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## Combating the Fear of Infection in the Built Environment: The Ghana Communication Technology University (GCTU) Experience during Corona Virus Pandemic

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### **Abstract:**

*Following a realization that staff and students in a Ghanaian public university were fearful of getting infected with COVID-19 due to their mistrust of the cleanliness of the campus environment, this study examined the built infrastructure cleaning and disinfection strategies adopted by the university during the COVID-19 pandemic, as well as the role played by the Facilities Manager in ensuring adherence to standard cleaning and disinfection practices. The objective was thus two-fold: first, to provide comprehensive information to all the University's stakeholders regarding the state of cleanliness of the campus environment, and secondly, to identify any possible lapses and make recommendations for improvement. The study adopted a direct observation approach to collect and analyse data, which revealed that deep cleaning approaches were adopted during the COVID-19 pandemic era. It is an extremely comprehensive cleaning exercise beyond basic cleaning, with detailed importance, and focuses on forgotten corners where dirt and dust hide. The study also revealed that the University's facility manager lacked a pre-disinfection plan, disinfection plan, and post-disinfection plan, all required to ensure adherence to standard cleaning and disinfection practices. The study thus recommends implementing some strategies and interventions to ensure the sustenance of a clean environment in the University and allay peoples' fear of contracting COVID-19 and other infections while using the University's facilities.*

**Keywords:** Facility manager, COVID-19, SAR-Cov 2, built environment, cleaning, Disinfection

### **1. Introduction**

In managing the built environment, facility managers are responsible for maintaining numerous workplace facilities. The management of waste, provision of security systems, supply of furniture, and provision and supervision of catering and cleaning services are among the tasks that facility managers have to supervise and execute efficiently. In 2020 these enormous roles of the facility manager became more challenging due to the advent of the SARS-CoV-2 virus in January 2020 into the world.

Since 2020, facility managers have been enforcing strict health and environmental safety rules in the built environment of their respective organisations to combat the fear of infection. Cleaning and janitorial works at various office locations, including schools, banks, hospitals, supermarkets, and hotels, among other areas where customer clientele is high, have become very challenging for the profession because of the risk which has been associated with cleaning contaminated surfaces and meeting infected persons. Since all these organisations have different core businesses, a variety of skills are needed in enforcing best practices by facility professionals. The International Facility Management Association in the United States and the Ghana Chapter have, therefore, since the year 2020 to date, been organizing a series of workshops and seminars for its members on how to improve their knowledge during this era of coronavirus to combat the fear of being infected with the virus, improve their working techniques and to keep their staff safe.

The Ghana Communication Technology University (GCTU) is a higher education institution focused on technology that is dedicated to offering the best possible educational opportunities. The University enrolls over two thousand (2000) students yearly; currently, the student population is about ten thousand (10,000). There are also administrative staff and faculty who are about three hundred (300) whose safety at work is the responsibility of the facility manager, who supervises cleaning work to ensure that the virus is not spread and infection rates are reduced to minimal. At GCTU, the facility manager is the Head of the Estate and Building Unit under the Directorate of Works and Physical Development. In addition, thirty-two (32) cleaners have been employed as in-house staff to assist janitorial works in the built environment. Therefore, this research was conducted to learn new cleaning techniques to improve the quality of work delivery and offer best work practices to the staff and students of GCTU during this coronavirus pandemic era.

### 1.1. Statement of Problem

The researcher's casual observation and interaction with some students and staff of GCTU during the peak of the COVID-19 pandemic revealed a sense of fear of contracting the coronavirus due to the perception that the university's environment was not as clean as they expected. This study was thus conducted as part of efforts to combat this fear by providing evidence of the state of cleanliness of the university's environment and establishing the capacity and competence levels of the managers and employees who were handed the responsibility of keeping the campus environment clean.

### 1.2. Objective

To establish the state of cleanliness of the GCTU built environment and identify good planning techniques which will be enforced to assist the facility manager in offering the best cleaning practices.

### 1.3. Research Question

*How can the Facility Manager at GC TU offer the best disinfection practices in the built environment to combat the fear of infection and keep people healthy and safe during this coronavirus pandemic?*

## 2. Literature Review

### 2.1. Historical Background of Pandemics

Ahsan (2020), citing Megaheda & Ghoneim (2020), said that pandemics had transformed our built environment because of the risk and fear of infection and diseases. Therefore, reflecting on previous events and learning about what can be improved for the future are necessary for the built environment and its related professionals because life after the pandemic will never be the same.

When tuberculosis, typhoid, polio, and Spanish flu broke out in the 20<sup>th</sup> century, architects used urban planning to design well-ventilated buildings, which cured the illness of overcrowded cities (Megaheda & Ghoneim, 2020). Ahsan (2020) also stated that in the year 2020, people were made to stay indoors due to the fear of being infected with the coronavirus. The virus was and is still spread by air, direct contact with infected people, and indirect contact with the viral particles as people move through the built environment.

According to the World Health Organisation (WHO), Coronaviruses are a large group of viruses common in animals. However, in rare cases, they are transmitted from animals to humans. WHO further stated that official names had been announced for the virus responsible for COVID-19 and the associated disease. The official name for the disease is Corona Virus disease (COVID-19), and the virus which causes it is known as SARS-Cov-2 (severe acute respiratory syndrome coronavirus 2).

Coronaviruses can move to human hosts and cause serious illness due to various factors. However, the main reason is humans' lack of immunity to the new virus. Some recorded examples of such coronaviruses are SARS-CoV, the virus that caused SARS. It was initially recognized in the year 2003. MERS-CoV, the virus that caused Middle East respiratory syndrome (MERS), was initially recognised in 2012. SARS-CoV-2, the virus that causes COVID-19, was initially recognised in 2019 (Health line 2022).

Scientists at the US Center for Disease Control and Prevention have confirmed that COVID-19 is a deadly and dangerous disease with an incubation period of four to six days. The elderly, very young people and people with weakened immune systems are at high risk of being infected. When somebody comes into contact with the infected person's secretion, through cough, sneezing, or handshake, he or she can be infected. In addition, touching an item that an infected person has touched and then touching your mouth, nose, or eyes can spread the virus. Unfortunately, there was no vaccine to protect people against this family of viruses before 2022. Therefore the need to reduce the risk of infection by:

- Frequently washing your hands with soap and water before touching something, including your eyes, nose, and mouth.
  - Covering your mouth and nose when you cough or sneeze.
  - Disinfecting or sterilizing the items and surfaces you touch.
  - Staying at home if you are sick and avoiding mingling with crowds. (Ghana Health Service, 2022).
- According to WHO (2022) and Ghana Health Service (2022):
- There is no specific treatment.
  - Medics can relieve symptoms by prescribing a pain or fever medication.
  - A room humidifier or a hot shower can help with a sore throat or cough.
  - Drink sufficient quantity of fluids
  - Sleep as much as possible and rest.
  - If signs feel worse than a standard cold, see your doctor.

These historical pandemic backgrounds have created fear of infection, and there is the need to improve disinfection techniques to handle these infectious diseases within our built environments.

## 2.2. The Built Environment

The built environment is an area with a lot of buildings (Cambridge English Dictionary, 2022). Lamprecht (2016) also stated that it includes places and spaces created or changed by people to serve their housing and accommodation needs and how people living in communities have altered their environment to suit their human activities. This comes about as a result of alterations made to nature, be it plants or domestic animals which otherwise would have been destroyed or left without care. In the writer's words, 'the built environment is not only the invention of humanity but also the basis of its development' (Lamprecht, 2016:3).

Lavin et al. (2016) also stated that the built environment encompasses buildings, public spaces, networks, and products created or modified by people. These have a significant impact on the indoor and outdoor physical environment as well as on the social environment. These subsequently affect our health and quality of life. Some of these factors which are affected by the built environment are:

- Air Quality
- Temperature
- Humidity
- Noise
- Light
- Safety
- Space
- Accessibility
- Immediate surrounding
- Locality
- House improvement

The management of these factors listed above during this pandemic era is very crucial health issues. Dietz et al. (2020), writing on the built environment during the SARS-CoV-2 outbreak, mentioned that multiple people live and share the same environment, making it possible for infectious diseases to be transmitted quickly. According to the writers, there are shared workspaces, shared rooms in our homes, shared cars, bikes, and other elements in the built environment. These shared facilities have increased the exposure to the infection, and therefore environmental protection has led to the implementation of social distancing.

The built environment of GCTU includes the administration blocks, blocks for lecture halls, cafeteria blocks, hostels, football fields, study bays, and other spaces created by the University Community to serve their needs of accommodation and the institution's core business as an academic institution. General cleaning of offices, lecture rooms, furniture, and equipment and deep cleaning is already enforced in GCTU, with cleaners going into offices and lecture halls to clean daily. Refuse from cafeteria, offices, hostels, and lecture halls are collected into a 12m<sup>3</sup> haulage tank and conveyed for disposal by Zoomlion Domestic Waste Limited weekly. The University has a contract with this service contractor to collect its waste for a fee. Solid and liquid waste is also collected into septic tanks which are dislodged periodically. GCTU has dedicated caterers who cook on campus for staff and students to eat; therefore, the risk of infection is low, and water dispensers have been put at the reception, some offices, auditoriums, conference rooms, laboratories, and other vantage points.

Disinfestation was carried out each semester at GCTU's Main Tesano campus, Abeka campus, and external hostels even before the advent of the SARS CoV-2 pandemic. This exercise covered both indoor and outdoor open spaces and was usually done over the weekend or on holidays for the chemicals sprayed to evaporate into the air before occupancy. Usually, this is a specialized field; therefore, a contract is awarded to an outsourced service contractor.

During the COVID-19 outbreak in 2020, GCTU benefitted from the Ministry of Education disinfestation exercise conducted by Zoomlion Domestic Company Limited in August 2020 and January 2021. All offices, lecture halls, hostels, and the compound were sprayed to protect the campus from any air-borne bacteria or virus.

## 2.3. Strategic Action Plans to Combat Infection in the Built Environment

Jones (2020) stated that environmental cleaning is a fundamental strategic method for reducing the risks from surface contaminants. Against SARS-CoV-2, the role of disinfection protocols cannot be underestimated; therefore, concerning this virus, the ultimate aim of environmental cleaning must be disinfection authentication. Disinfection is 'a process of cleaning something using chemicals that kill bacteria or other organisms that cause diseases' (Cambridge Online Dictionary 2022). This process has to be planned, executed and monitored. Therefore, for this study, it has been categorized as pre-disinfection, disinfection, and post-disinfection plans for clarifications.

### 2.3.1. Pre-Disinfection Action Plans

The facility manager needs a 'before' action plan to combat infection in the built environment. The word 'pre' refers to a period or event (Cambridge Online Dictionary 2022). Jones (2020) stated that an online survey to identify existing knowledge and perception about the environment surface contamination and COVID-19 is required before disinfection. This survey will help determine the number of people in the built environment who have been vaccinated. This will surely inform the decision to be taken by an organization. In addition, PCR testing of people can follow the survey as a positive public health initiative in the built environment.

The choice of appropriate personal protective equipment (PPE) like the quality of gloves, nose masks, face masks, disposable coveralls, and goggles, among other personal protective equipment for use by staff in an organisation or built environment, as a predisfection plan is also a good initiative. Likewise, the choice of chemicals, detergent quality, PH levels, and dilution ratios on the product labels must be read and followed. A high-risk training for cleaning staff to educate them on the use of chemicals and application of cleaning equipment is also essential. (WHO 2022)

The WHO newsroom series on question and answers for 31<sup>st</sup> March 2022 highlighted surface disinfectants that are effective against COVID-19 in a non-healthcare setting, and these are 'sodium hypochlorite (bleach/chlorine), which is recommended to be used at a concentration of 0.1% or 1,000ppm (1 part of 5% strength household bleach to 49 parts of water). Alcohol at 70-90% should also be used for surface disinfection'.

The report also highlighted that surface must be cleaned with water, soap, or a detergent first to eradicate dirt before disinfection. Cleaning should always start from the cleanest to the dirtiest area to prevent dirt spreading to less dirty areas. Emphasis was also made that all disinfectant solutions should be kept in opaque containers, in an airy and well-ventilated covered area, away from direct sunlight. In indoor spaces, routine application of disinfectants to surfaces by spraying is not recommended for COVID-19. WHO report advised that disinfectants should be applied using a cloth or wipe which is soaked in disinfectant. All high touch points have to be thoroughly cleaned daily.

At GCTU, protective gloves, nose masks, and face shields were provided for cleaning staff as soon as the outbreak of the COVID-19 pandemic was announced in the year 2020 by the Government of Ghana. However, the quality of detergents, the dilution ratio, and the PH levels of detergent that cleaners used before the COVID-19 were not checked. However, things are done differently now because of the knowledge acquired.

### 2.3.2. Disinfection Action Plans

The facility manager needs a guide during actual manual cleaning and knowledge of some innovative technological application tools, which are the 'current' action plans to combat infection in the built environment.

Best et al. (2014) stated that deep cleaning practice is required to disinfect areas of viruses. This is an extremely thorough cleaning exercise beyond general cleaning, with detailed importance placed on forgotten angles and holes, searching for dust, dirt, and virus-carrying particulate matter. This plan involves disinfecting all touch points using sprayers and foggers to make the process easier and ensuring that all difficult and tough notches will not be missed. However, Dexter et al. (2020) mentioned that deep cleaning alone cannot combat the infection completely. The writers stated in their research that strategies to decrease residual environmental contamination should involve a combination of deep cleaning and surface disinfectants. In health care centres, ultra violet lights should be included in the strategic plans. Together, these technologies will reduce bacteria and virus contamination because of human and social factors that can result in cleaning failures and disappointments.

When disinfecting non-healthcare settings, the WHO (2022) newsroom series stated the importance of identifying 'high touch surfaces' for priority disinfection. These areas include door handles, window handles, countertops, bathroom surfaces, toilets and taps, touch screen personal devices, personal computer keyboards, and work surfaces. Dietz et al. (2020) emphasized the WHO advice and mentioned that countertops should be cleaned with a 10% bleach solution or an alcohol-based cleaner regularly. They added that increasing the use of Ethanol is effective at eliminating SARS- COV-2. This ethanol concentration found in alcohol-based hand sanitizers makes it an essential tool against the spread of the virus in the built environment.

Fu et al. (2022) mentioned that the ATP hygiene monitoring systems should be adopted in disinfection because it provides an accurate, repeatable and reliable audit process. ATP, also known as Adenosine triphosphate, exists in all organic material and is the universal unit of energy used in all living cells. The presence of ATP on the surface signifies improper cleaning and the presence of contamination, including food residue, allergens, and bacteria (Wesse, 2022). Therefore, ATP testing should preferably be done after cleaning before sanitizer is applied. The best action is to remove all ATP before the sanitizing stage because sanitizers are less efficient when product residues are on the surface. However, each facility in each industry or organization should consider setting their clean levels after conducting several tests (Hygiena, 2022).

Jones (2020) further mentioned that in addition to the ATP meter, a PCR swab test should also be used to check the level of cleanliness of the selected surface within the built environment and a visual inspection to check and confirm the quality of work.



Figure 1: Sample ATP Meter  
Source: Hygiena, 2022



Figure 2: Door Testing, Water Closet Testing, and Wash Hand Basin Testing with an ATP Meter  
Source: Hygiena, 2022

The table below explains the ATP levels of cleaning and their interpretation. For example, reading in the range of 0-10 means the surface area is ultra clean. Alternatively, a reading in the 501-1000 means very dirty, while a reading greater than 1000 means filthy.

Surface Cleanliness	Hygiena Suggested ATP Levels of Clean
Ultra clean Sterile surfaces and food prep areas	0-10
Very Clean Critical touch points	11-30
Good Clean Floor requirement and typical Micro Fibre towel performance	31-80
Some What Clean Caution: The surface should be clean and has some risk of contamination from disease-causing bacteria	81-200
Dirty Warning Surface needs cleaning and medium risk of contamination from disease-causing bacteria	201-500
Very Dirty Danger: The surface needs cleaning and has medium to high-risk contamination from disease-causing bacteria	500-1000
Filthy Danger: The surface needs cleaning and has a high risk of contamination from disease-causing bacteria	>1000

Table 1: Adenosine Triphosphate (ATP) Levels of Cleanliness  
Source: [Http://Smartcommonsense.Com/Testing](http://Smartcommonsense.Com/Testing)

WHO (2022), newsroom series, listed the protection measures below to be considered during the act of disinfection to reduce the risk of using the disinfectants. These are:

- Care should be taken in selecting disinfectant and its concentration to avoid damaging surfaces and minimize toxic properties on household members and users of public spaces.
- Keep your children and pets away while applying disinfectants until it is dry and there is no odour.
- Disinfectant solutions should be prepared in well-ventilated areas. Remember to open windows and use fans to ventilate and keep the strong odour away.
- Children should not be allowed to use disinfectant wipes. Instead, keep cleaning solutions and fluids out of children's and pets' reach.
- Disinfectants like bleach and ammonia should not be mixed because they can cause respiratory irritation and release fatal gases.
- Remember to wash your hands after using disinfectants and even surface wipes.
- The lids of disinfectants should be kept closed at all times because they can spill and cause accidents.
- Remember to throw away disposable items like gloves and masks if they are used during cleaning and do not reuse them. Also, do not clean your hands with disinfectant wipes.
- Rubber gloves, waterproof aprons, and closed shoes are recommended personal protective equipment when disinfecting in a non-healthcare setting. In addition, to avoid the risk of splashing, eye protection, and medical masks may be needed to protect against chemicals in use.

At GCTU, the Estate and Building Unit has implemented a disinfection plan where cleaners move around with alcohol-based disinfectants to disinfect door handles and stairways every thirty (30) minutes. However, the practice has not been extended to computers, keyboards, washroom surfaces, and toilet taps.

The application of the ATP meter to check the level of cleanliness is new to Ghana Communication Technology University (GCTU). The facility manager has been exploring more into its usage and will make recommendations to management for its acquisition to support surface cleaning and ensure the safety of staff and students.

### 2.3.3. Post-Disinfection Action Plans

The facility manager needs an 'after' action plan to combat infection in the built environment. The term 'post' means after an event or time (Cambridge Dictionary, 2022). Griffiths et al. (2000), cited in Fernando et al. (2014), conducted ATP testing as a post-cleaning and post-disinfection cleaning test. The writers mentioned that recording high levels after post-cleaning (manual cleaning) shows a deficiency in cleaning, and inappropriate disinfectants, among others. Therefore, the ATP monitoring meters can also be used as post disinfection tool. Likewise, all equivalent technologies and testing tools like PCR swabs and ultraviolet lights should be used after deep terminal cleaning because of human factors which will result in cleaning failures (Dexter et al., 2020).

Dietz et al. (2020) also advised building and facility managers to mount signages after disinfection to inform people in the built environment about the usefulness of washing hands with hot water/running water and soap to avoid the spread of pathogens. Communication of cleaning work and the quality of disinfectants used for general and deep cleaning will gain their confidence.

Unfortunately, at GCTU, apart from a few posters on COVID-19 protocols, communication of quality cleaning work to staff and students is absent. To ensure best practices, the Estate and Building Unit will liaise with the University Relations Directorate to find better communication avenues with employees, including cleaners and students. In addition, the newsflash portal, which is a communication tool on campus, will be adopted to assist in efficient communication.

### 3. Research Methodology

The methodology adopted for this study was Direct Observation. As the name implies, observation is a way of gathering data through observation. Furthermore, it is a method categorised as a participatory study because the researcher immerses himself in the observation and takes notes of the setting (Moser et al., 2018).

In this study, direct observation was made by simply walking around and checking the areas that have been cleaned and disinfected as well as how the cleaners are going about their duties. First, an observation checklist was developed as a series of questions was answered by recording notes in a field notebook. Then, interpretations of the notes were made according to the relevant checklist. Finally, a well-organized interpretation was made to answer the research question.

The under-listed questions informed the judgement of the data collected:

Strategic Plan	Observation Check List
<b>Pre-Disinfection Action Plans</b>	Has any online survey been conducted in the built environment to know the level of knowledge of staff and students about disinfection protocols, environmental safety, and contamination of COVID - 19? Has the University conducted any PCR test of staff and students as a public safety initiative or organised COVID-19 vaccination for the people in the built environment? Is personal protective equipment (PPE) available for staff, students, and cleaners? Has any disinfection training been organized for cleaners, students, and other university staff? Are chemicals used for cleaning having chlorine and alcohol in the right %? Are the PH levels of the chemicals checked before use? Do Chemicals have bleach/chlorine? Are the cleaners able to commit to mixing chemicals with the correct dilution ratios? Has the University been supplied with alcohol-based chemicals as disinfectants? Are disinfectant solutions kept in opaque containers and rooms far away from sunlight?
<b>Disinfection Action Plans</b>	Are rooms disinfected from the least soiled areas (low risk) to the most soiled areas (high risk)? Is indoor disinfection done every day? Is indoor disinfection done by spraying, or are the disinfectants applied using a piece of cloth or wipe as recommended by WHO? Are high-touch surfaces like stairway rails, wash hand basins, and toilet surfaces tested for the presence or absence of the SAR-Cov -2 virus?
	Are cleaners doing their general cleaning work or now practice deep cleaning techniques. How are the items listed cleaned to avoid likely contamination of staff and students by SARS Cov 2 Virus? Light switches Door handles Window handles Stair rails Touch Screen personal devices Personal Key Boards Desk Top Computer Key Boards/mouse/printer Work Surfaces Counter Tops Bathroom Surfaces Toilet Taps Toilet Seat and Buttons Sinks in toilets Furniture: Tables and Chairs Air conditioners
<b>Post Disinfection Action Plan</b>	Is there any ATP or PCR cleaning test after disinfection to check the level of cleanliness? Have posters been pasted on campus to communicate disinfection protocols and quality work done?

Table 2  
Aryee (2022)

#### 4. Findings and Analysis

An analysis of the observation checklist against existing practices in the GCTU-built environment was made, and the findings are recorded in the table below:

No.	Observation Check List	Findings
1.	<b>Pre-Disinfection Plan</b>	
i.	Has any online survey been conducted in the built environment to know the level of knowledge of staff and students about disinfection protocols and environmental safety and contamination of COVID -19?	No documented survey has been conducted in GCTU.
ii.	Has the University conducted any PCR test of staff and students as a public safety initiative or organised COVID-19 vaccination for the people in the built environment?	No documented PCR Test has been conducted. However, health personnel from some renowned hospitals were invited to the University by the Directorate of Human Resources to vaccinate staff and students in the years 2020 and 2021.
iii.	Is personal protective equipment (PPE) available for staff, students, and cleaners to use?	Yes. Cleaners, other staff, and students have been provided with gloves and nose masks. Through the Ministry of Education, the Government of Ghana supplied GCTU with nose masks, hand sanitizers, and plastic buckets in August 2020 for staff and students to use to combat the spread of the virus.
iv.	Has any disinfection training been organised for cleaners, students, and other university staff?	No training has been held on the use of cleaning chemicals to disinfect the SAR-Cov -2 Virus.
v.	Are chemicals used for cleaning having chlorine and alcohol in the right %?	Yes. Disinfectants with chlorine are used for general cleaning, and alcohol-based solutions with 70-90% concentration are used for surface cleaning.
vi.	Are the PH levels of the chemicals checked before use?	No. Checking PH levels is not a practice enforced. However, training will be organised to educate cleaners on the required PH levels for chemicals.
vii.	Do Chemicals have bleach/chlorine?	Yes, chemicals have chlorine.
viii.	Are the cleaners able to commit to mixing chemicals with the correct dilution ratios?	No, cleaners do not have any formula for mixing chemicals (Dilution Ratios).
ix	Has the University been supplied with alcohol-based chemicals as disinfectants?	Yes, the Procurement Department has supplied alcohol-based disinfectants to be used by the University Community.
x	Are disinfectant solutions kept in opaque containers and rooms far away from sunlight?	Yes. The solutions are in opaque plastic containers and stored in rooms away from sunlight.
2.	<b>Disinfection Plan</b>	
xi.	Are rooms disinfected from least soiled areas (low risk) to most soiled areas (high risk)?	Yes, the cleaners who sweep offices do not cross over to sweep washrooms.
xii.	Is indoor disinfection done every day?	No. Indoor disinfection is not done every day.
xiii	Is indoor disinfection done by spraying, or are the disinfectants applied using a piece of cloth or wipe as recommended by WHO?	Yes. The cleaners spray disinfectants on pieces of cloth while cleaning surfaces.
xiv	Are high-touch surfaces like stairway rails, wash hand basins, and toilet surfaces tested for the presence or absence of the SAR-Cov 2 virus?	No, the high touch surfaces have not been tested for SAR-Cov 2.



xv.	Are cleaners doing their general cleaning work or now practise deep cleaning techniques?	Yes. Cleaners are doing general and deep cleaning on Holidays, Saturdays, and Sundays. With long non-working days, they get more time and execute cleaning well.
<b>No.</b>	<b>Observation Check List</b>	<b>Findings</b>
<b>2.</b>	<b>Disinfection Plan</b>	
xvi.	How are the items listed cleaned to avoid likely contamination of staff and students by SARS Cov 2 Virus? Light switches Door handles Window handles Stair rails Touch Screen personal devices Personal Key Boards Desk Top Computer Key Boards/mouse/printer Work Surfaces Counter Tops Bathroom Surfaces Toilet Taps Toilet Seat and Buttons Sinks in toilets Furniture: Tables and Chairs Air conditioners	Cleaners use pieces of cloth and wipe with disinfectants to clean the surfaces of door handles, worktops, countertops, and stair rails only. All the other listed items, including printers, keyboards, toilet buttons, and seats, are not disinfected with an alcohol-based solution to avoid possible contamination.
<b>3</b>	<b>Post Disinfection Plan</b>	
xvii.	Is there any ATP testing or PCR cleaning test after disinfection to check the level of cleanliness?	No. Technologically inclined cleaning tests are not done. Only visual inspections are made as a check of cleanliness
xviii.	Have posters been pasted on campus to communicate disinfection protocols?	Yes. New cleaning protocols have been communicated to the staff and students of GCTU, and posters have also been fixed at vantage areas.

*Table 3: An Analysis of Strategic Action Plans Against Observations Checklist*

*Source: Aryee (2022)*

Eighteen (18) questions were used as an observation checklist. Seven (7) of these questions were answered in the negative, and ten (10) of the questions were answered in the positive. In contrast, one (1) question regarding items likely to be contaminated with SARS COV2 virus was answered as partly negative and partly positive because not all items listed were included in the surface cleaning list to kill the virus.

Regarding disinfection strategies not practiced, it was observed that online surveys had not been conducted to check the level of knowledge of staff and students in GCTU on the coronavirus pandemic. Training has also not been done for cleaners to educate them on safety protocols against SARS CoV-2, dilution ratio, and PH levels of chemicals. Disinfection of possible contamination surfaces is not done every day, and high-touch surfaces are also not checked for infection. Surface cleaning is not executed extensively to cover other important high touch points; only visual inspection is made to check cleanliness.

Regarding disinfection strategies, it was observed that personal protective equipment is available for cleaners, other staff, and students. In addition, General and deep cleaning are already practiced while cleaners have adopted the cleaning practice of moving from less soiled to most soiled areas. Cleaners spray disinfectants into the cloth and wipe to clean door handles, stair rails, and worktops.

These observations revealed that some level of caution and cleaning strategies already exist in GCTU; however, there are still very important cleaning practices to be adopted to achieve the level of cleanliness required to get rid of the SARS-CoV-2 virus, minimize the risk of contamination and infection rate.

## 5. Conclusion

The facility manager of GCTU needs to develop and adopt a strategic action plan to support his/her work in combating the fear of infection in the University Community. When adopted and intensified, the built environment



cleaning processes and disinfection strategies highlighted in this study will remove fear and bring confidence back into the built environment at GCTU.

WHO (2022) newsroom series have provided adequate information that guide the built environment to disinfection. Several researchers have also expanded knowledge by providing pre-disinfection, disinfection, and post-disinfection information for this study. The knowledge acquired by the facility manager of GCTU is enormous and will be applied to cleaning practices to get rid of the SARs-Cov 2 virus. Inefficient disinfection strategies will be stopped, appropriate chemical composition will be checked, and after disinfecting, test checks using ATP meters and PCR swab tests for surfaces will be started to improve surface cleaning. The sustenance of these good planning techniques is required, and the facility manager of GCTU will have to enforce them to offer the best cleaning practices.

## 6. Recommendation

Based on the study's findings, the following recommendations are made for combating the coronavirus in the GCTU-built environment. The facility manager in GCTU should ensure that:

- An online survey is conducted to identify existing knowledge and perception about environmental surface contamination.
- Continuous supply of quality personal protective equipment (PPE) for use by cleaners during cleaning exercises and other staff and students should be maintained and their use enforced strictly.
- The PH levels of detergents purchased should be checked for chlorine content. Only alcoholic-based sanitizers with a composition of 70-90% should be used for cleaning surfaces and general equipment like printers, computers, mice, light switches, door handles, stair rails, countertops, toilet handles, and other high-risk surfaces.
- The Estate and Building Unit should liaise with the Directorate of Human Resources to organise training seminars for cleaners, students, and other staff of GCTU on disinfection protocols.
- Deep cleaning should be continued in the built environment at regular intervals, and cleaners should be encouraged to clean from high-risk to low-risk areas.
- Disinfection of surfaces should be done carefully, and the level of cleanliness checked with PCR swab kits and ATP Meters. As a post-disinfection plan, these technologically inclined tools should be added to manual cleaning to avoid human failures. A proposal to request for the procurement of ATP metres to be used by the cleaning units to check the surfaces of walls, wash hand basins, urinal pots, and door handles, among others, on the university campus, should be sent to the Director of Works and Physical Development for consideration.
- Communication of all safety protocols and cleaning work executed satisfactorily should be circulated in newsletters, posters and other communications means to build up the confidence of students and staff of the University Community.

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