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Critical measures for the prevention and control of respiratory infectious diseases in the workplace: a South African facilities management perspective

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Abstract

Purpose – This study aims to comprehensively examine the respiratory infection prevention and control measures used in South African workplaces, particularly in the context of facilities management (FM), during the 2020–2022 pandemic.

Design/methodology/approach – The present research involved pre-crafted semi-structured interviews conducted by University of the Witwatersrand students with FM heads in Johannesburg, South Africa. Recurrent themes were generated using NVIVO software and analysed using frequencies, word counts and word clouds.

Findings – This study identified 119 measures and placed these into two broad categories. Twelve critical measures were found. These measures were further validated by five FM experts, separate from FM heads, who cross-referenced them with WHO guidelines, enhancing the credibility of the findings. Subsequently, challenges with implementing these measures were explored.

Practical implications – The findings have direct relevance to the work of FM professionals, as they suggest that applying timely and comprehensive infection prevention and control measures can help employees to safely continue to work or return to the workplace during any future epidemic outbreaks.

Originality/value – Thus far, limited studies have explored critical measures used to prevent and control COVID-19 in the workplaces of developing countries during the 2020–2022 pandemic.

Keywords COVID-19, Facilities management,
Respiratory infection prevention and control measures, South Africa, Workplace environment

Paper type Research paper

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1. Background

The rapid increase in COVID-19 cases during the pandemic highlighted the need for prevention and control of the spread of infectious diseases in the workplace. Employees were at higher risk due to various factors, such as, the nature of their work, the inability of working conditions to adapt to new situations, lack of access to flexible working and paid sick leave and work and environmental factors (Godderis *et al.*, 2020). Infectious disease outbreaks occur in workplaces due to the risk of transmission between employees and their close contacts from their respective households and communities (Ingram *et al.*, 2021).

South Africa experienced its first case of COVID-19 in March 2020, the rapid spread of the virus prompted the National Corona Virus Command Centre (NCVCC) to recommend a total lockdown of the nation. This had an impact socially, economically and environmentally with a reduction in gross domestic product (GDP), increased unemployment, reduced air travel passenger numbers and limited foreign investment and trade [Coronavirus (COVID-19) Overview, 2020 (Pillay *et al.*, 2021; Chitiga-Mabugu *et al.*, 2021)]. On 11 January 2021, COVID-19 cases surged due to the spread of the "Delta" variant. A new South African revenue service-CoV-2 variant (501Y.V2) was then identified in South Africa, further increasing infections. In November 2021, medical practitioners alerted South African scientists of the rapid spread of COVID-19 cases in the Nelson Mandela Bay region in the Eastern Cape province, which led to the discovery of another variant of the virus in South Africa − "Omicron" (Bekker and Ntusi, 2021). Other variants discovered in South Africa include Beta and C1.2. The South African Government intensified efforts towards vaccinations which in turn lead to a drop in COVID-19 infection rates and the lifting of restrictions. As of February 2022, over 30 million people were vaccinated in South Africa, representing approximately 50% of the population. The below shows the progression of COVID-19 cases over a two-year period.

George and George (2020) advised:

> workplaces to establish a risk response team including those that represent stakeholders, use of a systematic strategy that includes human, financial, and material resources; conducting a risk assessment; developing a comprehensive project plan with specific actions; and consulting experts in relevant fields such as labour law, occupational health, public health and infection control, where required. After implementation, evaluation and improvement should be done where necessary

Hence, facilities management (FM) is an enabler of sustainable enterprise performance and contributes 1.4% to the GDP in South Africa (NICD, 2022; SAFMA, 2016). The facilities manager adds value to a business by implementing strategies to operate efficiently and sustainably. FM encompasses the delivery of services to support the workplace and providing a comprehensive response. Other research works have been conducted by Erber *et al.* (2022); Shaw *et al.* (2020); Amos *et al.* (2021); Benea *et al.* (2021); Gunawardana *et al.* (2021); Ingram *et al.* (2021) and Sarvari *et al.* (2022) have revealed that workplaces with COVID-19 prevention and control measures were safe places. However, this study addresses the lack of integration in the research and identifies what critical measures from a South African facilities management perspective need to be used to prevent and control further outbreaks of respiratory infectious diseases in the workplace.

2. Literature review

2.1 Workplace measures for infectious diseases

The theoretical underpinning of the study includes WHO guidelines and Chotipanich (2004) facilities management model that "FM is a key function in managing facility resources, support services and working environment to support the organisation's core business in both

the long- and short-term". FM is influenced by internal factors, including organisational characteristics, facility features and business sector, and external factors, including economic, social, environmental, legislation and regulation, FM market and local culture context. The COVID pandemic influenced the FM practice conditions in that it helped to reduce the spread of the virus (Amos *et al.*, 2021).

The findings from the literature review showed that measures used to prevent and control infectious diseases in the workplace globally include the following.

2.1.1 Health and safety. We used the World Health Organisation (WHO), the Occupational Health and Safety Act of 1993 and the National Disaster Regulation of South Africa measures to assess health and safety in the workplace. These included surveillance, outbreak investigations and response procedures, personal protective equipment (PPE), environmental adjustments, education, change in work arrangement in line with health and safety requirements and combined measures (Ingram *et al.*, 2021).

2.1.2 Facilities management. FM was on the frontline in combating the COVID-19 pandemic (World Health Organization, 2020) since the FM function is critical to the performance of an organisation to ensure efficiency and effectiveness through implementing the right procedures and supporting business continuity management through scheduled planning, tools, strategies and guidelines to assist organisations in continuing their work activities in line with basic regulations enforced by the government and WHO. Facilities managers are proactive crisis managers in charge of workplace safety and the security response plan. The safety of employees, contractors and guests became critical during the COVID-19 pandemic.

The role of FM includes dealing with the outbreak of COVID-19 in the workplace in two ways: prevention and decontamination of the COVID-19 spread in cases of exposure within the organisation, and implementing these strategies, ensuring that the law is adhered to Robinson *et al.*(2020). FM involves creating a "Workplace plan", which contains the protective measures for the phased return of employees to the workplace. This is important since facilities managers must re-examine the relationship between public space design and disease transmission (Honey-Rosés *et al.*, 2020).

Özoğul and Baran (2021) suggested some of the best practices during the pandemic included:

- Where employees' could work from home, they were instructed to do so.
- For employees unable to work at home, the work environment followed social distancing rules and regulations, decreasing the chances of transmission.
- Work shifts created for the different groups of employees.
- Relocate the space in which employees work before they returned to work.
- Have sanitisation stations.
- Bring employees back to workplace in stages.
- Limit the number of people who could access the building.
- Limit the number of face-to-face meetings.

The International Facilities Management Association (IFMA) 2020 Strategic Framework for COVID-19 created a compass/roadmap for facilities managers (for on their organisation) to manage and control the spread of COVID-19 and other infectious diseases in the workplace. Furthermore, IFMA set up a Coronavirus Preparedness Resource Centre where FM professionals shared approaches, strategies and techniques. Using case studies, articles and

personal experiences, it acted as a networking platform to aid one another in adapting to and overcoming the pandemic.

The outline was developed around business continuity programmes, risk assessment and plan testing. There was also the need to see how objectives could be altered for continuity, whilst making allowances for resource allocations, asset management, employees and financials to measure the feasibility of the organisation being deemed able to progress. Additionally, checklists were used to monitor the impact of the pandemic on pre-planning and responses.

Table 1 contains studies on the prevention and control measures used by facilities managers in the workplace. These measures showed that few studies have been done using an integrated approach, and their focus was not on extracting critical measures in the event of a pandemic in a developing country context.

2.2 Challenges of implementing safety measures for COVID-19 in the workplace in South Africa

In South Africa, Amoah and Simpeh (2021) listed the implementation challenges of COVID-19 safety measures in the construction industry, including ignorance of COVID-19, the supply of poor quality PPEs, lack of compliance, lack of sanitising of all materials, difficulty in sharing tools and equipment, public transport usage by workers, superstition (e.g. "COVID-19 is for white people"), failure to comply with social distancing rules, the supply of wrong information by workers, offsite behaviour of workers, lack of funding to implement COVID-19 measures, theft of sanitising materials, failure to remind workers to be compliant at all times and incorrect use of face masks. Other international studies on the challenges of implementing measures in the FM workplace (Chua *et al.*, 2023; Ling and Tam, 2022; Thomas *et al.*, 2022) identified problems such as cost, risk assessment, compliance, data, digital infrastructure, the transition of workspaces after the pandemic, human resources, client satisfaction and efficiency.

2.3 Studies on prevention and control measures used in workplace settings

In previous studies (see Table 2) on prevention and control measures in workplace settings, hospitals and health-care centres were the most common workplace settings, followed by nursing homes, offices, manufacturing facilities, meat factories and general workplaces.

This study focused on finding the critical risk areas and what could be used to mitigate risk in an outbreak (O'Hara *et al.*, 2014). This will result in facilities managers being able to easily replicate lessons learnt from previous pandemic experiences. This is particularly true for a developing country.

3. Research methods

The present qualitative research method seeks to explore the critical measures used to prevent and control COVID-19 in South African workplaces. The aim was, in fact, to find out measures to prevent future outbreak of respiratory infectious diseases in the workplace. This study formed part of students' projects for an FM course at the School of Construction Management and Economics at the University of the Witwatersrand in 2022. A review was done after a literature review on the prevention and control measures for COVID-19 in the workplace. Twenty-five semi-structured interviews were conducted with South African Facilities Management Association (SAFMA) members.

Semi-structured interviews were used instead of structured interviews to avoid interviewer bias when clarifying a question. This interview strategy gave the interviewees the space for clarification. The number of interviewees was determined when the saturation

Table 1. Studies on prevention and control measures in facilities management

Authors	Country	Sector	Research design	Prevention and control measures	Comments
Aidla *et al.* (2023)	Estonia	Office	Secondary data set	Work from home, well-being	The study was done in Estonia
Amos *et al.* (2021)	Ghana	Hospitals and FM	Conceptual	Communication, strategic management, space management, work scheduling for social distancing	Was conceptual and focused only on hospital settings
Chua *et al.* (2023)	Malaysia	Office	Case studies, interviews and observations	Open plan workspace design, task-oriented space, hot desking policy and IT infrastructure	Focused on flexible work arrangements
Hou *et al.* (2021)	Netherlands	Office	Thematic analysis and literature review	Strategic alignment, office workplace modification and risk control	Focused on strategic measures and health care and safety measures
Ibrahim and Hassanain (2022)	Saudi Arabia	Sports facilities	POE	Social distancing, cleaning, work scheduling	Did not study the economic impact on sports facilities and was not quantitative
Kasana *et al.* (2023)	Multi-country	Multi-sector	Survey and interviews	Appointment of a change agent, support of leaders, and the timeframe for implementing the change	Focused on change management
Ling and Tam (2022)	Singapore	Multi-sector	Survey	Agile strategies	The study was in Singapore and agile strategies
Ling and Teh (2024)	Singapore	Multi-sector	Survey and interviews	Leadership styles affect work outcomes	Focused on leadership styles
Ma and Chan (2022)	Hong Kong	Public health	Literature review	BIM	The focus was on the post-COVID era and public health

(*continued*)

Table 1. Continued

Authors	Country	Sector	Research design	Prevention and control measures	Comments
Mehmood *et al.* (2023)	Malaysia	Hospitals	Literature review	Work scheduling, training and resources, change management, communication, space management database, team	Paper was conceptual
Sarvari *et al.* (2022)	Global	Built environment	Survey	Training, design and construction, operation and maintenance	Other aspects of FM, such as performance management, change management, finance, environment and others, were excluded
Sunner *et al.* (2021)	Australia	Aged care facilities	Interviews	Safety, risk management, isolation and technology	The focus was on the aged care facility, not on the workplace
Zhang *et al.* (2022)	Australia	Multi-sector	Literature review	Hard services (HVAC and drainage system controls) to prevent aerosol transmissions, soft services (cleaning and disinfection) to prevent fomite transmissions, and space management (space planning and occupancy controls)	Was not on occupant behaviour in buildings and did not use an integrated approach to interventions
Zhao *et al.* (2021)	USA	University	Sensors and cloud-based computing	IoT sensor network for tracking sanitiser use in public facilities	It could also study the influence of occupant behaviour

Source: The authors' creation

Table 2. Studies on prevention and control measures in workplace settings

Authors	Country	Sector	Research design	Prevention and control measures	Comments
Benea *et al.* (2021)	Canada	Hospital	Prospective cohort study	Home-based control. Strategy for exposed HCW, asymptomatic testing	The focus was on hospitals and health-care measures
	Italy	Manufacturing	Cross-sectional	Social distancing, individual hygiene rules, PPE, cleaning and sanitising, information and training of employees	Focused on the manufacturing sector
Curtis *et al.* (2023)	Australia	Health care, quarantine facility	Survey	Training, compliance and reporting, safety, risk, communication	The focus was on safety and not generalisable
Darko *et al.* (2024)	Ghana	Healthcare	Survey	Sanitising, use of PPEs, training, management approach, compliance	The focus was on health-care facilities
Erber *et al.* (2022)	Germany	Hospital	Prospective sero-prevalence study	PPE, PCR testing and IgM testing	Focused on health-care measures
Eyre *et al.* (2020)	UK	Hospital	Prospective observational study	Nasal swab, testing, contact tracing, PCR test sensitivity	The focus was on hospitals and health-care measures
Gunawardana *et al.* (2021)	USA	Offices	Prospective cohort study	Nasal swabs, measuring antibodies	Focused only on health-care measures
Guo *et al.* (2021)	Multi-country	General	Conceptual	HVAC ventilation	Focused only on maintenance measures
Herstein *et al.* (2021)	USA	Meatpacking facility	Retrospective cohort study	PPE and physical barriers	Focused on health-care measures
Ingram *et al.* (2021)	Ireland	General	Conceptual	Surveillance, investigation and response, PPE, environmental adjustments, education, changes in work arrangements, and combined measures	It was conceptual and done in another context

(*continued*)

Table 2. Continued

Authors	Country	Sector	Research design	Prevention and control measures	Comments
Kurogi *et al.* (2023)	Japan	General	Cohort study, survey	Employees not going to work, temperature checks, PPEs, visitors health screening, reducing business trips, workplace partitions	The study was in Japan
Licata *et al.* (2024)	Italy	Health care	Survey	Handling of PPE, risk management, contact tracing, training, knowledge about COVID	The focus was on health-care facilities
Shaw *et al.* (2020)	USA	General	Conceptual	Supervisor support, ability to accommodate physical demands, perceived impairment, job stress, coping, fears of worsening health conditions, family caregiving roles, social support	Was conceptual and focused on workplace productivity and health care and safety measures
Umair *et al.* (2021)	Australia	Health care, construction, transportation and industries	Conceptual	"Internet of Things" (IoT), smart buildings, remote sensing, automation	Relied mostly on health care and IT measures

Source: The authors' creation

point was reached, and when the themes were repeated (Adewunmi, 2014). A previous study in South Africa on a similar population of facilities managers had a sample of 29 as they are difficult to reach (Azasu *et al.*, 2018). Participants were purposively selected based on their ability to respond to the pandemic. The project focused on the impact of coronavirus pandemic in South Africa in 2021 and, the role of facilities manager in managing coronavirus. It also covered the application of FM topics and how it can assist an organisation in managing future outbreaks.

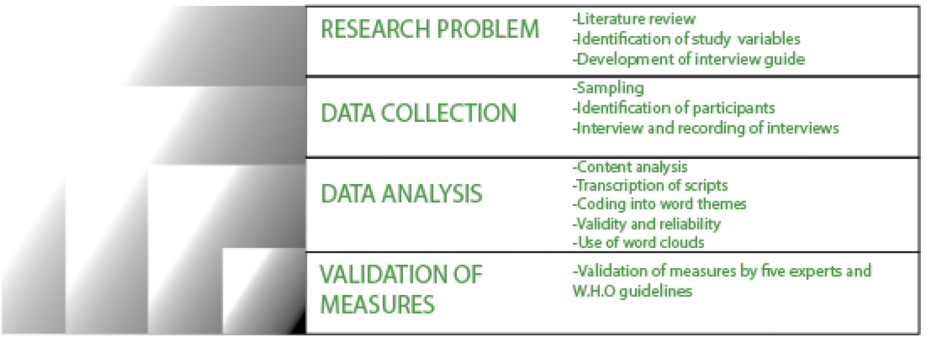
To minimise physical contact, data was collected through Microsoft Teams or Zoom video calls during the pandemic's peak between May and June 2020. Interviews were recorded with the participant's consent. Questions asked covered the following: "sector", "aspects of FM practised by the organisation", "aspects of FM change as employees return to work post-lockdown" and the "problems in managing this change in response to the post-COVID era for each aspect of FM".

The study adopted the four stages of conducting a research process (see Plate 1). This according to Bengtsson (2016) involve decontextualisation, recontextualisation, categorisation and compilation.

The measures were obtained based on themes emerging from the interviews. These were further subjected to validation by two experts from the health and safety department, two from the facilities management department, and one expert from the public health sector. All the measures were rated as complete, effective, correct, practical and high (Adewunmi *et al.*, 2017). Measures were further validated using WHO guidelines for the prevention of COVID-19. The measures most frequently used across all the sectors were selected as critical measures (O'Hara *et al.*, 2014).

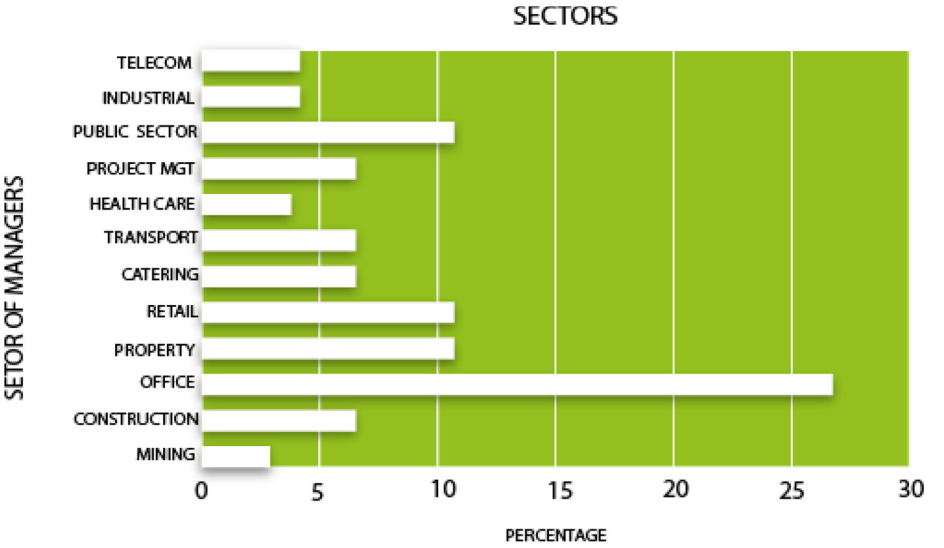
Content analysis was undertaken using NVivo10 software to generate themes. The interview transcripts were coded and reviewed to check for agreement and consistency (Wackowski *et al.*, 2017). A Wordle-inspired "word cloud generator" positioned words without overlap. The advantage of Wordle is that it is simple to use (Porcaro *et al.*, 2016). According to Rahadi *et al.* (2013), larger words produced by the word generator show the importance of the words, while smaller words produced by the word generator show the insignificance of the words and repetitive words. The study did not involve contact with participants by the authors; the University of the Witwatersrand granted an ethics waiver.

The interviewees' profiles (Plate 3) showed that 72% of the managers had at least six years of work experience and were from diverse economic sectors (Plate 2).



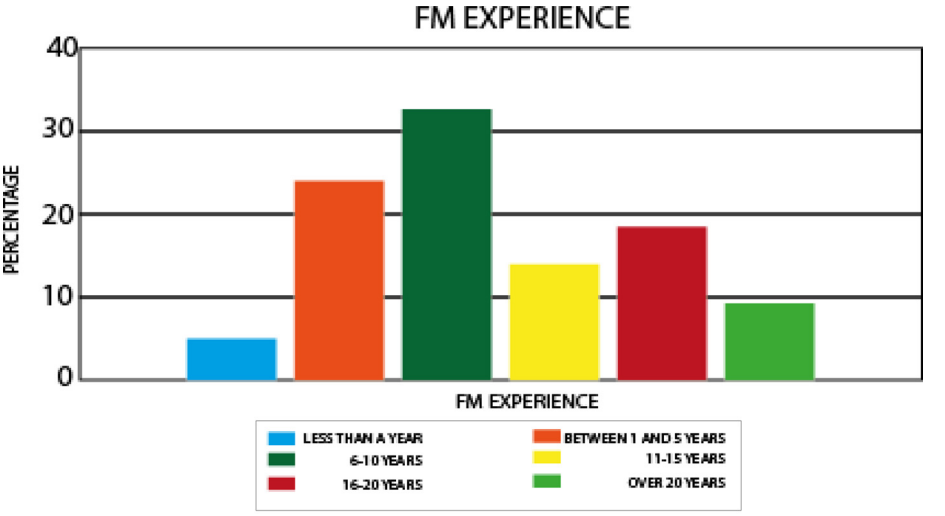
Source: The Authors' creation

Plate 1. Research methods process



Source: The Authors' creation

Plate 2. Sector of facilities managers



Source: The Authors' creation

Plate 3. Experience of facilities managers

Plate 4 shows the frequency of words associated with the practices of FM. The services offered align with the scope of services, which covers both "hard" and "soft" FM services as delineated by SAFMA (Kleynhans, 2016).

4. Results

4.1 Measures for prevention and control of infectious diseases

The study identified 119 measures and placed the measures into two broad categories and eighteen sub-categories used by the interviewed organisations for workplace management in response to COVID-19. Seven of the sub-categories were "health and safety measures" while eleven sub- categories were "facilities measures" (see Appendix).

4.2 Prioritisation of measures

The most preferred measures in general and per sector are in Plates 5 and 6, and facilities managers should prioritise critical measures during a pandemic. The two broad categories and 12 critical measures were obtained using the WHO guidelines, and the most recurring measures were generated from the thematic/content analysis.

4.3 Health and safety measures

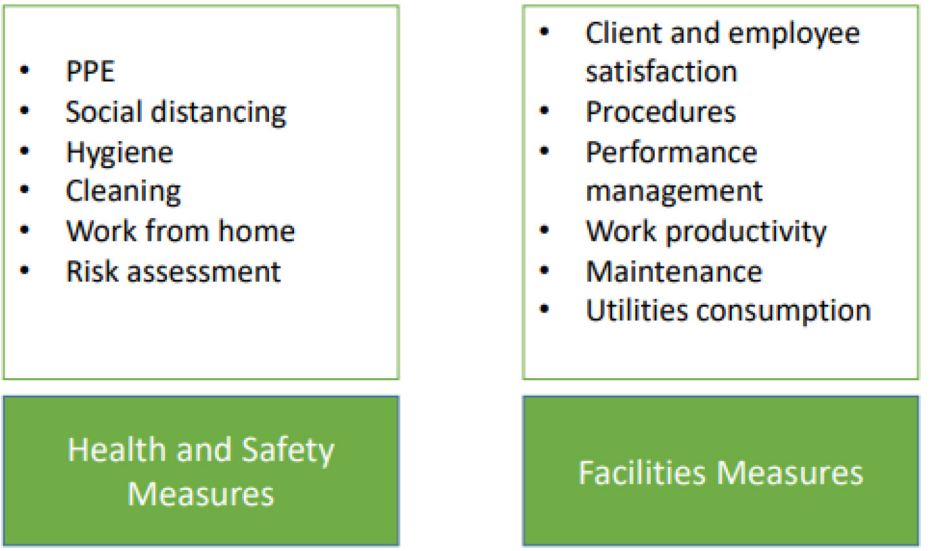
"Health and safety" measures were framed based on guidelines by WHO and the Occupational Health and Safety Act 85 of 1993, which is the guiding legislation in South Africa for health and safety. There is also the Occupational Health and Safety (OHS) workplace directive of 2020. The South African Government issued a COVID-19 Directive on Health and Safety in the Workplace regarding Regulation 10(8) of the National Disaster Regulations. In addition, measures covered in the guideline include "risk assessment", "engineering controls", "administrative control", "PPE", "health and safety practices" and "safe transport".

In the sampled organisations, the use of PPE was encouraged to limit workers/employees physical handling of cash, and payments made via electronic transfer were preferred.



Source: The Authors' creation

Plate 4. Word cloud for FM practice



Source: The Authors' creation

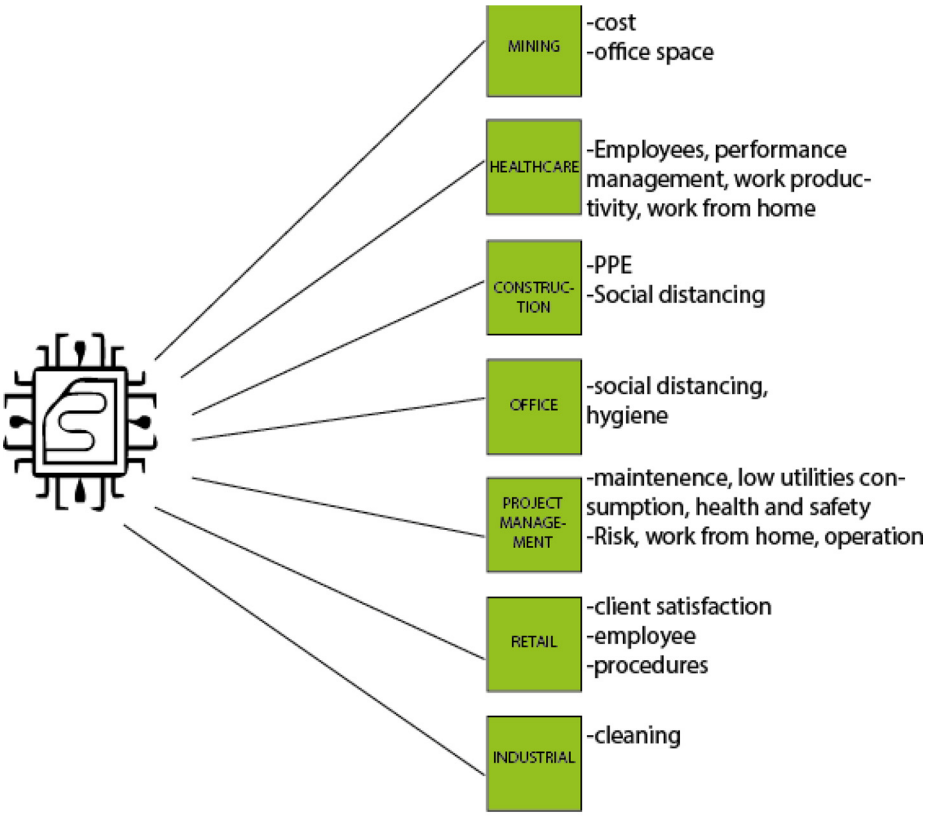
Plate 5. Critical measures

Introducing new cleaning methods involved much disinfecting to reduce the spread of infection and increasing the intensity of cleaning of frequently touched surfaces such as conference and control rooms, mess/restrooms, permit issuing offices, handrails, communal tables, taps, handles, doorknobs, shared tools and shared keyboards. Cleaning operations were also pre-scheduled using software to assist with the increased frequency of cleaning tasks. Due to the implementation of the work-from-home strategy, the volume of in-building users decreased, reducing the number of cleaning staff. Also, additional cleaning services were provided, revision of schedules for essential services and strict adherence by service providers. In some organisations, self-service payment facilities were in place to reduce cash handling.

The safety representatives enforced and modelled social distancing and acceptable health behaviours. In addition, office layouts were changed to promote greater social distancing. Other measures related to compliance with legislation, such as the National Disaster Legislation of 2002, the use of risk assessment and the review of risk assessments to prevent infection in the workplace. The Occupational Health and Safety Act of 1993 places a responsibility on both the employer (section 8) and employee (section 14) to ensure that the workplace is safe and without risk to the health and safety of all others in the same workplace regarding COVID-19 regulations. The health and safety measures used were similar to those used in other workplace settings (Ingram *et al.*, 2021) as stipulated by the WHO and the Department of Health in South Africa.

4.4 Facilities management measures

"Facilities management measures" are used in the integrated management of the function to support the organisation's core business, and 11 sub-categories and 85 measures are identified (see Table A1 in the Appendix). The critical measures were low utility consumption and an increased need to look at portfolio and asset management since/while



Source: The Authors' creation

Plate 6. Critical measures per sector

many employees worked from home. As a result of budget cuts, there was an increased need for resource management.

Since the pandemic came unexpectedly, many new measures were subjected to trial-and-error. Measures such as "security" and deactivating building pass or keys were used to enforce compliance with COVID-19 measures put in place. Previous studies by Guo *et al.* (2021) focused on "heating, ventilation and air-conditioning" (HVAC) systems to contain COVID-19. Ventilation has been known to contribute to spreading COVID-19 infections (Blocken *et al.*, 2021; Qian *et al.*, 2021).

This study revealed that preventative maintenance, simplifying asset location tracking and mobile access to work orders, inventory audits and replenishment and facility condition assessment were some of the measures used by FM in the "maintenance" sub-category during the COVID-19 pandemic. "Budget costing and optimisation" were essential due to the financial positions of many businesses. The pandemic brought unique budget requirements, such as the cost of testing employees for COVID-19, which could lead to increased maintenance costs.

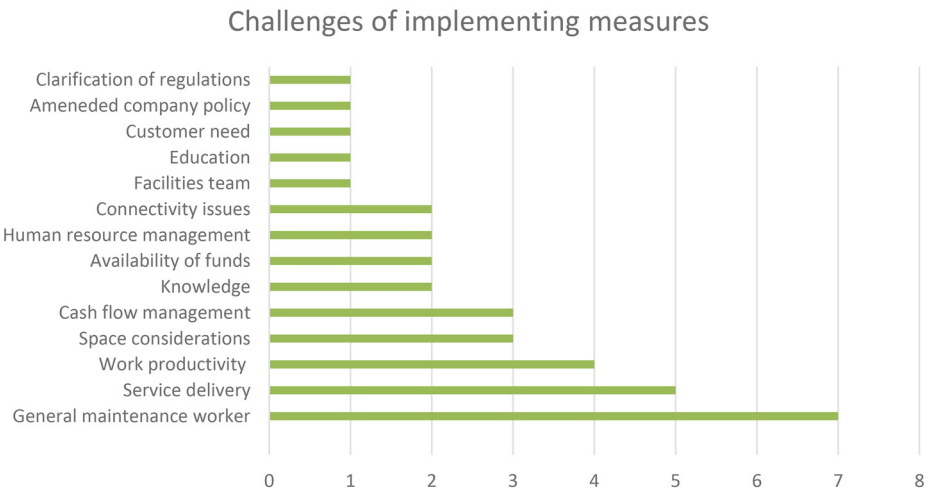
Regarding workplace productivity, the COVID-19 pandemic created a new workplace hazard that caused many workers a lot of stress and anxiety about their health and safety. This anxiety is understandable where the risk of infection is high, wherever workers needed to continue working and for especially vulnerable workers (Shaw *et al.*, 2020). One of the measures in this category was "trust between management and employees" due to new changes and policies implemented by management because of the COVID-19 pandemic. There could also be mistrust since some other employees lost their jobs. Another measure is "value enhancement", where facilities are managed to ensure services are provided while considering cost, quality and exposure to risk. The COVID-19 pandemic resulted in change to clients' and employees' experience, as their needs changed because of the pandemic. Likewise, facilities managers have experienced increased responsibilities towards meeting such needs.

4.5 Challenges of implementing the facilities management measures

The challenges of implementing the FM measures are shown in Plate 7.

Since maintenance schedules were reviewed, service delivery can be more of a hassle and inconvenience. Assets that showed defects that cannot be repaired have to be transported to locations where this can be done. Administration for obtaining a permit so that the defective item can be transported following the lockdown restrictions could have been better/more efficient. Also, there were service delivery problems because things were done on a trial-and-error basis, which was new to many facilities managers.

Meeting COVID-19 regulations, such as those of WHO and the Department of Health, brought about the need for facilities managers to update themselves on COVID legislation to keep the workplace compliant with these regulations. These legislations kept on changing based on the risk-adjusted level requirements and post-COVID requirements put in place by



Source: The Authors' creation

Plate 7. Challenges of implementing COVID-19 measures in facilities management

the government. This changes brought about the need to amend company policies, with some employees needing help with complying with health and safety requirements.

The issue of workplace productivity was a problem since many employees/people worked from home, and ensuring productivity under such conditions was a problem. In addition, time-consuming systems needed to be put in place, such as screening employees and lack of proper planning for unmet targets. Hence, new ways of working were required. Post-COVID employees' who were comfortable working from home found it difficult to return to their office. However, there was a plan for reintegrating of employees/workers back into the workplace in South Africa, such as that published by the Department of Labour.

Space considerations were a problem as regulations stipulated that there must be social distancing between workers thus bringing about the need for previous spatial arrangements in many workplaces to be revised. After the pandemic since there is no need for social distancing, it brings about the need for further adjustments to space requirements again that have further cost implications.

It took much work to manage the information technology (IT) connectivity issues that employees were experiencing due to homeworking; managing this required IT technicians to work remotely to assist employees. The increased need to procure IT, health and safety supplies and other supplies put forward by COVID was an added expense.

Extra funds were needed to train the FM team on health and safety protocols. The direct and indirect costs of COVID-19 measures took valuable financial resources away from other necessary FM operations. Thus, careful management of finances was needed. Additionally, some of the supplies procured during the COVID-19 period may become a waste/surplus after the pandemic.

Human resource management and managing the issue of fairness or perceived fairness, as other employees who were allowed to work from home were perceived to be getting preferential treatment in some cases. There was also a problem related to being able to pay employees their normal wages and salaries. Their willingness to reduce pay was the best scenario for some organisations to sustain themselves. The dynamics of the pandemic brought about changes in customers' needs, thereby increasing the demands put on the facilities manager and meeting their needs can be challenging. These needs changed as the risk levels of the pandemic changed.

5. Discussion

The study contributed to the knowledge of qualitatively investigating measures used by facilities managers during the COVID-19 pandemic. The framework included measures implemented or proposed to contain the pandemic or future pandemics in the workplace.

The health and safety measures found in this study agreed with those identified by previous studies such as Benea *et al.* (2021), Bontach *et al.* (2021), Kurogi *et al.* (2023), Curtis *et al.* (2023), Licata *et al.* (2024) and Darko *et al.* (2024).

Furthermore, previous studies in FM were mainly focused on certain aspects of FM and not using an integrated approach (Zhang *et al.*, 2022). Table A1 in the appendix presents the studies in FM. Moreover, limited papers were directed at finding critical measures to prevent and control COVID-19 in the workplace. For example, a study on strategy was in the corporate real estate domain (Hou *et al.*, 2021). This study found that customer satisfaction and value enhancement can assist with managing the workplace during a pandemic. A study by Chua *et al.* (2023) focused on flexible workplace arrangements and found that open-plan workspace design, task-oriented space, hot desking policy and IT infrastructure form flexible work arrangements used to manage COVID in work settings. Zhao *et al.* (2021) examined the use of IoT in the workplace, Sunner *et al.* (2021) on safety, Kasana *et al.* (2023) study was

directed at change management and Ling and Teh (2024) studied leadership outcomes in the workplace. Other papers on COVID-19 in the workplace were not empirical, such as those of Amos *et al.* (2021), Mehmood *et al.* (2023) and Ma and Chan (2022).

Some separate studies were focused on other types of workplaces than that of the corporate setting; Summer *et al.* (2021)'s study was on aged care facilities, Aidla *et al.* (2023) was on home working, while Savari *et al.* (2022) was directed towards the built environment. This study found that client satisfaction, work productivity, performance management and utility consumption measures were critical measures for preventing and controlling COVID-19 in the workplace, which were not identified in other studies reviewed in the FM space (Table 1).

Not many studies have been done specifically in mining, retail, project management and industrial settings in FM. For example, client satisfaction was a critical measure in the retail sector and utilities consumption in project management. Also, work productivity and performance management were critical in the hospital setting (see Plate 6).

Previous studies on the challenges of implementing measures in the workplace were conducted in the construction industry, such as those of Amoah and Simpeh (2021). They identified ignorance of COVID-19, the supply of poor PPEs by contractors, lack of compliance, sanitising construction materials, difficulty in sharing tools and equipment, public transport usage by workers, the superstition that COVID-19 is for a particular group of people, complying with social distancing rules, among others to be challenges of implementation of COVID-19 safety measures. In the area of FM, studies by Lestari *et al.* (2022) revealed that challenges include a perceived lack of clear direction from the government, rapid changes in directives, poor worker awareness and limited organisational resources. In addition, Chua *et al.* (2023), Ling and Tam (2022) and Thomas *et al.* (2022) showed problems regarding cost, risk assessment, compliance, data, digital infrastructure, the transition of workspaces after the pandemic, human resources, client satisfaction and efficiency. Compared to other studies, service delivery, issues with the facilities team, amending the company policy and clarifications of regulations were unique challenges identified in this study.

The literature review revealed that more research on supporting workers using an integrated approach from the FM perspective was required. The study made use of the integrated FM model and the WHO guideline for health and safety (Chitga-Mabuga *et al.*, 2021; Ingram *et al.*, 2021). This framework would assist facilities managers, regardless of the sector and practice, in having a concise insight into important measures to use in future pandemics, especially in a developing country. Most of the multi-sector studies, including Ling and Tam (2022), Kasana *et al.* (2023) and Ling and Teh (2024), were undertaken in "developed countries".

An interview with an FM in an organisation that had a low incidence of COVID-19 showed that regarding health and safety measures, the facilities manager's role was to ensure the implementation of health and safety policies for COVID-19 and to enforce self-assessment before accessing the building to prevent an outbreak of infectious diseases at the workplace. Guidelines and waste management policies were implemented to position changes in the frequency and quality of waste registers, such as water, medical and the environmental aspects. WHO guidelines were also used to improve and change the previous work arrangements. WHO guidelines informed the improvement and change in the measures to provide support services. Vaccinations were compulsory for employees as it is the duty of the employer (section 8) and employee (section 14) in line with the Occupational Health and Safety Act 85 of 1993 of South Africa to ensure that the workplace is safe and without risk to the health and safety of others.

6. Recommendations

The following were the main recommendations.

6.1 Strategy development

Organisations should develop strategies to comply with WHO and OHS guidelines. Facilities managers also suggested the need for increased frequency in knowledge and training of health and safety practices to help organisations respond to changes posed by COVID-19 since legislation kept changing. Business continuity plans should be developed to include alternative workplace practices, such as the various hybrid working solutions discussed in the Verdantix (2021) study covering 250 international workplaces. These hybrid solutions vary from decentralised smaller workplaces to a mixture of office/remote workers. For example, they have been found in previous studies such as Choudhury *et al.* (2024) and Naqshbandi *et al.* (2024) to sustain efficient performance when workplace policies and procedures are adapted to the new environment.

6.2 Resource emergency teams

Organisations should consider improving the authority and resourcing of their emergency response teams to ensure adequate preparedness in the future. The International Standards Organisation (ISO 41017:2024) recommends that the following steps should be taken to improve emergency response in organisations:

- Authority and responsibilities are clearly defined.
- Effective collection of information and evaluation of incidents.
- Operations and logistics.
- Finance and Administration.

6.3 Cost-saving approaches

Use of cost-saving approaches, such as "value management", are proposed to enhance quality while saving costs. Organisations experiencing underutilisation of space may consider cost-saving options such as subletting office space or mixed-use facilities (if applicable). Innovation, education and research will promote the implementation of timely measures and help with proactive management. The government can also assist small businesses by providing funding to implement safety measures in the workplace, which may not be affordable to them.

6.4 Work productivity

Regarding workplace productivity, organisations should ensure that employees who work from home have good internet connectivity and that the IT hardware can be serviced when due. Managers noted that: "working from home can be a problem for some employees who will have to work in unconducive environments, and proper orientation is needed". Facilities managers believe that: "buildings in the future will focus on how facilities can improve productivity". Work productivity should also consider the pandemic's influence on workers' well-being even when restrictions have been reduced. Facilities managers should be responsive to changing customer needs, as these needs will continue to change through the post-COVID period. Organisations need to manage those employees who have long-term COVID and those who get infected after vaccination.

6.5 Design space improvements

The need for social distancing brought about new work arrangements. At the same time, managers suggested changes in the workplace's spatial arrangements, where some spaces were changed to maintain social distance. Some of such space arrangements should be flexible to avoid becoming a waste after the pandemic. New design requirements can be used with technology that help to reduce personal contact to assist with social distancing.

7. Conclusion

The study examined the role of FM in the prevention and control of respiratory infectious diseases in the workplace. Measures such as health and safety, client satisfaction, work productivity, maintenance, performance management and utility management should be prioritised by facilities managers when there is a pandemic for business continuity. The study is limited because no statistical analysis or hypothesis testing was done to examine the relationships or differences between groups and was done in one country.

Although this study noted spikes in the number of COVID-19 cases at certain times, future research can examine how facilities managers can create proactive measures based on data obtained before a pandemic and measure the impact of those measures in controlling a pandemic. Studies focusing on FM at different risk levels of the pandemic will be relevant since this study was undertaken at the height of the pandemic. It can also examine how facilities managers can support employees with long-term COVID-19. Some of the other suggested areas of future research are investigating how specific FM areas, such as procurement, performance management, sustainability, wellness, psychological and social aspects of workplace productivity influence, preventing and controlling respiratory infectious diseases in different workplace settings, especially in developing countries. Also, more experiments and models that are cost-effective and time-saving to implement that can provide measures to control respiratory diseases should be studied. This research indicates that timely and comprehensive prevention and control measures can help people safely continue to work or return to the workplace during the COVID-19 pandemic and at the outset of future respiratory epidemics.

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References

Adewunmi, Y.A. (2014), "Benchmarking practice in facilities management in selected cities in Nigeria", *Unpublished Ph*D. Thesis of the Department of Estate Management, *University of Lagos, Akoka, Yaba, Lagos, Nigeria*.

Adewunmi, Y.A., Iyagba, R. and Omirin, M. (2017), "Multi-sector framework for benchmarking in facilities management", *Benchmarking: An International Journal*, Vol. 24 No. 4, pp. 826-856.

Aidla, A., Kindsiko, E., Poltimäe, H. and Hääl, L. (2023), "To work at home or in the office? Well-being, information flow and relationships between office workers before and during the COVID-19 pandemic", *Journal of Facilities Management*, Vol. 21 No. 3, pp. 431-452.

Amoah, C. and Simpeh, F. (2021), "Implementation challenges of covid-19 safety measures at construction sites in South Africa", *Journal of Facilities Management*, Vol. 19 No. 1, pp. 111-128.

Amos, D., Au-Yong, C.P. and Musa, Z.N. (2021), "Enhancing the role of facilities management in the fight against the covid-19 (SARS-CoV-2) pandemic in developing countries' public hospitals", *Journal of Facilities Management*, Vol. 19 No. 1, pp. 22-31.

Azasu, S., Adewunmi, Y. and Babatunde, O. (2018), "South African stakeholder views of the competency requirements of facilities management graduates", *International Journal of Strategic Property Management*, Vol. 22 No. 6, pp. 471-478.

Bekker, L.G. and Ntusi, N.A. (2021), "Lessons from two SARS-CoV-2 waves in South Africa", *The Lancet Global Health*, Vol. 9 No. 9, pp. e1177-e1178.

Benea, C., Rendon, L., Papenburg, J., Frenette, C., Imacoudene, A., McDonald, E.G., Nguyen, Q.D., Rajda, E., Tran, E., Vameghestahbanati, M. and Benedetti, A. (2021), "Evaluation of a home-based 7-day infection control strategy for health-care workers following high-risk exposure to severe acute respiratory coronavirus virus 2 (SARS-CoV-2): a cohort study", *Infection Control and Hospital Epidemiology*, Vol. 42 No. 10, pp. 1194-1197.

Bengtsson, M. (2016), "How to plan and perform a qualitative study using content analysis", *NursingPlus Open*, Vol. 2, pp. 8-14.

Blocken, B., van Druenen, T., Ricci, A., Kang, L., van Hooff, T., Qin, P., Xia, L., Ruiz, C.A., Arts, J.H., Diepens, J.F.L. and Maas, G.A. (2021), "Ventilation and air cleaning to limit aerosol particle concentrations in a gym during the covid-19 pandemic", *Building and Environment*, Vol. 193, pp. 107659-107673.

Chitiga-Mabugu, M., Henseler, M., Mabugu, R. and Maisonnave, H. (2021), "Economic and distributional impact of covid-19: evidence from macro-micro modelling of the South African economy", *South African Journal of Economics*, Vol. 89 No. 1, pp. 82-94.

Chotipanich, S. (2004), "Positioning facility management", *Facilities*, Vol. 22 Nos 13/14, pp. 364-372.

Choudhury, P., Khanna, T., Makridis, C.A. and Schirmann, K. (2024), "Is hybrid work the best of both worlds? Evidence from a field experiment", *Review of Economics and Statistics*, pp. 1-24, doi: 10.1162/rest_a_01428.

Chua, S.J.L., Myeda, N.E. and Teo, Y.X. (2023), "Facilities management: towards flexible work arrangement (FWA) implementation during covid-19", *Journal of Facilities Management*, Vol. 21 No. 5, pp. 697-716.

Curtis, S.J., Trewin, A., McCormack, L.M., Were, K., McDermott, K. and Walsh, N. (2023), "Building a safety culture for infection prevention and control adherence at Howard springs: a workplace survey", *Infection, Disease and Health*, Vol. 28 No. 1, pp. 47-53.

Darko, D.O., Opoku, D.A., Ayisi-Boateng, N.K., Mohammed, A., Ashilevi, J., Amponsah, O., K., O., Mate-Kole, A., Egblewogbe, D., Darko, B.A., Agyemang, E. and Okyere, P. (2024), "Health and safety of health workers in the Suame municipality of Ghana–lessons learnt from the covid-19 outbreak in infection prevention and control for future pandemics", *SAGE Open Medicine*, Vol. 12, pp. 20503121231225924-20503121231225934.

Erber, J., Kappler, V., Haller, B., Mijočević, H., Galhoz, A., da Costa, C.P., Gebhardt, F., Graf, N., Hoffmann, D., Thaler, M. and Lorenz, E. (2022), "Infection control measures and prevalence of SARS-CoV-2 IgG among 4,554 university hospital employees, Munich, Germany", *Emerging Infectious Diseases*, Vol. 28 No. 3, pp. 572-581.

Eyre, D.W., Lumley, S.F., O'Donnell, D., Campbell, M., Sims, E., Lawson, E., Warren, F., James, T., Cox, S., Howarth, A. and Doherty, G. (2020), "Differential occupational risks to healthcare workers from SARS-CoV-2 observed during a prospective observational study", *Elife*, Vol. 9, p. e60675.

George, R. and George, A. (2020), "Prevention of covid-19 in the workplace", *SAMJ: South African Medical Journal*, Vol. 110 No. 4.

Godderis, L., Boone, A. and Bakusic, J. (2020), "Covid-19: a new work-related disease threatening healthcare workers", *Occupational Medicine*, Vol. 70 No. 5, pp. 315-316.

Gunawardana, M., Breslin, J., Cortez, J.M., Jr, Rivera, S., Webster, S., Ibarrondo, F.J., Yang, O.O., Pyles, R.B., Ramirez, C.M., Adler, A.P. and Anton, P.A. (2021), "Longitudinal COVID-19 surveillance and characterization in the workplace with public health and diagnostic endpoints", *Msphere*, Vol. 6 No. 4, pp. e00542-21.

Guo, M., Xu, P., Xiao, T., He, R., Dai, M. and Miller, S.L. (2021), "Review and comparison of HVAC operation guidelines in different countries during the covid-19 pandemic", *Building and Environment*, Vol. 187, pp. 107368-107377.

Herstein, J.J., Degarege, A., Stover, D., Austin, C., Schwedhelm, M.M., Lawler, J.V., Lowe, J.J., Ramos, A.K. and Donahue, M. (2021), "Characteristics of SARS-CoV-2 transmission among meat processing workers in Nebraska, USA, and effectiveness of risk mitigation measures", *Emerging Infectious Diseases*, Vol. 27 No. 4, p. 1032.

Honey-Rosés, J., Anguelovski, I., Chireh, V.K., Daher, C., K.V., den Bosch, C., Litt, J.S., Mawani, V., McCall, M.K., Orellana, A., Oscilowicz, E. and Sánchez, U. (2020), "The impact of covid-19 on public space: an early review of the emerging questions–design, perceptions and inequities", *Cities and Health*, pp. 1-17.

Hou, H., Remøy, H., Jylhä, T. and Vande Putte, H. (2021), "A study on office workplace modification during the COVID-19 pandemic in The Netherlands", *Journal of Corporate Real Estate*, Vol. 23 No. 3, pp. 186-202.

Ibrahim, A.M. and Hassanain, M.A. (2022), "Assessment of covid-19 precautionary measures in sports facilities: a case study on a health club in Saudi Arabia", *Journal of Building Engineering*, Vol. 46, pp. 103662-103675.

Ingram, C., Downey, V., Roe, M., Chen, Y., Archibald, M., Kallas, K.A., Kumar, J., Naughton, P., Uteh, C.O., Rojas-Chaves, A. and Shrestha, S. (2021), "Covid-19 prevention and control measures in workplace settings: a rapid review and meta-analysis", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 15, pp. 7847-7873.

Kasana, D., Smithwick, J., Dodd, J., Cavalline, T.L. and Mayo, G. (2023), "Successful change management strategies for unforeseen events: impact of covid-19 on facility management", *Journal of Management in Engineering*, Vol. 39 No. 4, pp. 4023016-4023016-13.

Kleynhans, S.A. (2016), "The corporate opportunity rule: a comparative study", Doctoral dissertation.

Kurogi, K., Ikegami, K., Ando, H., Hino, A., Tsuji, M., Igarashi, Y., Nagata, T., Muramatsu, K. and Fujino, Y. (2023), "Evaluation of workplace infection prevention and control measures for COVID-19: a prospective cohort study in Japan", *Heliyon*, Vol. 9 No. 5.

Lestari, F., Cook, M., Johnstone, K., Wardhany, M.S., Modjo, R., Widanarko, B. and Octaviani, D.F. (2022), "COVID-19 in the workplace in Indonesia", *Sustainability*, Vol. 14 No. 5, p.2745.

Licata, F., Viscomi, C., Angelillo, S., Di Gennaro, G. and Bianco, A. (2024), "Adherence with infection prevention and control measures among Italian healthcare workers: lessons from the covid-19 pandemic to tackle future ones", *Journal of Infection and Public Health*, Vol. 17 No. 1, pp. 122-129.

Ling, F.Y.Y. and Tam, J.Y. (2022), "Agility of facilities management organizations during the covid-19 pandemic: lessons learnt for future pandemics", *Facilities*, Vol. 40 Nos 13/14, pp. 862-878.

Ling, F.Y.Y. and Teh, K.K.L. (2024), "Effective leadership styles to boost employees' work outcomes during covid-19 pandemic: perspective of facilities management professionals", *Engineering, Construction and Architectural Management*.

Ma, P. and Chan, I.Y.S. (2022), "The changing role of BIM-facilitated facilities management in the post-covid era: a systematic literature review", *In IOP Conference Series: Earth and Environmental Science*, Vol. 1101 No. 3, p. 32024.

Mehmood, W., Fareed, M., Mohd-Rashid, R., Ashraf, M.U. and Aman-Ullah, A. (2023), "The role of facilities management in fighting covid-19 outbreak: evidence from Malaysian public hospitals", *Frontiers in Psychology*, Vol. 13, pp. 104597201-104597209.

Naqshbandi, M.M., Kabir, I., Ishak, N.A. and Islam, M.Z. (2024), "The future of work: work engagement and job performance in the hybrid workplace", *The Learning Organization*, Vol. 31 No. 1, pp. 5-26.

National Institute for Communicable Diseases (NICD) (2022), accessed 27 April, available at: https//nicd.ac.za

O'Hara, R., Johnson, M., Hirst, E., Weyman, A., Shaw, D., Mortimer, P., Newman, C., Storey, M., Turner, J., Mason, S. and Quinn, T. (2014), "A qualitative study of decision-making and safety in ambulance service transitions", *Health Services and Delivery Research*, Vol. 2 No. 56.

Özoğul, G. and Baran, G.G. (2021), "Covid-19 outbreak: effects on tourism and management measures taken", *COVID-19 and the Hospitality and Tourism Industry*, Edward Elgar Publishing.

Pillay, Y., Pienaar, S., Barron, P. and Zondi, T. (2021), "Impact of COVID-19 on routine primary healthcare services in South Africa", *South African Medical Journal*, Vol. 111 No. 8, pp. 714-719.

Porcaro, P.A., Jackson, D.E., McLaughlin, P.M. and O'Malley, C.J. (2016), "Curriculum design of a flipped classroom to enhance haematology learning", *Journal of Science Education and Technology*, Vol. 25, pp.345-357.

Qian, M., Liu, R., Hu, L., Gao, W., Cai, G., Yang, X., Song, H. and Zhang, J. (2021), "Investigation and analysis of the logistics personnel's working condition in the post-Covid-19 era–an example of a top three hospital in Shanghai", *Journal of Emergency Management and Disaster Communications*, Vol. 2 No. 1, pp. 69-79.

Rahadi, R.A., Wiryono, S.K., Koesrindartoto, D.P. and Syamwil, I.B. (2013), "Attributes influencing housing product value and price in Jakarta metropolitan region", *Procedia - Social and Behavioral Sciences*, Vol. 101, pp. 368-378.

Robinson, L., Schulz, J., Khilnani, A., Ono, H., Cotten, S., Mcclain, N., Levine, L., Chen, W., Huang, G., Casilli, A. and Tubaro, P. (2020), "Digital inequalities in time of pandemic: covid-19 exposure risk profiles and new forms of vulnerability", *First Monday*, Vol. 25 No. 7.

Sarvari, H., Chen, Z., Chan, D.W., Lester, E.A., Yahaya, N., Nassereddine, H. and Lotfata, A. (2022), "A global survey of infection control and mitigation measures for combating the transmission of covid-19 pandemic in buildings under facilities management services", *Frontiers in Built Environment*, Vol. 7, p. 644104.

Shaw, W.S., Main, C.J., Findley, P.A., Collie, A., Kristman, V.L. and Gross, D.P. (2020), "Opening the workplace after covid-19: what lessons can be learned from return-to-work research?", *Journal of Occupational Rehabilitation*, Vol. 30 No. 3, pp. 299-302.

South African Facilities Management Association (SAFMA) (2016), *What is Facilities Management*?, SAFMA.

Sunner, C., Giles, M., Parker, V., Kable, A. and Foureur, M. (2021), "COVID-19 preparedness in aged care: a qualitative study exploring residential aged care facility managers experiences planning for a pandemic", *Journal of Clinical Nursing.*

Thomas, N., Umasankar, M. and Srihari, B. (2022), "Facilitating the new normal: challenges and opportunities of facility management companies in India", *ECS Transactions*, Vol. 107 No. 1, pp. 18349-18356.

Umair, M., Cheema, M.A., Cheema, O., Li, H. and Lu, H. (2021), "Impact of COVID-19 on IoT adoption in healthcare, smart homes, smart buildings, smart cities, transportation and industrial IoT", *Sensors*, Vol. 21 No. 11, p. 3838.

Verdantix (2021), "Impact of COVID on the future of EHS", *The Impact of COVID-19 On The Future of EHS*, available at: verdantix.com (accessed June 2023).

Wackowski, O.A., Hammond, D., O'Connor, R.J., Strasser, A.A. and Delnevo, C.D. (2017), "Considerations and future research directions for E-cigarette warnings—findings from expert interviews", *International Journal of Environmental Research and Public Health*, Vol. 14 No. 7, p. 781.

World Health Organization (2020), Water, sanitation, hygiene, and waste management for the COVID-19 virus: interim guidance (No. WHO/2019-nCoV/IPC_WASH/2020.3). World Health Organization.

Zhang, Y., Hui, F.K.P., Duffield, C. and Saeed, A.M. (2022), "A review of facilities management interventions to mitigate respiratory infections in existing buildings", *Building and Environment*, Vol. 221, pp. 109347-109364.

Zhao, Y., Yang, C., An, X., Xiong, Y., Shang, Y., He, J., Qiu, Y., Zhang, N., Huang, L., Jia, J. and Xu, Q. (2021), "Follow-up study on COVID-19 survivors one year after discharge from hospital", *International Journal of Infectious Diseases*, Vol. 112, pp. 173-182.

Further reading

Cirrincione, L., Plescia, F., Ledda, C., Rapisarda, V., Martorana, D., Moldovan, R.E., Theodoridou, K. and Cannizzaro, E. (2020), "Covid-19 pandemic: Prevention and protection measures to be adopted at the workplace", *Sustainability*, Vol. 12 No. 9, pp. 3603-3621.

International Facility Management Association (2020), "Pandemic manual – planning and responding to a global health crisis for facility management professionals", available at: https://foundation.ifma.org/wp-content/uploads/2020/05/IFMA-Foundation-Pandemic-Manual-FINAL.pdf (assessed June 2020).

World Health Organization (2022), COVID-19 weekly epidemiological update, edition, 10 April.

Appendix. Measures (119) used by the facilities managers for South African workplaces

Table A1. Health and safety measures

Health and safety measures Sub-category of measures	Measures
1.1 Surveillance measures	• Screening for COVID 19 • Daily checks with records of temperature • Cost for testing COVID 19 • Monitoring of workers for COVID symptoms • Mandatory vaccination
1.2 Outbreak investigations and response	• Quarantine of employees potentially infected • Accommodation for quarantine • Isolation wards • Self-isolation of confirmed cases
1.3 PPE	• Wearing of PPE • Use of face masks and hand sanitizers • Reduction in cash handling • Lifts with pedals that eject sanitizers. • Installing sanitizers at access points
1.4 Environmental adjustments	• Hygiene management • Sanitisation protocols • Ventilation • Cleaning and hygiene management • Frequent cleaning • New cleaning methods that involve a lot of disinfecting • Managing cleaning and sanitisation activities • Cleaning of touch surfaces • Pre-scheduling cleaning operations
1.5 Education	• Training • Training of cleaning staff • Display of health and safety policy
1.6 Changes in work arrangements	• Social distancing • Paid sick leave • Safety reps to enforce compliance • Visitor record management • Changes in office layouts • Verification of staff and visitors in the workplace

(*continued*)

Table A1. Continued

Health and safety measures Sub-category of measures	Measures
1.7 Others	• Compliance to legislation • Risk assessment • Checklist • Review of policies • Permit approval

Source: The authors' creation

Table A2. Facilities measures

Facilities measures Sub-category of measures	Measures
2.1 Support services	• Additional cleaning services; • Revision of schedules for essential services; • Security response plan; • Review and defer scheduled maintenance for non-essential assets; • Procedure to address safe shut-down/isolation of equipment; • Loss of failed equipment; • Deferred maintenance work orders; • Determine whether continued delay increases risk beyond reasonable tolerances; • Review of maintenance schedules; • Robust maintenance; • Increased maintenance frequency; • Preventive maintenance; • Inventory audits and replenishment; • Simplify asset location tracking; • Mobile access to work orders; • Low utilities consumption; • Essential services; • Trial-and-error method; • Monitor of business continuity; • Security; • De-activating building passes or keys; • Portfolio and asset management; • Resource management; • Facilities condition assessment. • HVAC maintenance • Mixed use and tenanted facilities
2.2 Procurement	• Service level agreement review to reflect change in service; • Changes in bill of quantities and scope; • Increase in purchase of consumables.
2.3 Space planning and management	• Space planning and management; • Change in office design; • Use of separation and single office rooms; • Facility plan; • Limit in the number of people allowed in common areas; • Limit in the number of people allowed in smoking areas; • Reduction in staff;

(*continued*)

Table A2. Continued

Facilities measures Sub-category of measures	Measures
	• Less space required by employees; • Facility capacity; • Appointment systems; • New projects for social distancing; • Reduced demand for office facilities.
2.4 Human resource management	• Review sick leave; • Shift system; • Reduce impact on wages; • UIF for pay for days of work; • Staff shortages; • Change for inclusion. • Upskilling employees
2.5 Work productivity	• Work productivity; • Productivity and sales; • Work from home; • Limits in resources; • Trust between management and employees; • Increased knowledge for work environment for social interactions.
2.6 Performance management	• Performance management for employees.
2.7 Strategy	• Strategic planning for responsive and agile worker to COVID-19 requirements; • Change in business process; • Planning; • Workplace policies; • Review of procedures and policies; • Value enhancement to the organisation; • Employee experience; • Change in client needs; • Liaison with clients; • Reduced demand for office facilities.
2.8 Change management	• Timely response to major problems; • Resistance to change; • Stigma surrounding the use of the workplace e.g. hospitals; • Change in operations; • Change in maintenance;

(*continued*)

Table A2. Continued

Facilities measures Sub-category of measures	Measures
	• Change management.
2.9 Finance	• Operating costs; • Cost of testing employees for COVID-19; • Cost-saving efforts; • Higher costs; • Decreased revenue from operations; • Increase in OPEX expenditure. • Cost of innovation • Cost of research
2.10 Environment	• Green elements in properties • Energy efficiency • Rain water harvesting to reduce costs • Sanitising and cleaning of high touch surfaces • Environmental management system • Water
2.11 Technology	• Internet of things • Access to internet • Use of software to manage cleaning • Smart technology • Virtual meetings • Automation • Innovation • IT to enable work from home

Source: The authors' creation

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