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Issues and Innovation for Setting and Infrastructure Management in the Islamic University of Lebanon in the Time of Pandemic

Jamal Haydar, Walid Fahs, Mohammad Ayache*
Islamic University of Lebanon, Wardanieh, Lebanon
*corresponding author: jamal.haydar@iul.edu.lb

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Abstract. The Islamic University of Lebanon (IUL) is committed to providing faith and knowledge as a source of inspiration for the Lebanese nation, citizen, state and society as a whole. IUL has paid special attention to the environment and to the green metrics when establishing the new campus in Wardanieh, the rules related to green buildings and the preservation of the environment were taken into account. The COVID-19 pandemic has created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries. In this paper we will describe how the setting and infrastructure of Wardanieh campus has helped in managing the Covid-19 crisis at the university through different levels: the physical distancing, the effect of the large campus buildings area according to the campus population, moreover the large forest spaces, the natural ventilation of buildings, the sanitization and sterilization procedures with setting guidelines for Covid-19 such as the obligation of wearing masks. Furthermore, we will describe the influence of ICT technologies into education in many different ways for distance learning, and how the university has evolved its ICT infrastructure to support the increase in demand on the internet capacity and on university servers.

Keyword:
IUL university, Green, SDGs, Covid-19 prevention, education, settings and infrastructure

1. Introduction

The COVID-19 pandemic has created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries. Closures of schools, institutions and other learning spaces have impacted more than 94% of the world's

student population [1].

The Islamic University of Lebanon (IUL) is a private Lebanese institution of higher education, licensed under Decree No. 8600 of June 12, 1996. This institution is committed to providing faith and knowledge as a source of inspiration for the Lebanese nation, citizen, state and society as a whole.

IUL is a national project for the future, arising from a vision of Lebanon as a pioneer in all the different domains of modern knowledge. This institution aims to popularize and deepen higher education, taking into account the historical and contemporary conditions that are indispensable for a balanced perspective, so that learning becomes the cornerstone of the nation's development.

IUL is a comprehensive university which contains nine faculties and four campuses (Fig. 1):

- Khaldeh Campus: located near Beirut, the capital of Lebanon.
- Baalbek Campus: located in Baalbeck city in the northeast of Lebanon, in Baalbek-Hermel governorate center.
- Tyre Campus: located in the south of Lebanon, in Tyre city.
- Wardanieh Campus: located in Saida city in the south of Lebanon, Saida is the center of the South governorate.

Figure 1. IUL Campus Sites

The Wardanieh campus comprises three faculties: The Faculty of Engineering (FoE), the Faculty of Sciences and Arts (FoSA) and the Faculty of Economics and business administration (FoEBA).

The IUL University pays special attention to the environment and to the green metric, so in establishing the new campus in Wardanieh, the rules related to green technology and the preservation of the environment were taken into account.

In this paper, we will describe the setting and infrastructure of Wardanieh campus at the university level in the time of the pandemic. In section 2, we will discuss the commitment of green buildings against COVID-19, while in section 3 we will describe the Setting and

Infrastructure of Wardanieh campus. Moreover, we will highlight in section 4 on how this infrastructure has helped in managing the Covid-19 crisis at IUL level, and finally we will conclude by discussing the study.

2. The commitment of green buildings against COVID-19

The criteria for green buildings are useful to the COVID-19 avoidance and control. The positive impacts of green buildings within the COVID-19 avoidance and control can be outlined into five points [2]:

a. Giving the fundamental capacities for scourge avoidance and control that incorporate characteristic ventilation, indoor cleansing and cleaning, and maintaining a strategic distance from gathering; for property administration, incorporate squander administration, data exposure, data administration, discuss quality and water quality observing, steady operation of building hardware and aptitudes in reacting to the scourge.
b. Giving facilities for scourge avoidance and control that empower buildings occupants to supply fast get to medical facilities.
c. Reduce the chance of disease spread so the building itself should isolate the infection as much as conceivable to reduce the chance of disease. Thus, the building should be developed to improve the joint ventilation, control the air conditioning framework by zones, etc.
d. Advancing and securing the health of occupants: Currently there's no particular antiviral sedate against the novel coronavirus. COVID-19 depends on the body's resistance. For this reason, it must control water quality and antibacterial work building materials in arrange to decrease the chance of getting infection and improve the capacity of standing up to infections.
e. Stabilize work and living environment during the epidemic prevention and control.

3. Setting & Infrastructure (SI) of Wardanieh campus

In this section we will talk about the settings and infrastructure of Wardanieh campus that has helped in dealing with the crisis in the time of Covid-19 pandemic spreading

3.1. Wardanieh Total Campus Area

The Wardanieh campus is located near Saida city (the third-largest city in Lebanon and the capital of the South Governorate), where the direct distance to Saida old city is almost 4198 m. The total campus area of Wardanieh campus is about 468,501 square meters (Fig. 2).

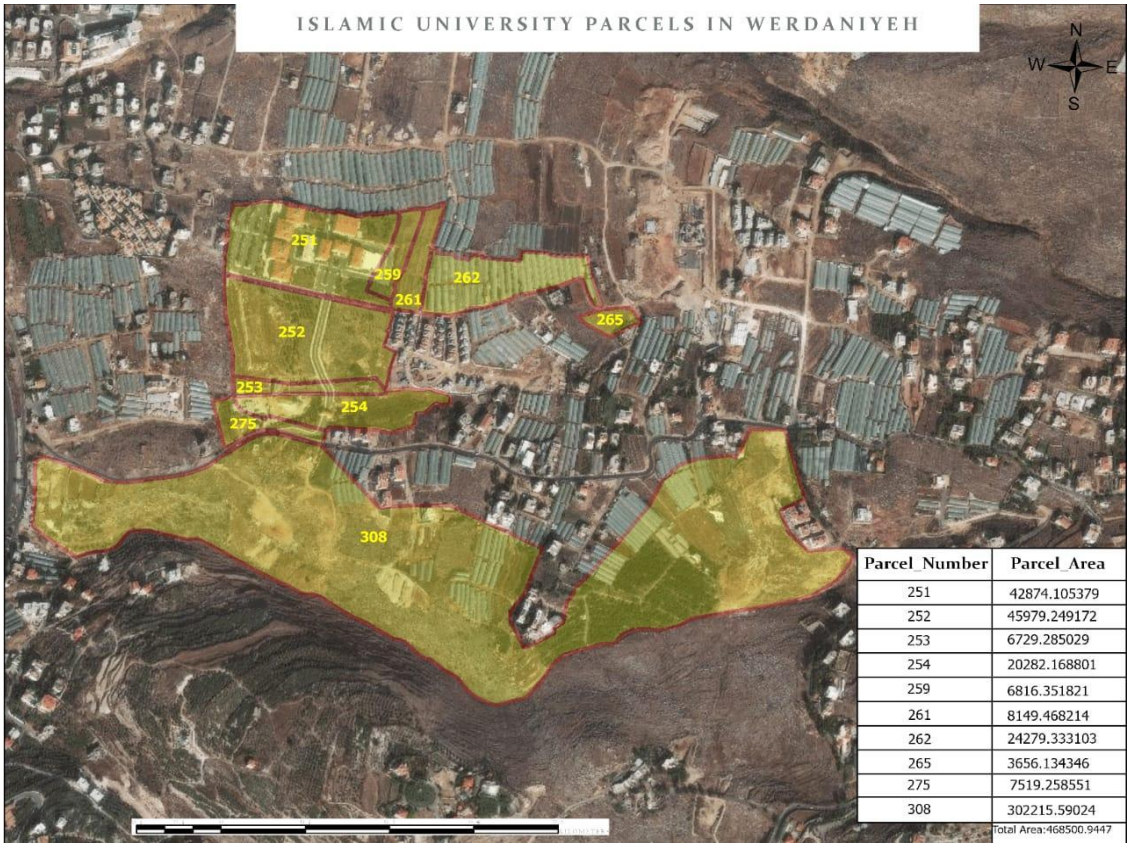

Figure 2. Total Campus Area.

3.2. Wardanieh campus area and buildings distribution

Fig. 3 shows the distribution of the buildings on the Wardanieh campus, where it comprises eight buildings (or blocks) providing academic services to the students:

- The faculties of Engineering reside on buildings 3 and 4, while the faculty of Arts and Sciences, and the faculty of Economics and Business Administration, reside on buildings 2 and 1 respectively.
- The library is located in building 5.
- The sports center occupies building 7.
- Buildings 6 and 8 contains the auditorium and the conferences center.

These buildings occupy a total ground floor area of about 9,285 square meters, and a total buildings area of about 28,625 square meters.

Number	Total_area	Built_up_area	Ground_area
1	6921.530273	5296.343262	1625.18689
2	6307.199707	5070.372559	1236.827271
3	6211.27832	4943.644043	1267.634277
4	6746.998047	5245.481445	1501.516602
5	3786.773193	3155.644287	631.128845
6	1857.801147	1238.534058	619.267029
7	3814.076416	2542.717529	1271.358765
8	1132.403931	1132.403931	1132.403931

Figure 3. Distribution of the buildings on the Wardanieh campus with total ground and buildings area.

The large area of the campus offers the best ways to make events safely during the pandemic. Here we shall mention that the ratio of open space area to total campus area is extremely high and reaches 98%.

Total open space area = Total Campus Area – Total ground floor area of buildings = 459,215 m^2

Ratio of open space area to Total area = Total open sapce area / Total Campus Area = 459,215 m^2/ 468,500 m^2 = 98%

3.3. Open space area to population ratio

The total number of regular students attended the three faculties of the Wardanieh campus on the academic year 2018-2019 is up to 1119 students.

The total number of academic and administrative staff (part time and full time) worked at Wardanieh campus on the academic year 2018-2019 is about 279.

The ratio of the open space area to the total campus population = 459,215.6 /1,398 = 328.48 m^2/person.

3.4. Systems and infrastructures for COVID-19 risk reduction

During the crisis period the university has launched self-sterilization corridors at the entrances of all building (Fig. 4). The university has also setting regulations for COVID-19 and obligating of all students and workers inside the campus to wear masks and to wash their hands regularly or to use hand sanitizers.

Figure 4. Tunnels for sterilization and some instructions for Covid-19 social distancing

3.5. Infrastructure of the E-learning Management System (EMS)

During the crisis period, the university was updating the E-learning Management System, it has used the Moodle platform for online courses and for online exams. Fig. 5 shows the architecture of the Moodle system which comprises three main components: the software part, the hardware part (the servers) and the infrastructure (the network).

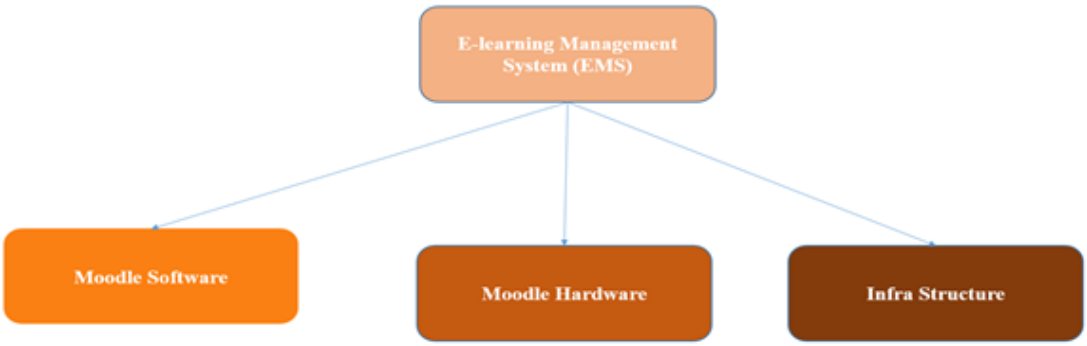

Figure 5. E- Learning management system

Table 1 shows statistics about the use of the Moodle platform during the COVID-19 pandemic for Wardanieh campus users only. On the other hand, the number of users (students and instructors) using Moodle in all university campuses are around 485 instructors and 12173 students.

Table 1. Statistics about using Moodle platform during the Covid-19 pandemic for Wardanieh campus

Total Numbers of Participants	1758 users
Data Size	13 TB
Number Courses Groups	1213 Groups
Number of Quizzes and Assignments	147791 Activities

The huge traffic load on the Moodle system for distance learning needs during the pandemic has put the university into a real challenge concerning the continuity of providing remote services to both instructors and students. Therefore, the university has evolved its network and extended the servers, as well as increasing the internet capacity from 50 Mbps to 200 Mbps as a dedicated bandwidth. Six servers were put into work to provide a continuous online access to all users to the system with a secure manner, also the IT team has used a load balancer to distribute the load on these six servers. Fig. 6 shows the infrastructure topology of the E-Learning management system and the location of the online servers and the security model used.

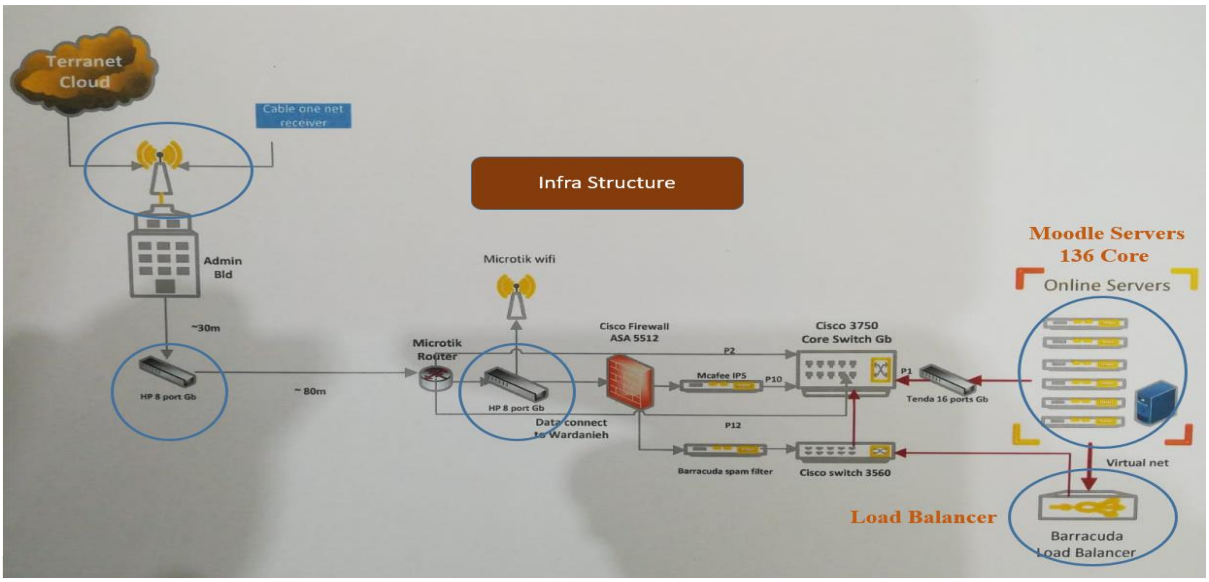

Figure 6. The infrastructure of E-Learning management system

4. Settings and infrastructure against the crisis due to the spread of Covid-19

The settings and infrastructure of the Wardanieh campus helped in managing the crisis due to the spread of Covid-19 through different levels:

a. Physical distancing is the practice of staying at least 6 feet away from others to avoid catching a disease such as COVID-19 [3]. In Wardanieh campus the total Campus Area and the total open space area to the total campus population helped to keep a physical distancing between students when they came to the university for some Practical Courses and also the distribution of students to small groups helped preventing overcrowding among students.

b. Through the large campus buildings area according to the campus population, and moreover the large space of practical laboratories, the Wardanieh campus was able to accommodate all students who needed to come to the university to complete the work of some laboratories and take written exams while maintaining social distancing.

c. Computer based communication technologies are bringing new possibilities into instructor education in many different ways for distance learning for the students [4]. During the crisis, the network infrastructure and the strength of the university's information system helped to deliver information and lectures to all students without any problem.
d. In addition to physical distancing, building ventilation can also be an important risk mitigation measure for controlling exposure to Covid indoors [5], for that the building architecture and the natural ventilation inside buildings in Wardanieh campus were among the factors that contributed to mitigating the risks of Covid-19.

Finally, the measures taken during the crisis period, such as establishing some corridors for sterilization at all entrances of buildings on the university campus, setting guidelines for Corona and obligating all students and workers inside the campus to wear masks and sterilization, all contributed to reducing the risks of contracting Covid-19 disease.

5. Conclusions

This study has sought to describe the impact of COVID-19 pandemic on Islamic University of Lebanon, UI Green Metric, and SDGs. We described the setting and infrastructure for Wardenieh campus and how this infrastructure has helped in managing the Covid-19 crisis at the university. The study showed that there is a significant effect of UI green regulations especially for the settings and infrastructures on the limitation of risks of Covid-19. For example:

a. Large Total Campus Area helped to keep a physical distancing between students,
b. The large ratio of Campus buildings area according to the campus population was able to accommodate all students who needed to come to the university to complete the work,
c. Establishing some corridors for sterilization at buildings entrances, setting guidelines for Corona contributed to reducing the risks of contracting Covid-19 disease,

The building architecture and the natural ventilation inside buildings were among the factors that contributed to mitigating the risks of Covid-19.

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