covid-19 was recorded on March 21, 2020, and by April 13, 2020, Zimbabwe had recorded 14 cases with three deaths of Covid-19 (Rahman & Shaban, 2020). By June 11, 2020, Covid-19 cases in Zimbabwe had soared to 279 where most were recorded among returnees from South Africa which had the highest levels recorded.

Bulawayo, a city in the Southern part of Zimbabwe was once an industrial hub of the nation earning itself the name, 'Kontuthu ziyathunqa' However, things are no longer as they were, as much of the industry has dissipated due to a prolonged period of economic meltdown. The outbreak of Covid-19 exerted another layer of pressure on the already troubled business

environment. It has been reported that though there were lockdowns, businesses exhibited striking resilience (Legat, 2021). On a macroeconomic level, the economy is amazingly reported to have experienced some measurable growth during the Covid-19 induced lockdowns (Legat, 2021). Could it be that the use of technology contributed towards this resilience and if so, to what extent? If it did, how then can we better leverage technology to circumvent future pandemics? These questions constitute the mainstay of this study. Against this background, it is paramount to understand the collection of technologies that businesses have at their disposal as an arsenal and survival tool. In this study the Covid-19 pandemic era is roughly the period April 2020 to April 2022.

Research Questions
1. What specific technologies were used to facilitate day to day operations and to what extent?
2. How was technology employed to facilitate the day to day business operations?
3. What are the problems that were encountered in the use of technology?
4. What measures can be put in place to facilitate the smooth adoption of technology?

LITERATURE REVIEW
Definition of Technology
According to Kumar *et al.* (1999) technology consists of two primary components, that is, the physical components and the informational components. The physical components comprise of items such as products, tooling, equipment, blueprints, techniques, and processes and the informational components consist of know-how in management, marketing, production, quality control, reliability, skilled labour and functional areas. This resonates well with the basic view of a computer which alludes to the physical visible components as constituting 'hardware' and the invisible informational components as constituting the 'software'. The current studies on the technology transfer have connected technology directly with knowledge and more attention is given to the process of research and development (Dunning, 1994). By scrutinizing the technology definitions above, there are two basic components that can be identified, and these are 'knowledge' or 'technique' and 'doing things'. Technology is always connected with obtaining a certain result (in this case business survival by facilitating the day to day operations), resolving certain problems, completing certain tasks using particular skills, employing knowledge and exploiting assets (Lan & Young, 1996).

Technology is accelerating its ability to help businesses do more with less and provide better results. New technologies that are coming on board include Artificial intelligence (AI), big data, and the Internet of things (IoT) which work together to create programmes that businesses can use to decrease time from product idea to product creation and product creation to customer delivery. Nowadays of rapid change (a phenomenon commonly referred to as digital disruption), it is becoming increasingly important to lengthen the product life cycle by collapsing as much as possible the time to market a new product in order to maximise profitability before competitors emulate and modify the product. Technology indeed plays a big role in achieving this goal. Manyika *et al.* (2013) contend that "Advances in artificial intelligence, machine learning, and natural user interfaces (for example voice recognition) are making it possible to automate knowledge worker tasks that have long been regarded as impossible or impractical for machines to perform".

The above is indeed a comprehensive study of the definition of technology. These definitions helped to explore the technologies used to aid business survival under the auspices of 'physical' technologies and 'knowledge or technique' based technologies. It is very interesting to see the degree to which these technologies were used during the covid-19 era.

Types of Technology Adopted
Various types of technologies used during Covid-19 were identified from literature and these are discussed below.

Digital and Contactless Payments
Cash notes can transmit the Covid-19 virus to different destinations once an infected person gets to access it (Greer *et al.,* 2021). According to the World Bank, more than 1.7 billion unbanked individuals do not have convenient access to digital payments. The obtainability of digital payments also depends on the availability of the internet, computers and a network to turn money into a digital format. According to Xiao (2020), contactless digital payments, either in the form of cards or e-wallets, are the recommended payment method to avoid the spread of Covid-19. Digital payments enable people to make online purchases and payments of goods, services and even utility payments, as well as to receive stimulus funds faster.

Remote Work Driven Technologies
According to Ruktanonchai *et al.* (2020), cloud technologies and work communication software such as Zoom and Skype allow a person to appear in front of a virtual backdrop while remaining in the privacy of their own home. As a result, there will be less movement and less communal transmission of the Covid-19 virus. Di Domenico and others (2020) also allude to the fact that, in order to prevent the transmission of Covid-19 infections, remote work saves time and allows for greater flexibility. Xiao (2020) noted that many companies during the Covid-19 pandemic have asked employees to work from home and this was enabled by technologies including virtual private networks (VPNs), voice over internet protocols (VoIPs), virtual meetings, cloud technology, work collaboration tools and a virtual background to preserve the privacy of the home. Remote

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work according to Xiao (2020), does not only help to curb the spread of the Corona virus but also saves time to commute and provides more flexibility.

Live Streaming Platforms

Social media has significantly transformed the business environment. Social media provides low cost charges and efficient management of online information exchange and relationships. For example, social media offers social networking and generated content about products, brands and services etcetera (Xiao, 2020). The emergence of Web 2.0 provides online social spaces for real-time connectivity among businesses and Internet users by easily creating and exchanging information.

Live Stream Conference to Replace Face To Face Conferences

During the pandemic, Zimbabwean lifestyles have been quickly adapted to a new virtual reality, including e-learning, e-commerce, e-entertainment, live-stream conferencing, and remote working. For organizers, virtual conferences can create new and lucrative opportunities in terms of increased content delivery options, more robust networking, and extend sponsorship options (Xiao, 2020). For attendees, benefits include decreased health risks, travel time, and costs. Several organizations and businesses chose to hold their events virtually. According to the Centre for Exhibit Industry Research (Xiao, 2020), 40% of corporate brand marketers and 31% of exhibition marketers held virtual events; 71% of respondents used virtual reality to accommodate a geographically widespread workforce.

Electronic Monitoring Systems

According to Alge (2001); & Ball (2010), monitoring refers to systems, people, and processes used to collect, store, analyse, and report the actions or performance of individuals or groups on the job. Monitoring today may assume a variety of forms: telephone, video, Internet, and GPS (Cascio & Montealegre, 2016). Many companies are outfitting machinery, shipping, infrastructure, gadgets, and even workers with networked sensors and actuators that allow them to monitor their surroundings, report their condition, receive instructions, and take actions depending on the data they collect (McNall & Stanton, 2011).

Robots

For decades, manufacturing floors have been home to robots. They used to be largely large, expensive devices that had to be enclosed in cages to avoid colliding with humans. Furthermore, they were limited to performing only one activity (for example, spot welding) repeatedly, albeit very quickly and precisely. For small firms, they were neither inexpensive nor practicable. Collaborative machines, on the other hand, are now built to work with people in close quarters (Davenport & Kirby, 2016). Furthermore, developments in artificial intelligence, along with enhanced sensors, are allowing robots to make increasingly sophisticated decisions and learn how to complete tasks on their own, allowing them to operate effectively in uncertain and fluid environments. Robots are not only becoming enmeshed in organizational social systems, but they are also becoming social players inside them. Kiva robot, owned by Amazon, is an example of a robot that is designed to move across large warehouses, fetching racks of ordered goods and delivering the products to humans who package the orders (Rotman, 2013).

Teleconferencing

Teleconferencing is an electronic medium for interactive group communication (three or more persons in two or more places) (Rogan *et al.,* 1984). The American Telephone and Telegraph Company's Picture phone was the first to offer the concept in the 1960s. Teleconferencing comes in at least five flavours: audio, audio graphic, video, online, and business television. Virtual teams, in which members are not physically co-located, are one sort of extended work arrangement in which teleconferencing has made the physical and electronic realms more integrated. The most significant benefit of virtual teams is that they allow enterprises to tap into a bigger pool of intellectual resources and diverse talent to solve challenges by spanning geographical, cultural, organizational, and time boundaries (Potosky & Lomax, 2014).

Big Data, Artificial Intelligence and Internet of Things

Big data is "things one can do at a large scale that cannot be done at a smaller one, to extract new insights or create new forms of value, in ways that change markets, organizations, the relationship between citizens and governments, and more" (Mayer-Schönberger & Cukier, 2013, p.6). Chui *et al.* (2010) define the Internet of Things (IoT) as "sensors and actuators embedded in physical objects, from roadways to pacemakers that are linked through wired and wireless networks, often using the same Internet Protocol (IP) that connects to the Internet". According to Frankenfield (2021), Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving. IoT captures data that AI can organise into big data.

Theoretical Framework

The advent of Covid-19 has seen the rapid adoption of technology like never before. In some cases, businesses that were rigid were forced by the prevailing environment to adopt technology. This study is based on some of the theories that are briefly explored below.

Technology Acceptance Theory

Probably the most common and quoted technological theory is the Technological Acceptance

Theory by Davis *et al.* (1989). The theory has been popular, being used to describe technology adoption over the past two decades. According to this theory, perceived usefulness and ease of use are the most important factors of behavioural intention to use technology.

User acceptance is defined as the demonstrable willingness within the user to employ information technology for the task it is designed to support.
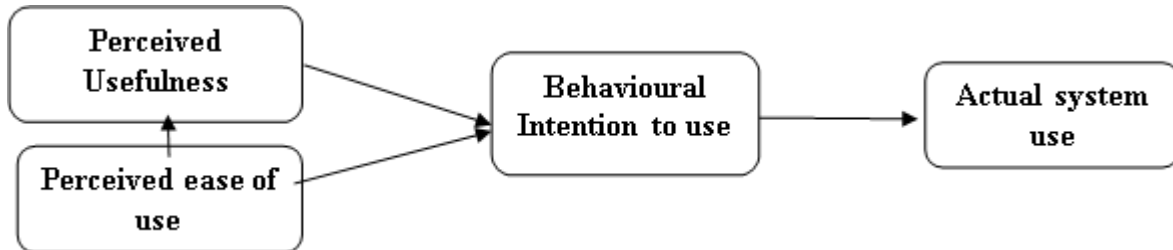
Perceived risk, trust, security and privacy are some of the factors that affect acceptance of using technology. Perceived usefulness refers to the degree to which the user believes that using a particular system will enhance his or her job performance. On the other hand, perceived ease of use refers to the degree to which a user believes that the use of a particular system will be free of effort (Davis *et al.,* 1989).

Figure 1. Technology Acceptance Model
Adopted from: Davis *et al.* (1989)

Perceived usefulness and ease of use are factors which had a potentially great effect on the extent to which new technology was adopted during the Covid-19 era. From the assumptions of the Technology Acceptance Model, the higher the perceived usefulness of a type of technology, the higher the degree of usage of that technology. Similarly, the easier a new technology can be used, the higher the degree of adoption of the technology in question (Davis *et al.,* 1989).

Diffusion of Innovation theory
This theory was developed by Rogers in 1983. Diffusion of innovation is a theory of how, why, and at what rate new ideas and technology spread through cultures, performing at the individual and firm level. The theory finds innovations as being transmitted through certain channels over time and within particular social systems (Turana *et al.,* 2015). Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time (Rogers, 1983). According to Rogers (1983 cited in Turana *et al.,* 2015), diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. The researchers further argued that it is a special type of communication because messages are concerned with new ideas, the more compatible the technology will be to users the less a change of behaviour is required, therefore, allowing for faster adoption. Trial ability is the degree that the innovation can be tested and experimented before its inclusion. The complexity (its ease of use) of technology will also impact on adoption. If the use of technology requires considerable learning, it is less likely that users will persevere with it. Observability is whereby the innovation use and effects must be visible by others.

The advent and impact of Covid-19 was sudden, requiring businesses to reconfigure immediately. There was not enough time for trials and training of staff. The tenets of the Diffusion of Innovation Theory was a useful point of reference in the study of the problems encountered in the adoption of new technology.

Theory of Planned Behaviour (TPB)
The theory of planned behaviour (Ajzen, 1991) is based on the assumption that behaviour is influenced by individual desires. According to this theory, human behaviour is formed by three categories of beliefs: behavioural, normative and control. The theory therefore claims that the main factors that determine behavioural tendencies are attitude towards the behaviour, subjective norm and perceived behavioural control.

Technology Readiness (TR) Model
The model refers to people's propensity to embrace and use new technologies for accomplishing goals in home life and at work based on technology readiness and technology readiness score (Parasuraman & Colby, 2001). Parasuraman & Colby (2001) further classified technology consumers into five technology readiness segments of explorers, pioneers, sceptics, paranoids, and laggards. This is similar to Rogers (1995) S-shaped adoption curve of innovators, early adopters, early majority, late majority and laggards.

Task-Technology Fit (TTF) Model
According to Goodhue & Thompson (1995), Task-technology Fit (TTF) emphasizes individual impact. Individual impact refers to improved efficiency, effectiveness, and or higher quality. Goodhue & Thompson (1995) assumed that a good fit between a task and technology increases the likelihood of utilization and also increases the performance impact since the technology meets the task needs and wants of users more closely. This model is suitable for investigating the actual

usage of the technology especially testing of new technology to get feedback. The task-technology fit is good for measuring the technology applications already released in the market place like in the google play store or apple store app (iTunes) etcetera.

Empirical studies on Types of Technologies adopted during Covid-19 era

Hodder (2020), acknowledges the deployment of new technology during the Covid-19 pandemic. These are technologies that either did not exist before Covid-19 or existed but lacked widespread adoption by businesses. He advocates for a retrospective view in order to understand the current technologies adopted during Covid-19.

China being the first country to record Covid-19 cases occupies a very important place as a test bed and leader in implementing pandemic induced technologies and business models. Fannin (2020) in an online article highlights the new technologies that were being rolled out in response to the pandemic by high-tech companies in China such as Baidu, Alibaba, JD.com and DJI. New technologies that were rolled out include Big Data, Facial recognition, and artificial intelligence. Autonomous robot vehicles were deployed to bring food, medicine and other supplies to residents. In the logistics industry, IoT platforms with connected smart devices for streamlined deliveries were developed. Robots were being put to work in factories, warehouses and assembly operations as part of the robotic revolution dubbed the 'Made in China 2025'plan (Guerzoni, 2018). Virtual Health Care also came on board.

Merritt (2021) in agreement with Hodder (2020) alludes to the fact that the health restrictions put in place to stop the spread of the virus have underscored the importance of integrating digital technologies in business operations. The analysis by Merritt (2021) indicates that companies' interest in digital technologies has grown between 2019 (pre-covid-19 period) and 2021(a year into the pandemic). In his study on SMEs in Brazil, he found that SMEs deployed the Internet of Things (IoT), Big data, cloud computing, Artificial Intelligence (AI) and virtual and augmented reality.

Lau (2020) conducted a study in the Chinese Hotel sector, one of the sectors hardest hit by the pandemic globally. In order to survive and stimulate the needed sales, Lau (2020) subscribe that hotels adopted live stream promotion, live stream conference as well as 5G technology working alongside Wifi-6. Lau (2020) contends that the use of 5G technology ensures better bandwidth and faster downloads speeds (10 Gigabyte per second) which allows a larger number of applications and devices to be connected onto the network. Lau (2020) also narrates the fact that, Live-stream promotion and live-stream conference are introduced to primarily improve information quality, while 5G technology and Wi-Fi 6 are installed to enhance the system quality.

Facial recognition, AI, and Robots are integrated to the daily operations to enhance service quality.

Very limited research has been conducted on the adoption of different technologies during the Covid-19 lockdowns. There seems to be a proliferation of research on the fight or management of the pandemic and comparatively less studies on business survival.

Problems Encountered in the use of Technology

According to Merritt (2021), the main barriers encountered in the use of technology in his study is lack of skilled labour, infrastructure barriers to the availability of digital technology and inadequate support from executives. Merritt (2021) also cited financial constraints worsened by the pandemic itself as one of the problems which hampered the adoption of new technology. Richardson (2011) in a study which was based on data collected from an open ended survey, face to face and interviews identified hardware incompatibility; complexity; language barriers; the lack of electricity, computers, and Internet access as major problems encountered. Thorne (2020) picks on lack of suitable infrastructure and stable access to electricity as major stumbling blocks in the adoption of technology. Lau (2020) pointed out the challenge of low bandwidth size and download speeds associated with 4G technology. A 4G technology is not capable of hosting a range of devices and applications that were required during the Covid-19 pandemic.

Measures to Facilitate the Smooth Adoption of Technology

Richardson (2011) alludes to the fact that, in order to maximise the benefits of technology, good infrastructure is required. There must be, firstly stable access to electricity. This, however, is the most binding constraint in most African countries. The second issue mentioned by Richardson (2011) which coincides with Merritt (2021)'s view is that digital infrastructure, including universal mobile internet access, faster connections and greater access to smartphone handsets capable of running more complex mobile apps must be put in place.

Furthermore, Richardson (2011) noted that, internet access has improved globally, but gaps remain. Europe/Central Asia has 68%, East Asia and the Pacific 56%, Latin America and the Caribbean 53%, Middle East and North Africa 40%, South Asia 33% and Sub Saharan Africa 24%. These figures indicate an increase in Internet penetration (connectivity). Richardson (2011) notes that developing countries are still home to 90 percent of those with mobile Internet coverage but who do not use the Internet and 97 percent of those globally who live without mobile broadband coverage. According to Thorne (2020), in addition to electricity and internet access, establishing a secure, universal digital identity would be a key piece of technology infrastructure.

RESEARCH METHODOLOGY

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Research Paradigm

Bhattacherjee (2012) defines a research paradigm as the overarching term relating to the development of knowledge and the nature of that knowledge in relation to research. The basic research paradigms include positivism, interpretivism and pragmatism. This study has adopted the pragmatic approach. Pragmatism is concerned with "what works" and solutions to problems (Creswel, 2014). Instead of methods being important, the problem is most important, and researcher uses all approaches to understand the problem (Creswell, 2014). In this study, the researchers adopted a pragmatist research philosophy thus implying the adoption of the mixed methods approach which is an approach to inquiry involving collecting both quantitative and qualitative data. The pragmatist research paradigm or philosophy was useful to this study in providing an understanding of the extent to which technology has been used as a source of business survival during the Covid-19 pandemic among the businesses in Bulawayo.

Research Design

A descriptive research design was used by the researchers. Its aim was to understand the extent to which technology has been used as a source of business survival during the Covid-19 pandemic among the businesses in Bulawayo. The descriptive research design makes use of multiple methods of research instruments such as interviews, document reviews, archival records, direct and participant observations which subsequently lead to 'thick descriptions' and subtleties of the phenomena under research (Yin, 2013).

Research Approach

The study adopted a mixed method approach. Huey Chen (cited in Onwuegbuzie & Leech, 2007) defines a mixed methods research as, "a systematic integration of quantitative and qualitative methods in a single study used for purposes of obtaining a fuller picture and deeper understanding of a phenomenon". The researchers administered questionnaires to management of selected businesses in Bulawayo and then followed up with structured interviews. In the first stage of the study, the self-administered questionnaire was analysed quantitatively. Interviews were conducted to supplement the questionnaire where certain responses were not given. The study targeted 198 large businesses operating in Bulawayo categorized into 12 sectors. The 12 sectors included Tourism and Hospitality, Transport, Manufacturing, Retail, Mining and Metals, Education, Financial Services, Utilities, Telecommunication, Real Estate, Heath Care and Construction (Zoom info n.d). As a result, the study adopted stratified random sampling to arrive at a sample size of 65. From each stratum the study employed simple random sampling procedure to select the sampling elements. Quantitative data was analysed using SPSS while qualitative was analysed using thematic analysis.

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

Response rate

For the quantitative part of the study, from 65 questionnaires administered 61 were returned and 60 were deemed usable for analysis. The returned questionnaires represented a response rate of 95.3% and this response rate was deemed to be adequate in the realization of the research objectives (Mugenda & Mugenda, 2013). Open ended telephonic interview questions were administered on seven (7) respondents who had not provided responses on the type of technology they will use assuming funding was available.

Specific Technologies Used to Facilitate Business Operations

The first secondary objective of this research was to examine the specific technologies that were being used by businesses in Bulawayo to facilitate day to day business operations. To attain to this objective, the study sought the opinions and perceptions of top business officials and business representatives on the extent to which technology was used amongst businesses in Bulawayo as a survival tool during the Covid-19 pandemic. Perceptions of business officials on specific technologies were explored and the results on this are interpreted as mean and standard deviation. The range for possible responses was 5 = To a very large extent, 4 = To a large extent, 3 = To a moderate extent, 2 = To a small extent and 1 = Not at all. The technology which has been adopted to a lesser extent has been allocated a mean score of 0 to below 2.5 on the continuous Likert scale. The scores indicating moderate adoption of a specific technology have been taken to represent a variable with a mean score of 2.5 to 3.4 on the continuous Likert scale while scores for high levels of adoption of a particular technology have been taken to represent a variable which had a mean score of 3.5 to 5.0 on a continuous Likert scale. The standard deviation (SD) shows the variability among the responses where, SD > 0.49 is interpreted to show high variability among the responses. On the other hand, standard deviation of greater than 0.9 implies a stark divergence in respondents' perceptions on the extent to which a specific technology has been adopted amongst businesses, while a standard deviation of less than 0.9 indicates the commonalities of views expressed by respondents on the measured variable (Odhiambo, 2015). Table 1 below shows the results on the extent of usage of technology to facilitate day to day business operations.

Table 1: Extent of usage of technology to facilitate day-to-day business operations

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Technology Type	No.	Mean	Std. Deviation (SD)
Social Media	60	4.100	0.30338
Zoom Meetings	60	3.700	0.19369
Contactless Payments	60	3.150	0.27119
Microsoft Teams	60	3.100	0.15396
Teleconferencing	60	2.750	0.12168
Skype	60	2.100	0.64537
Cloud Computing	60	1.950	0.83309
Big Data	60	1.550	0.48161
Internet of Things	60	1.550	0.48161
Intranet	60	1.400	0.47772
Artificial Intelligence	60	1.350	0.47120
Biometrics	60	1.300	0.46199
ATMS	60	1.300	0.46199
Team Viewer	60	1.250	0.77295
Live Stream Conference	60	1.250	0.77295
VOIP	60	1.250	0.77295
Block Chain	60	1.250	0.77295
Robots	60	1.150	0.48099
Global mean	**60**	**1.969**	**0.641**

Source: Researchers' compilation from IBM SPSS Statistic version 28

The researchers ranked the technologies according to their corresponding mean scores and they were further categorised into four main groups; that is, most prevalently used, moderately used, less commonly used and extremely scarce technologies.

Most Prevalent Technologies during the Covid-19 Pandemic

Findings shown in Table 1 above reveal that most businesses in Bulawayo indicated that they used social media to a large extent to facilitate their day to day business operations. This is evidenced by a mean score of 4.100 and a corresponding standard deviation (SD) of 0.30338. This standard deviation is lower than 0.49, which is interpreted to show very low variability among the responses. These results reveal that the responses have a more stable standard deviation (SD) thus fair variability meaning that despite the difference in opinions, the contrast between the opinions was not so high. High usage of social media by businesses during the pandemic was stimulated by several factors. Social media has significantly transformed the business environment. Social media provides low cost charges and efficient management of online information exchange and relationships. For example, social media offers social networking and generated content about products, brands and services etcetera (Xiao, 2020). Deloitte (2021) further established that during the pandemic most businesses used enterprise social media to facilitate their day to day business operations.

The second most prevalently adopted type of technology is zoom meetings which enabled businesses to hold virtual meetings at the peak of the pandemic. Study findings in Table 1 reveal that the majority of respondents ranked zoom meetings as the second most commonly used type of technology during the Covid-19 pandemic. This is supported by a mean score of 3.700 and a corresponding standard deviation of 0.19369. These descriptive statistics imply that in the majority of businesses, zoom meetings were used to a large extent to facilitate day to day business operations during the Covid-19 pandemic. The standard deviation is lower than 0.49 implying that there is no stark contrast between individual perceptions on the extent of usage of zoom meetings by businesses during the pandemic. This finding is supported by empirical literature. Zoom, had 10 million daily meeting participants in December 2019, but by April 2020, that number had risen to over 300 million as most businesses began to embrace zoom meetings primarily due to the emergence of Covid-19 crisis (Evans, 2020). According to a customer satisfaction survey conducted by the Boston Consulting Group (BCG) commissioned by Zoom in 2021, in the United States zoom meetings helped enable business continuity, introduce new ways of working, and even helped improve employee morale at the SMBs surveyed (BCG cited in Morieux & Tollman, 2020).

These findings indicate that businesses in Bulawayo have been using social media and zoom meetings to a large extent in order to facilitate their day to day business operations during the Covid-19 pandemic. These technologies will continue to receive a boost even on the aftermath of the Covid-19 pandemic as more and more businesses continue to embrace them (BCG cited in Morieux & Tollman, 2020). The findings had lower standard deviations, ranging from 0.19369 to 0.30338, indicating no significant variation in respondents' judgments.

Moderately Common Technologies during the Covid-19 pandemic

There are also types of technologies that were moderately common as revealed by their respective mean scores. These included, among others; Contactless Payments (mean = 3.150; SD = 0.27119), Microsoft Teams (mean = 3.100; SD = 0.15396) and Teleconferencing (mean = 2.7500; SD = 12168). The majority of businesses indicated that they used contactless payment systems, Microsoft Office teams, and teleconferencing to a moderate extent as tools for survival during the Covid-19 pandemic.

Less Common Technologies during the Covid-19 pandemic

There are also types of technologies which were less common amongst businesses in Bulawayo as revealed by their respective mean scores. These practices include; Skype which received a mean score of 2.100 and a corresponding standard deviation of 0.64537. This standard deviation showed that even though the responses significantly vary, the majority of respondents held the similar opinion that the use of Skype amongst the businesses was less frequent. The findings further reveal that the majority of businesses used cloud computing technologies to a small extent. This is evidenced by a mean score of 1.950 and an associated standard deviation of 0.83309. This standard deviation entails that the majority of respondents shared the similar view that cloud computing services were less common amongst businesses and have been used only to a small extent during the Covid-19 pandemic. Big Data analytics have been less common with a mean score of 1.550 and a corresponding standard deviation of 0.48161 which implies no stark contrast between individual responses. Internet of Things was also found to be less common with a mean score of 1.550 and supported by a standard deviation of 0.48161. Contrary to these findings, Merritt (2021); & Lau (2020) posits that Big Data Analytics, Cloud Computing and Internet of Things were key technologies that were adopted to facilitate the day to day business operations. This difference is possible explained by the level of technological development of the country.

Extremely Scarce Technologies during the Covid-19 pandemic

These technologies were employed by businesses to a very small (marginal) extent. These technologies include; Intranet, which according to study findings was not used by 85% of the businesses in the sample (mean = 1.400; SD = 0.47772). Correspondingly, Artificial Intelligence on the other hand, received a mean score of 1.350 and a standard deviation of 0.47120. This is contrary to Merritt (2021); & Lau (2020) who established that artificial intelligence was one of the key technologies adopted to facilitate day to day business operations in the Brazilian SMEs and China's Hotel sector respectively. Other peripheral technologies which were not used by the overwhelming majority of businesses include Biometrics (mean = 1.300; SD = 0.46199), ATMS (mean = 1.300; SD = 0.46199), Team Viewer (mean = 1.250; SD = 0.77295), Live Stream Conference (mean = 1.250; SD = 0.77295), VOIP (mean = 1.250; SD = 0.77295), Block Chain (mean = 1.250; SD = 0.77295), Robots (mean = 1.150; SD = 0.48099).

How the Technologies Were Being Used To Facilitate Day to Day Operations

The respondents were asked to indicate the ways in which they have been using the technologies. The researchers invited the respondents to offer free responses to the question on how the technologies were used. Thematic analysis was used to analyse the responses. The following themes were identified from the data.

Theme 1: Communication Strategy

Respondents indicated that they used social media platforms as tools for external communication, while intranet and VOIP (Voice over Internet Protocol) were primarily used to facilitate internal communication and conveyance of messages within the organisation. Teleconferencing was also used as a communication tool to hold workshops with customers and employees. Robots were also identified to be a critical tool for manning communication centres such as switch boards and chat bot. Internet of things was also used to handle mass communications such as sending bulk emails, SMS alerts, and email alerts to bulk users. Artificial intelligence was used as a tool for automated interactions such as manning a WhatsApp chat bot used to communicate with customers with limited human intervention.

The results of the study were found to be consistent with the findings of Eriksson *et al.* (2005) who established that the rapid adoption of information and communication technologies mainly social media platforms, created possibilities for businesses to expend their activities also in an electronic environment. Hotels for instance indicated that they used a technological base for development and implementation of Internet booking, hotel's product that provides the possibility for customers to make bookings online even without having to visit the hotel physically.

Theme 2: Advertising and Digital Marketing

Businesses indicated that they used a collection of technologies for advertising and to conduct digital marketing programmes. For instance, Live Stream Conference was found to be a crucial tool for e-commerce, while artificial intelligence was employed in customer service.

Theme 3: Virtual meetings

The main tool which was used by businesses to hold virtual meetings with its various stakeholders mainly customers and employees is zoom. Furthermore,

conferences and other virtual meetings were also held using Microsoft Teams, Teleconferencing and Skype.

Theme 4: Housekeeping and routine business operations

Some few businesses indicated that they used robots to conduct routine and repetitive business operations like cargo handling, production of goods, packaging and dispatching and housekeeping deliveries. Internet of things (IoT) was also a critical tool in production operations amongst some businesses.

Theme 5: Data management

The use of technology for data management was also found to be prevalent amongst businesses. Technologies which played the major role in data management during the Covid-19 pandemic include cloud computing services, block chain technologies, big data and artificial intelligence (AI). These technologies were also used for data collection, data harvesting, data warehousing and data analysis to give real time business performance insights and to reveal underlying trends and crucial descriptive statistics.

Theme 6: Accounting and financial reporting

The contactless payment systems were used to provide platforms for bill payments, sales and payments for suppliers, creditors and customers and to monitor and control various other electronic money transfers and payments. These contactless payment platforms were connected to a cloud, database or an Enterprise Resource Planning (ERP) system at the backend where payments data was stored for accounting and financial reporting.

Theme 7: Security and Human Resource Management (HRM)

The Biometric system was crucial for personnel management where most businesses also used it to monitor employee attendance, punctuality and to control access to certain points and work stations within businesses.

Theme 8: Education

Education is another domain in which there was a dramatic shift to the online mode of transacting. Since the beginning of the lockdown, schools, colleges, and universities around the world shifted their classes to video conferencing platforms like Zoom and Live Stream Conference. Along with these synchronous modes of teaching, asynchronous platforms like edX and Coursera also saw an increase in enrolments. Some institutions shifted entirely to the online mode, with the exception of sessions that require a physical presence.

The above themes were captured in Merritt's (2021) analysis. However, themes like the use of technology to remote control assets and supply chain integration were quite unique and were not highlighted by any of the respondents. In general businesses attempted to match a given type of technology to a specific task according to the Task-Technology Fit Model (Goodhue & Thompson, 1995).

Preferred Technologies

The unavailability of capital was indicated as one of the draw backs in the adoption of technologies during the Covid-19 era. As a result, the researchers also prompted the respondents to highlight and pinpoint technologies which they were going to use if funding was available. The majority of respondents indicated that they would choose to use robots for production of goods, handling cargo, and for packaging and dispatching of goods. Digital transformation technologies such as Cloud computing, Internet-of-Things (IoT), Blockchain (BC), Artificial Intelligence (AI), and Machine Learning (ML), constitute the bulk of the preferred technologies by businesses in Bulawayo as part of their transformation effort. Businesses indicated that they seek to adopt Blockchain technologies to a greater extent. Blockchain (BC) technology presents an opportunity to create secure and trusted information control mechanisms (Upadhyay, 2020). As education and healthcare services witnessed a shift to the digital domain, BCs enable a way to secure and authenticate certificates, health records, medical records, and prescriptions.

More advanced technologies highlighted in Merritt (2021); & Lau (2020) were mostly the ones that were mentioned by most respondents as the technologies they would have adopted assuming funding was available. Even if the perceived usefulness was high according to the Technology Acceptance Model (Davis *et al.,* 1989), the cost aspect hindered their adoption in line with the tenets of the Technology Adoption Factors Theory (Mallat, 2006).

Problems that were encountered in the Use of New Technology

The third objective of the research was to examine the problems that were encountered in the use of new technology. To achieve this objective, the study sought the perceptions of respondents on the key challenges faced by businesses in Bulawayo in the use of new technology. The respondents were required to provide the rankings for each of the 10 possible challenges that were encountered in the use of new technology as outlined in the questionnaire using a Five-point Likert Scale, where; 5 = To a very large extent, 4 = To a large extent, 3 = To a moderate extent, 2 = To a small extent and 1 = Not at all. The relative importance index was then computed for each challenge or problem encountered.

Relative Importance Index method

The study computed the Relative Importance Index (RII) as outlined in the study by Fagbenle *et al.* (2004).

The results of the rankings are shown in Tables 2 below:

Table 2: Relative Importance Index and Ranks for Technological Challenges

Challenge	N	RII	Rank
Inadequate Infrastructure	60	0.610	1
Lack of Electricity	60	0.590	2
Downloading Speed	60	0.590	2
Unavailability of Capital	60	0.560	4
Internet Access	60	0.520	5
Lack of Computers	60	0.510	6
Lack of Skilled Labour	60	0.490	7
Security & Privacy	60	0.380	8
Unemployment	60	0.310	9
Technical support& knowledge	60	0.240	10
Global mean	**60**	**0.480**	

Source: Researchers' compilation from IBM SPSS Statistic version 28

The higher the RII score (above 0.5) implies that respondents perceived the challenge or problem to be more critical and severe amongst businesses. On the other hand, lower RII scores (lower than 0.5) imply that the challenge was less severe upon businesses. Findings shown in Table 2 reveal that the businesses in Bulawayo experienced six main challenges which significantly impacted their business operations. Findings reveal that the majority of the respondents ranked inadequate infrastructure and poor ICT architecture as the biggest challenges impacting businesses in Bulawayo in their use of new technologies. This is supported by the highest RII score of 0.610 which is greater than 0.5 implying that inadequate infrastructure and poor ICT architecture were the most prevalent problems amongst businesses and negatively impacted technological advancement.

Ranked the second in terms of severity is lack of electricity which rendered all electronic technologies ineffective. This is evidenced by an RII score of 0.590 which is greater than 0.5 implying that the challenge of lack of electricity was severe amongst businesses and negatively impacted technological advancement.

Ranked second also was slow downloading speed which also received an RII score of 0.590. This was followed by unavailability of capital which constrained technological advancement amongst businesses. Internet access was another big challenge, and this is supported by an RII score of 0.520. The other critical challenge faced by businesses was lack of hardware (computers) required to facilitate these technologies amongst businesses. This problem received an RII score of 0.510.

In terms of less prevalent challenges, the study findings revealed that Lack of Skilled Labour was not much of a critical problem (RII = 0.490). The majority of businesses do not perceive security and privacy concerns as the biggest challenge, with RII score of 0.380. Concerns of unemployment were not severe as indicated by the RII score of 0.310. The least severe challenge encountered by businesses in their use of new technologies was lack of technical support and knowledge. This is evidenced by an RII score of 0.240.

In support of the above findings, Merritt (2021) also concluded that 4G Technology is insufficient to support the growing number of devices and applications introduced into wireless networks during the covid-19 crisis. The use of 5G Technology which provides greater bandwidth and faster download speeds (up to 10 Gigabits per second) (Merritt, 2021) would improve the situation. In contrast to the above findings, however, lack of electricity was not mentioned in Merritt (2021); Lau (2020) as a hindrance in the adoption of new technologies. This is due to the fact that the Zimbabwean situation is peculiar being characterised by the existence of a power utility that is failing to provide reliable services due to obsolete infrastructure.

Measures that can be employed to facilitate the Smooth Adoption of Technology

The final objective of the study was concerned with establishing the measures that can be employed to facilitate the smooth adoption of technology in businesses. To attain this objective, the researchers prompted the respondents to indicate their views with regard to the extent to which; good infrastructure, stable access to electricity, mobile internet access, faster connectivity, accessibility and affordability of tech gadgets, training of employees, affordability of data; facilitate the smooth adoption of technology in businesses.

The respondents were required to rank their perceptions on a 5-point Likert scale where: 5 = To a very large extent, 4 = To a large extent, 3 = To a moderate extent, 2 = To a small extent and 1 = Not at all. Means and standard deviations were used to measure the extent to which the aforementioned measures facilitate the smooth adoption of technology in businesses. The results are shown in the Table 3 below.

Table 3: Measures to facilitate the smooth adoption of technology in businesses

Action	N	Mean	SD
Good ICT Infrastructure	60	4.150	0.436
Faster Connectivity	60	4.150	0.400
Mobile Internet Access	60	4.000	0.353
Stable Access To Electricity	60	3.950	0.443
Training of Employees	60	2.300	0.076
Accessibility & Affordability of Tech Gadgets	60	2.150	0.359
Affordable Data	60	2.150	0.259
Global mean	**60**	**3.264**	**0.332**

Source: Researchers' compilation from IBM SPSS Statistic version 28

The findings shown in Table 3 above show that the majority of respondents believe that having good ICT infrastructure will facilitate the smooth adoption of technology in businesses to a large extent. This is evidenced by a mean score of 4.150 and a corresponding standard deviation of 0.436. This standard deviation implies that there was no stark contrast between individual perceptions concerning the contribution of good ICT infrastructure towards facilitating the smooth adoption of technology by businesses. Faster connectivity was also identified to be another requirement to enable the smooth adoption of technology in businesses. This is supported by a mean score of 4.15 and a standard deviation of 0.400. Findings further reveal that the majority of businesses believe that mobile internet access is also critical in facilitating the smooth adoption of technology in businesses. This is evidenced by a mean score of 4.000 and a standard deviation of 0.353 which implies that the majority of respondents held a similar view that mobile internet access is critical for the smooth adoption of technology in businesses. Businesses also indicated that a stable access to electricity is also critical for a smooth adoption of technology in businesses. Respondents however, indicated that training of employees (mean = 2.300; SD = 0.076), accessibility and affordability of tech gadgets (mean = 2.150; SD = 0.359) and affordability of data (mean = 2.150; SD = 0.259) facilitate the smooth adoption of technology in businesses to a small extent. Therefore, good ICT Infrastructure, faster connectivity, training of employees were ranked highly as enablers of technology adoption (Merritt, 2021; & Lau, 2020).

Recommendations
From the study findings and conclusions, the following recommendations were made;

General Recommendations
- Businesses should place adequate infrastructure in order to support the adoption of technological innovations. 5-G Network is a requirement in order to allow multiple devices to be installed on the network as well as support faster download speeds.
- In order to reduce the impact of power cuts on deployment of technology, businesses should consider solar as an alternative source of energy in order to mitigate the challenge of electricity.

- Instead of investing more in the form of office, it is suggested that businesses should invest in emerging technologies like Big data, Artificial Intelligent, Robots, Machine learning and Internet of things.
- Budgetary Allocations towards new technologies should not only increase in terms of capital investment but generous amounts should be allocated towards training and development in order to impart the necessary technical skills.

Recommendations to SMEs
Since small businesses were found to be facing more challenges in the use of new technologies relative to medium and large businesses the following recommendations were made:
- SME managers should continue to develop creative practices in relation to all enterprise activities to adapt to the challenges imposed by the pandemic.
- SME managers should keep abreast of necessary business information solutions (whether through networking with other entrepreneurs or consultations and training) to help them make rational decisions to overcome the ordeal.
- SME managers should constantly update their plans and strategies to achieve the flexibility required to respond to the ramifications of Covid-19.
- SME managers should work on upgrading and improving their necessary business information solutions to ensure continuity and survival during and post-Covid-19 crisis.

CONCLUSION
The study focused on technology as a source of business survival during the Covid-19 pandemic. The study focused on Bulawayo businesses. Questionnaires were used as the primary data collection instruments. These were supplemented by interviews where there were no questionnaire responses. Descriptive Statistics were used to analyse data. It was noted that the majority of the businesses surveyed used mainly social media and zoom platforms to facilitate business survival during Covid-19. Contactless payments, Microsoft Teams and Teleconferencing were used to a moderate extent. Many businesses wished they could have adopted more advanced technologies like Big Data Analytics, Internet of Things, Artificial Intelligence, Machine Learning and Block Chain had the financial resources permitted them to do so. Lack of adequate ICT infrastructure, lack of

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electricity, slow downloading speed, unavailability of capital, lack of skilled labour, lack of technical support and knowledge were identified as the major challenges in the use of new technologies. The measures to facilitate the smooth adoption of technology focused on tackling the identified challenges. In general businesses should invest more and allocate generous amounts towards acquiring new technologies (including, preferably 5G Technology) and training of employees on new tech skills. Business should backup power supply through installation of solar power. In particular SMEs should network widely and make their business models more amenable to technological disruption in order to survive crises such as the Covid-19 pandemic.

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