# MANAGING SUSTAINABLE UNIVERSITIES DURING COVID-19 PANDEMIC



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Editors: Riri Fitri Sari Nyoman Suwartha Junaidi

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COVID-19 Pandemic is one of the latest disruptions which transformed tertiary institutions on the way it performs teaching and learning, research, and community engagement. In some cases, this great reset created a condition in which universities becomes more environmentally friendly and sustainable. The impacts of this pandemic force all universities to adapt and mitigate the impacts not only in the present but also in the future. To discuss the experiences of several universities on this matter and in order to document the adaptations of sustainability programs many universities, the UI GreenMetric team held the UI GreenMetric International and National Webinar Series on Managing Sustainable University During Covid-19 Pandemic via Zoom Cloud Meeting application and live video streaming via YouTube. This work contains invited papers which has been presented by the university leaders during several webinar series.

The total number of invited speakers in all series was 54 speakers. The presenters were esteemed representatives from universities of UI GreenMetric members (rectors, vice-rectors, sustainability directors, deans, respectful professors). They shared their experience in managing food sufficiency, energy management, teaching, learning, working, waste management, and well-being of all stakeholders to keep performing as a sustainable university during this pandemic.

We hope that this event will provide an opportunity for learning and provide insight into many sustainable university's efforts during the COVID-19 pandemic.

Moreover, this series of event were officially opened by Prof. Ir. Nizam, M.Sc., DIC., Ph.D., Director General of Higher Education, Ministry of Education and Culture.

We convey our greatest appreciation to all distinguished speakers and chairs from Universitas Indonesia - Indonesia, Universitas Diponegoro - Indonesia, University of Oviedo - Spain, Kazakh National Agrarian University - Kazakhstan, IPB University - Indonesia, National Pingtung University of Science and Technology - Chinese Taipei, University of Sousse - Tunisia, University of Zanjan - Iran, El Bosque University - Colombia, University of Bologna – Italy, Bülent Ecevit University – Turkey, Escuela Superior Politécnica de Chimborazo – Ecuador, University of Szeged – Hungary, Seinajoki University of Applied Sciences - Finland, Riga Technical University - Latvia, King Abdulaziz University - Saudi Arabia, Aalborg University – Denmark, Universitas Negeri Semarang – Indonesia, Universitas Sebelas Maret – Indonesia, UIN Raden Intan Lampung – Indonesia, Universitas Gadjah Mada – Indonesia, Universitas Sumatera Utara (USU) - Indonesia, Institut Teknologi Sepuluh Nopember - Indonesia, Universitas Padjadjaran - Indonesia, Universitas Negeri Padang - Indonesia, Telkom University -Indonesia, President University - Indonesia, Brawijaya University - Indonesia, Universitas Hasanuddin -Indonesia, Universitas Islam Indonesia – Indonesia, Universitas Airlangga – Indonesia, Universitas Medan Area - Indonesia, Institut Teknologi Bandung - Indonesia, Universitas Muhammadiyah Yogyakarta -Indonesia, Universitas Halu Oleo – Indonesia, Universitas Lampung – Indonesia, Universitas Multimedia Nusantara – Indonesia, Universitas Bengkulu – Indonesia, Institut Teknologi Sumatera – Indonesia, Universitas Pancasila - Indonesia, Universitas Bangka Belitung - Indonesia.

We thank the conference contributors for their papers. This conference has attracted active participation from many high-rank officials from many universities. Each series was attended by more than 250 participants. We thank all participants and all stakeholders for making UI GreenMetric International and National Webinar Series on The Sustainable University Effort during COVID-19 Pandemic a fruitful event from which the future generation could learn to be adaptive. In the meantime, please stay safe and healthy.

**Editorial Team** 

Riri Fitri Sari, Nyoman Suwartha, Junaidi



# Remark – Director General of Higher Education of Ministry of Education and Culture, Republic of Indonesia

Dear Rectors, Vice-Rectors, University Leaders, Campus Sustainability Officers and all stakeholders of worldwide Sustainable Campuses.

Based on the results of THE Impact Ranking 2020, 9 universities in Indonesia have been included in the ranking list this year. This a proud moment for Indonesian Universities. In addition, we highly appreciate the achievement of Indonesian universities to compete with the best campuses in the world in the UI GreenMetric World University Rankings developed by Universitas Indonesia. I am happy to learn that our campus is very active in achieving SDGs through research and student activity units. The benchmarking platform is a very good platform for us to encourage and continue to develop and advance.

During pandemics, we work from home and learn from home, which in fact encourages development and learning in a short period of time and with extraordinary results. The distance learning program that had been pushed since the 2000s was underdeveloped. However, suddenly in a very short time the various platforms for online learning developed rapidly during the Covid-19. In fact, the previous distance learning process was only a sweetener and an alternative to learning, but now it has been adopted by 98% of Indonesian universities. We once conducted a survey with respondents of around 270 thousand students. It was seen that even though they were still hobbled, the effectiveness of learning from home was quite good.

Once again I would like to congratulate the campuses included in the THE Impact Ranking and also on UI GreenMetric World University Rankings. I really hope our campuses can dominate in UI GreenMetric as well. Apart from that, I also thank the tertiary institutions for their efforts to mitigate Covid-19. After the Covid-19 pandemic, we will be required to be able to inspire and accelerate economic and social recovery of our nations. I wish that we can support and collaborate further to go beyond this great disruption and make out campuses even more sustainable than before.

All in all I would like to thank all authors and contributors to this highly authentic book and UI GreenMetric with their highly appreciated initiative.



**Prof. Ir. Nizam, M.Sc., DIC., Ph.D.** (Director General of Higher Education of Ministry of Education and Culture)



### **Remark - Rector of Universitas Indonesia**

Dear Rectors, Vice Rectors, University Leaders, Campus Sustainability Officers and all participants.

The University of Indonesia proudly organised among the first webinar series conducted to gather university leaders in the world during the COVID-19 pandemic. The invited speakers are highly respected university leaders from the UI GreenMetric University Rankings Network. The total number of individual participants during all those 2 international webinars are 720 participants, from 43 countries, such as Bangladesh, Brazil, Bulgaria, Chile, Colombia, Ecuador, Guatemala, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jordan, Kazakhstan, Lebanon, Malaysia, Malta, México, Pakistan, Palestine, Panamá, Poland, Portugal, Russia, Saudi Arabia, Slovakia, Slovenija, South Africa, Spain, Sweden, Taiwan, Thailand, The Netherlands, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom and United States. In addition there are 1.022 participants from 280 universities in Indonesia during UI GreenMetric Indonesia Webinar Series.

I wish you all a constructive and productive time during pandemic COVID-19 and hope your stay safe and healthy.



Prof. Ari Kuncoro, S.E., M.A., Ph.D (Rector of Universitas Indonesia)

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### Chapter 1: World Sustainable Campuses Online Collaboration during COVID-19 Pandemic: UI GreenMetric Initiative

Riri Fitri Sari<sup>1</sup>

At the beginning of the Covid-19 Pandemic, UI GreenMetric as an institution who has taken the role of a rankologist for universities for their performance on their sustainability achievements since 2010, invited global university leaders to collaborate. UI GreenMetric conducted webinar series activity to facilitate the process of building a sense of togetherness and self-confidence through the difficult times of large-scale social restrictions or so called lockdown period, which lasted more than 3 months. University administrators around the world became more aware of the importance of operating and developing campuses with economic, social, and environmental perspectives, which are often called sustainable campuses. More than 55 leaders of major campuses in the world who have integrated environmental science into higher education management policies, have shared their latest experiences on handling the Covid-19 pandemic and reported changes in the way the their three pilar activities of teaching, research and social impact have been carried out. Uncertainty of how educational process would be conducted, has triggered university leaders from 41 universities to share their experience in 8 webinars..

Looking back into history, there were some movement around the world for university leaders to meet under common interest for sustainability. For example, the Association of University Leaders for a Sustainable Future (ULSF) initiated the Tallories Declaration in France in 1990. The movement led by Tufts University (USA). This association existed two decades before the UI GreenMetric initiative began at the University of Indonesia. Subsequently UI GreenMetric declared a formation of a UI GreenMetric network for participating universities in 2017. UI GreenMetric was born during the momentum of the development of Rankings as an encouragement for universities to perform better in carrying out its role. In the early days of the Covid-19 pandemic, universities performed their responsibility in terms of ensuring the implementation for health and welfare as well as quality education. In addition their role for running and maintaining energy efficient infrastructure, conserving water, treating waste, paying attention to the carbon footprint of the pandemic related transportation, and learning and research related to sustainability have also been reported. UI GreenMetric organised Eight webinar series on the theme of sustainability, food security, waste management, teaching and research, energy management, welfare of lectures and students during the pandemic have provided opportunities for further collaboration such as collaboration in developing eco-enzymes for disinfectants, making online lecture models and various collaborative activities that produce cooperation to feel in one community. The webinar with 30 speakers and attended by a total of 5233 participants through the Zoom platform, Facebook, and Youtube.

<sup>&</sup>lt;sup>1</sup> R. F. Sari

UI GreenMetric World University Rankings, Universitas Indonesia, Depok, Indonesia e-mail: <u>riri@ui.ac.id</u>



#### 1.1. Introduction

UI GreenMetric World University Rankings is a non-profit initiative from the University of Indonesia. UI GreenMetric ranks universities around the world for their commitment and actions towards sustainability. The UI GreenMetric World University Rankings aimed at increasing their universities awareness four sustainability. In 2009 the University of Indonesia hosted the International Conference on World University Rankings. The conference was attended by world university rankers such as Webometrics, HEEACT Taiwan, and research institutes on higher education from Canada. In 2010, Prof. Dr. Gumilar Rusliwa Somantri as the Rector of the University of Indonesia at that time initiated the UI GreenMetric World University Rankings and appointed Prof. Riri Fitri Sari as the chairman. Not long after that the team consisting of Junaidi, Dr. Budi Hartono, Dr. Allan Lauder, and Prof. Dr. Ir. Gunawan Tjahjono formulated the UIGM Questionnaire and introduced the UI Ranking to the world. In 2011, 11 new indicators in 5 categories have been added. Furthermore, Education was added as a new category in 2012. In 2015, measurements of carbon footprint were added and more systematic data collection was carried out. In 2016, an online-based review and validation system was established for the assessment team.

UIGM applies a new theme each year, namely Policy into Action in 2016, Global Partnership for Sustainable Future in 2017, Universities, Impacts, and Sustainable Development Goals (SDGs) in 2018, Sustainable University in a Changing World: Lessons, Challenges and Opportunities in 2019, and the Universities' Responsibility for Sustainable Development Goals and World's Complex Challenges in 20 in 2020. In 2020, 912 universities from 84 countries participated in the ranking.

In 2019 THE Impact Ranking was introduced, and ranked over 850 universities who has submitted data regarding their achievement in Sustainable Development Goals (SDGs). Statistics of universities global universities that participate in the UI GreenMetric and THE Impact Ranking are shown in Table 1.

	Funning.				
		UI Gree	nMetric	THE	Impact
No	University	Ran	king	Ra	nking
		2019	2020	2019	2020
1	Universitas Oviedo	90	145	301+	-
2	Bulent Ecevit University	254	303	-	-
3	Institut Teknologi Sumatera	433	240	-	-
4	Universitas Islam Indonesia	109	112	-	-
5	Telkom University	135	123	-	-
6	UIN Raden Intan Lampung	172	126	-	-
7	Universitas Airlangga	255	183	-	301-400
8	Universitas Bengkulu	428	463	-	-
9	Universitas Halu Oleo	444	241	-	-
10	Universitas Hasanuddin	436	359	-	-
11	Universitas Medan Area	303	230	-	-
12	Universitas Muhammadiyah Yogyakarta	189	137	-	-
13	Universitas Pancasila	451	289	-	-
14	Universitas Negeri Padang	658	498	-	-
15	Universitas Teuku Umar	422	333	-	-

Table 1. Comparing world universities achievements in the UI GreenMetric ranking and THE Impact Ranking.



P University	40	10		
B University	40	49	201-300	77
niversitas Negeri Sebelas Maret	96	99	-	-
niversitas Gajah Mada	47	44	101-200	72
niversitas Negeri Semarang	71	66	-	-
niversitas Lampung	343	258	-	-
niversitas Multimedia Nusantara	213	199	-	-
niversitas Brawijaya	257	147	-	201-300
niversitas Diponegoro	50	39	101-200	301-400
niversitas Sumatera Utara	250	136	-	-
niversitas Bangka Belitung	442	556	-	-
azakh National University	344	454	-	-
cuela Superior Politécnica de Chimborazo	206	211	301+	301-400
ational Pingtung University of Science and Technology	37	31	-	-
alborg University	63	63	97	23
ng Abdulaziz University	44	36	54	101-200
ga Technical University	95	56	201-300	101-200
inajoki University of Applied Science	-	605	-	-
niversitas El Bosque	143	125	-	-
niversitas Sousse	557	569	-	601+
niversitas Szeged	74	86	101-200	101-200
niversitas Zanjan	48	54	301+	-
stitut Teknologi Bandung	418	336	301+	301-400
stitut Teknologi Sepuluh November	59	61	-	401-600
niversitas Indonesia	27	27	80	47
niversitas Padjajaran	142	151	301+	101-200
esident University	718	832	-	-
	niversitas Negeri Sebelas Maret niversitas Gajah Mada niversitas Gajah Mada niversitas Negeri Semarang niversitas Negeri Semarang niversitas Lampung niversitas Lampung niversitas Multimedia Nusantara niversitas Brawijaya niversitas Brawijaya niversitas Brawijaya niversitas Brawijaya niversitas Bangka Belitung azakh National University cuela Superior Politécnica de Chimborazo ational Pingtung University of Science and Technology alborg University ng Abdulaziz University ga Technical University inajoki University of Applied Science niversitas Sousse niversitas Szeged niversitas Zanjan stitut Teknologi Bandung stitut Teknologi Sepuluh November niversitas Indonesia niversitas Padjajaran esident University	be chriteristry10niversitas Negeri Sebelas Maret96niversitas Gajah Mada47niversitas Gajah Mada47niversitas Negeri Semarang71niversitas Negeri Semarang71niversitas Lampung343niversitas Multimedia Nusantara213niversitas Brawijaya257niversitas Diponegoro50niversitas Sumatera Utara250niversitas Bangka Belitung442azakh National University344cuela Superior Politécnica de Chimborazo206ational Pingtung University of Science and Technology37alborg University63ng Abdulaziz University95inajoki University of Applied Science-niversitas Sousse557niversitas Szeged74niversitas Zanjan48stitut Teknologi Bandung418stitut Teknologi Sepuluh November59niversitas Padjajaran142esident University718	bit of the last of the las	bit Netherly       10

Large-Scale Social Restrictions situations have had tremendous impact to univesities around the world which suddenly have shifted to online learning during the pandemic. As the result it was obvious that the reduction CO2 emission has reduces that global warming. Various urban farming efforts were reported, and intellectual individuals in their respective locations tool part. Various reports of good environmental management, building assets and the environment, and the continuously planned and maintained environmentally friendly concepts are continuously carried out by university management.

Climate change and an increase in temperature on the earth's surface caused by the CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and CFC gases in the atmosphere occurred. The UN agreement declared to keep the global temperature rise to no more than 1.5 degrees Celsius by 2100, is still difficult to achieve, even though the whole world is implementing lockdown policy. During this pandemic there were many evaluations carried out on the influence of the lockdown conditions on environmental preservation, earth temperature, climate change. Various challenges such as the sea level rise, ecological disturbances, and socio-political and economic impacts have been carried out. The impact of global warming has also been felt accross the globe.. Online collaboration at the start of the pandemic has shown the perseverance of campus managers to create and maintain a sustainable campus. This paper explains how UI GreenMetric initiated a collaboration from an Indonesian sustainable campus online to share the latest experiences related to the handling of the Covid-19 pandemic and report changes in the way of doing tridharma higher education activities. In methodology part we described the data collection process, in discussion section we evaluate



the implementation of the webinar series, and the impact of the collaboration is presented in the summary section.

#### **1.2. Methodology**

This section describes data collection and analysis of the series of webinars content carried out by UI GreenMetric during the COVID-19 pandemic. This series of webinars have attracted the attention of many university leaders. The main idea behind carrying out the COVID-19 webinar series for university leaders is to provide online and regular discussion forums. These activities became the medium for communicating and sharing best practice experiences in campus management during the COVID-19 pandemic among universities. This program helps universities to gain insight into daily activities and programs that can be carried out during the COVID-19 pandemic. Some new breakthroughs that can be adapted to mitigate the spread of the corona virus have also been presented. It appears that these initiatives have had a significant impact and special benefits for the stakeholders, both individually and institutionally. UI GreenMetric promotes this virtual gathering as a medium to reconnect participating universities. UI GreenMetric uses a simple and common platform, namely Zoom and Youtube which we found very efficient in providing a medium for conducting discussions, sharing information, and making presentations. Apart from Zoom, UI GreenMetric also provides live broadcasts via the YouTube and Facebook platforms.

The webinar series started at the start of the COVID-19 pandemic by inviting a group of university leaders from the top universities in the UI GreenMetric network. The list of university leaders invited during the webinar series is listed in Table 2. The webinar series began to be held on 24 April 2020 and ended on 11 June 2020, with a total of 8 webinars. UI GreenMetric also encouraged universities to write about their experiences related to the pandemic.

No	University	Potition	
1	Ministry of Education and Culture	Director General of Higher Education	
2	Universitas Oviedo	Rector	
3	Bulent Ecevit University	Rector	
4	Institut Teknologi Sumatera	Rector	
5	Universitas Islam Indonesia	Rector	
6	Telkom University	Rector	
7	UIN Raden Intan Lampung	Rector	
8	Universitas Airlangga	Rector	
9	Universitas Bengkulu	Rector	
10	Universitas Halu Oleo	Rector	
11	Universitas Hasanuddin	Rector	
12	Universitas Medan Area	Rector	
13	Universitas Muhammadiyah Yogyakarta	Rector	
14	Universitas Pancasila	Rector	
15	Universitas Negeri Padang	Rector	
16	Universitas Teuku Umar	Rector	
17	IPB University	<ol> <li>Rector</li> <li>Vice Rector</li> <li>Representative of Rector - Director of Scientific and Strategic Information Publications</li> </ol>	

Tabel 2. List of university leaders invited to the UI GreenMetric Webinar Series





No	University	World University Rankir Potition
		1. Rector
18	Universitas Negeri Sebelas Maret	2. Representative of Rector - Head of the Center for
	U	Environmental Research
		1. Rector
19	Universitas Gajah Mada	2. Representative of Rector - Dean of the Faculty of
		Agriculture
		1. Rector
20	Universitas Negeri Semarang	2. Representative of Rector - Head of Conservation
		Development Unit
21	Universitas Lampung	Vice Rector
22	Universitas Multimedia Nusantara	Vice Rector
22	Universite a Duraniiana	1. Vice Rector
23	Universitas Brawijaya	2. Representative of Rector - Coordinator of waste
		1 Vice Pactor
		<ol> <li>Vice Rector</li> <li>Representative of Rector - Head of Planning and</li> </ol>
24	Universitas Diponegoro	Development Agency
2.	eniversitus Diponegoro	3. Representative of Rector - Deputy Director of Research
		and Industrial Cooperation
		1. Vice Rector
25	Universitas Sumatera Utara	2. Representative of Rector - Coordinator of Waste
		Processing
26	Universitas Bangka Belitung	Vice Rector
27	Kazakh National University	Representative of Rector - Director of International
21	Kazakii Wational Oniversity	Cooperation Department
28	Escuela Superior Politécnica de	Representative of Rector - Director of International
	Chimborazo	Relations
29	National Pingtung University of Science	Representative of President - Vice Dean of the International
20	and Technology	Affairs
30	Aalborg University	Representative of Rector - Unier Data Strategist
31	King Abdulaziz University	Academic Standards & Excellence
		Representative of Rector - Director of Quality Management
32	Riga Technical University	and Sustainability RTU
33	Seinajoki University of Applied Science	Representative of Rector - Lecturer
24		Representative of Rector - Director of Environmental
34	Universitas El Bosque	Business Management
35	Universitas Sousse	Representative of Rector - Professor
36	Universites Szered	Representative of Rector - Director of Jozsef Attila Study
50	Oniversitas Szegeti	and Information Service
37	Universitas Zanian	Representative of Rector - Director of International
57	eniversitus Zunjun	Scientific Cooperation Office
38	Institut Teknologi Bandung	Representative of Rector - Head of the Quality Assurance
		Unit
		1. Representative of Rector - Head of the Smart Eco
		Campus Development Unit
39	Institut Teknologi Sepuluh November	2. Representative of Rector - Head of the Center for Sustainable Infrastructure and Environmental Decourt
		3 Representative of Pactor Head of the Captor for
		Sustainable Energy Research
40	Universitas Indonesia	1. Representative of Rector - University Secretary
		r in the second s



No	University	Potition
		2. Representative of Rector - Director of Operation and
		Maintenance of Facilities
41	Universitas Padjajaran	Representative of Rector - Director of Innovation and
		Corporation
42	President University	Representative of Rector - Head of Environmental
		Engineering Program

The list of university leaders sharing experiences in handling pandemics at GreenCampus in the UI GreenMetric Webinar Series shows that presentations made directly by many Rectors at the beginning of the pandemic received great attention. Among them there were Rector Universitas Oviedo, Bulent Ecevit University, Institut Teknologi Sumatera, Universitas Islam Indonesia, Telkom University, UIN Raden Intan Lampung, Universitas Airlangga, Universitas Bengkulu, Universitas Halu Oleo, Universitas Hasanuddin, Universitas Medan Area, Universitas Muhammadiyah Yogyakarta, Universitas Pancasila, Universitas Negeri Padang, Universitas Teuku Umar, IPB University, Universitas Negeri Sebelas Maret, Universitas Gajah Mada and Universitas Negeri Semarang. In addition, Presentations from Universitas Lampung, Universitas Multimedia Nusantara, Universitas Brawijaya, Universitas Diponegoro, Universitas Sumatera Utara, Universitas Bangka Belitung, Kazakh National University, Escuela Superior Politécnica de Chimborazo, National Pingtung University of Science and Technology, Institut Teknologi Bandung, Institut Teknologi Sepuluh November, Aalborg University, King Abdulaziz University, Riga Technical University, Seinajoki University of Applied Science, Universitas El Bosque, Universitas Indonesia, Universitas Padjajaran, Universitas Presiden, Universitas Sousse, Universitas Szeged, Universitas Zanjan and President University were represented by Vice Rectors or competent university leaders.

#### 1.3. Discussion

The series of webinars carried out involved all elements of society, both national and international, local governments, leaders and lecturers of higher education institutions, and the media. The total number of invited speakers from the 8 webinars was 54, including 27 university leaders. The speakers were representatives from participating universities in the UI GreenMetric World University Rankings Network (Rector, Vice Rectors, Directors of Sustainability Officers, Deans, and Honored Professors). The distribution of the number of speakers in the eight-webinar series is described in Figure 1.



The Sustainable University Effort during COVID-19 Pandemic



Figure 1. Number of Speakers by position in the UI GreenMetric Webinar Series

The webinar series initiated by UI GreenMetric has set an example with a snowball effect that expands the reach and scope of disseminating best practice in tertiary management. It has been noted that many universities have followed UI GreenMetric's steps to hold similar webinars by involving their networks to spread awareness of sustainability on campus. Some of them are Islamic colleges, universities in Eastern Indonesia, and universities in Indonesia. During the webinar series, there were 5233 active participants participating in the Zoom, Facebook, and Youtube platforms having participated in the UI GreenMetric webinar series. The number of participants for each webinar theme that was conducted is described in Figure 2 and the distribution of participants in all UI GreenMetric webinar series is illustrated in Figure 3.

The documentation of the series of webinars was later recorded by collecting chapters written by 24 university from within and from abroad in a book entitled The Sustainable University Effort During Covid-19 Pandemic. Among them, eleven of the papers were written by rector of universities, thirteen were written by university leaders appointed by the rector. This book contains invited papers that have been presented by university leaders in a series of webinars that have been held. The number of contributors to articles in books related to experiences in dealing with the pandemic The Sustainable University Effort During Covid-19 Pandemic is described in Figure 4.





Figure 2. Number of Participants in the UI GreenMetric Webinar Series



Figure 3. Distribution of Countries of Origin of Participants in the UI GreenMetric Webinar Series





Figure 4.Number of article contributors to the book Managing Sustainable University During Covid-19 Pandemic

From the 54 presentations and discussions that have been carried out by university managers, it is evident that many emergency policies have been devoted to taking into account environmental, economic, social issues which are the 3 pillars of environmental aspects. The most frequently mentioned words are Covid-19, waste, food, students, online, activities, management, education, research, community, learning, energy, programs, systems, health, social, sustainability, area, green, good, development, environment, people, new, bring, use, water, process, air, learn, process, crisis, and others. This can be seen in Figure 5.



Figure 5. Number of word occurrences from articles in Managing Sustainable University During Covid-19 Pandemic



The number of word occurrences in all articles is calculated to analyze what topics are of greatest concern to university managers in Indonesia. Number of word occurrences from articles in the book Managing Sustainable University During Covid-19 Pandemic. According to the data, the top topics that get the most attention in the article are waste (335 word occurrences), food (227 word occurrences), students (212 word occurrences), and online activities (191 + 177 word occurrences). It can be seen that the campus leaders have the knowledge, skills and commitment to manage their respective campuses in accordance with the main principles of UI GreenMetric. Furthermore, the word spread of the articles in the book is identified and described as wordcloud.

#### **1.4.** Conclusion

This collaboration of university leaders throughout Indonesia has provided knowledge, improved skills and fostered the commitment of campus managers in the field of Sustainable Campus Management. This has become a provision for policies in realizing a Green Campus during a pandemic and has generated a spirit of togetherness. Many university leaders strive to support the creation of a comfortable learning atmosphere according to the abilities of online lecturers and students. In the long term, the Lesatari Campus collaboration can make a real contribution to reducing global warming and provide a standard for implementing online and offline teaching and learning processes in Indonesia.

From the many collaboration sessions that have been carried out, university leaders have received sufficient knowledge and materials to make policies and plans to create a Sustainable Campus in higher education during the Covid-19 Pandemic. This can be seen from the ability of university leaders to apply the principles of a sustainable campus in the daily life of university management.

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Part I:

# Teaching, Learning and Working in Sustainable University during COVID-19 Pandemic







### Chapter 1.1: Universities as Sustainability Actors in the COVID-19 Crisis Case Study of the University of Oviedo

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The growing influence of the movement to integrate sustainable development within universities, raises a number of questions regarding higher education's potential to lead this change within society, especially in times of the current COVID-19 pandemic. The 2030 Agenda shows that missions of huge importance are being assigned to all educational institutions, including the academic ones, to ensure the achievement of the Sustainable Development Goals (SDGs), which can be classified in four key pillars: education, research and innovation, knowledge transfer (technological and social) and management. The aim of the present work is to show a case study: how the University of Oviedo is aligned with the 2030 Agenda and how its university community has handled the present COVID-19 crisis, what is mainly an enormous challenge in the field of research and education for higher education institutions. Collaborative research will be a key aspect for fighting globally this infectious disease, but also the lessons learnt from this pandemic will be crucial to scope the future of universities.

#### 1.1.1. Introduction

Among the university functions, the social services would be included [1]. Thus, within the universities mission, vision and values, national and internationally, the greatest cohesion and quality of the Spanish university system as a whole contributes to the evolution and progress of current and future society, through the improvement of higher education, scientific research and the transfer of knowledge.

The strength of Spanish universities is of being united and working together, through collaboration and democratic dialogue, at challenging times for universities. To obtain these values, the role of CRUE (Rectors' Conference of Spanish Universities) is essential. Nowadays

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CRUE is integrated by 76 universities, 26 are private and the 50 public. The University of Oviedo is in the second group.

Within the framework of preparing actually the exit to the sanitary, social and economic crisis generated by COVID-19, it arises the question if Spanish universities are considering that the 2030 Agenda constitutes a valid roadmap for the guidance of priorities in attention to the expected effects of this medium- and long-term crisis? Particularly, in this work, we analyze the case study of the University of Oviedo, a medium size public university, the unique university in an autonomous community of about one million population.

#### 1.1.2. Universities and SDGs

It is known that the main roles of the universities are: (a) Education and Training, (b) Research and Innovation, (c) Knowledge Transfer, and (d) Management.

The contribution of (a) Education and Training to consider the SDGs can be summarized in the following subtopics: inclusion of sustainability subjects, value-based and quality education, competences in all education and training programs (sustainability and designing integrated curricula), multidisciplinary and intercultural training of students and staff for sustainable development, inclusive and effective education for society and creative engagement of students.

(b) Research and Innovation at universities in line with the SDGs can be fostered by promoting multidisciplinary and transversal research and offering topic specific training for research staff. But also, a key challenge is to design science, technology and innovation policies, roadmaps and instruments focused on supporting the 2030 Agenda (efficiently at local and university level) that translate the Goals' universality principle into specific actions, while recognizing national science, technology and innovation priorities and realities.

(c) Knowledge Transfer and knowledge sharing is definitely a driver for achieving the SDGs as a third pillar for sustainable development. Universities demonstrated acting as "Local service delivery institutions" and are often vital contributors of tested, successful solutions and proven good practices in all areas of the SDGs. These solutions and innovations are often local, and they need to be identified, captured in time, and shared for national and international scale-up, especially in the context of the actual world-wide infectious disease. Knowledge Transfer also stays for cooperation with local communities, cultural promotion and preservation, empowerment of civil society and alliances generation to address social challenges.

Finally, and related to the fourth defined pillar (d) Management, universities often can provide an effective example of institutional management to mobilize other entities around the SDGs, improve their functioning and promote horizontal and vertical coherence. Providing, and being themselves, laboratories of good practices to be translated to the community.

#### 1.1.3. Towards a sustainable University of Oviedo

The University of Oviedo is a public institution of higher education and research in the Principality of Asturias (Spain). It offers a full range of undergraduate degrees adapted to the European Higher Education Area (EHEA) in all knowledge areas and postgraduate degree programs in collaboration with national and international universities and more than 250 companies. The University of Oviedo undertakes approximately 80% of the R&D and Innovation activities carried out in Asturias [2], and, has cutting-edge services and facilities to facilitate knowledge transfer to the business world. As part of its corporate social responsibility, the



University of Oviedo offers care and support services for people with special needs and a "Solidarity Space" where voluntary work and international cooperation actions take place. The Equality Unit ensures compliance with gender equality and work/family reconciliation policies. In addition, the academic institution has fully equipped sports facilities and modern, refurbished accommodation for students, lecturers and administration and service staff.

The 2030 Agenda has given to the University of Oviedo the chance to rethink their role in society and has led for the first time and fully awareness to manage and implement strategic actions in the last years linked with the Sustainable Development Goals. This focus has never been given before to the University's strategic roadmap, neither in other education institutions in their geographic environment. With this challenge the University of Oviedo is one of the pioneering Spanish universities in going a step further by making the community more responsible and calling for collective actions for the commitment of sustainable development and increasing the awareness that the University of Oviedo have multiple roles to play in this (in education, research and as institutions in a specific economic and social ecosystem). An important lesson learnt by the University of Oviedo has been that, even though the 2030 Agenda appeals to every country, government, organization and citizen, its targets need to be localized to a certain geography and/or institution (both metaphorically and literally).

Signing up to the Salamanca Declaration on Sustainable Development Goals in July 2018 and preparing the institution's first social responsibility reports of 2017 and 2018 [3] aligned with the SDGs (presented at the end of December 2018 and 2019 –figure 1-) have been specific milestones that set out clearly the day-to-day life at the University of Oviedo where the progress and contribution in achieving the SDGs across the University's main functions are shown: education, research, knowledge transfer (both technological and social) and management and strategy alignment. Its report included indicators in order to measure the 2030 Agenda contributions made. In the same way, in 2020, the University adheres to SDSN (Sustainable Development Solutions Network).



Figure 1. CSR reports aligned with 2030 Agenda

In this sense, the University of Oviedo has been recently chosen as a finalist of the Carlos Canales-CEX Award 2020 for Good Management Practices related to "Social Responsibility Reports: Commitments, Actions and Indicators" [4]. The University's application relies on to



prove that the good practice implemented in the last years has allowed the institution to make a qualitative leap in its management, with measurable and relevant results in the field of SGDs.

#### 1.1.4. COVID-19 Challenges for the University of Oviedo

This reflection and accountability towards the different stakeholders have been an aid in addressing such an exceptional situation as that caused by the COVID-19 health alert. When a new virus appears in a society, like COVID-19, many are at risk for citizens that could fall ill, the health care system could strain and devastating the economy [5]. This pandemic has created challenges for the global higher education community [5, 6, 7].

The crisis caused by COVID-19 has stopped the world in some way and the effects that derive from this situation will have to be analyzed and resolved probably for the next coming years. The blow has been so great that all the actors worldwide are rethinking their role in the face of this new scenario, which, far from being circumstantial, could become structural.

We walk on non-traveled and uncertain paths and solutions what will require new leadership, cultural leadership. In this sense, in particular, universities have shown their most ethical and social side, and this has allowed them to consolidate their commitment to some goals of the 2030 Agenda. Specifically, the priority objective has been the achievement of the SDG4: Firstly, Spanish universities have endeavored to maintain access and quality of education, abruptly transforming its teaching and assessment methodologies. Secondly, as the COVID-19 is mainly a huge health crisis, a good part of its actions have focused on to support the public health systems and the different groups that make up the university community (SDG3). Taking into account the research, innovation and knowledge transfer function, the contributions of universities to fulfill the SDG10 has been relevant, by providing technological and innovative initiatives, by their research teams or in collaboration with companies and other institutions. Last but not least, universities have also contributed to the achievement of SDG11, trying to reduce inequalities through their disposal of materials, equipment and human resources.

The recovery process is an opportunity for the implementation of more responsible production systems and social behaviors, and in this process, universities will be key elements in transmitting examples of good practice through activity on their campuses in context of the COVID-19 crises.

From an educational point of view, the pandemic crisis has brought about a radical change in 24 hours from a presence university teaching system to another virtual one but guaranteeing the quality of the teaching-learning process [6]. Citing literally Hodges et al. [9]: "Well-planned online learning experiences are meaningfully different from courses offered online in response to a crisis or disaster". So, the University of Oviedo has acquired and demonstrated the ability to teach remotely, taking advantage of synchronous and asynchronous teaching [6]. This involved a titanic institutional effort to train staff in new requirement and digital applications for education and management in a very short time, providing resources, mainly technological ones, to all the university community (students, teachers and administrative and service staff).

Many Spanish universities, as well as the University of Oviedo, were forced to suspend their activities and the vast majority turned their eyes towards distance learning under the virtual modality to address the educational disruption in the face of the crisis caused by the COVID-19. The University's website allows the visualization of some actions put into practice in the face of the pandemic, as well as their evolution over time (figure 2).





Figure 2. University of Oviedo's website (<u>www.uniovi.es</u>)

This health crisis showed clearly the demand for scientific and technological expertise and knowledge by the increasing search for certainty in understanding problems and choosing responses for decision-making [8]. Collaboration between research groups, even from different institutions (SDG17) has allowed to give short-term solutions to COVID-19 challenges [10], as it is for example in case of the high transmission rate or the absence of a vaccine [11, 12]. This become in an important and huge field of university research. Considering together research and alliances (SDG17), and with the relevant aim to implement rapid testing that informs community surveillance [5], around 25 research teams of different knowledge areas of University of Oviedo (medicine, biochemistry and molecular biology, mathematics, energy and fluid mechanics, functional biology, physical and analytical chemistry, legal and social sciences) have started to develop and implement R&D projects and are applying to specific national and European calls which have been launched specifically related to the COVID-19 pandemic (SDG3). Many of these projects are proposed and developed in cooperation with companies (SDG12) and other regional R&D centers. All together try to avoid the lack of adequate testing and surveillance has been a major weakness in the initial crisis or to enhance protection of population [4]. But not only health areas, also technological branches have been encouraged to implement research work, due to the fact that this kind of virus can survive long periods outside and on surfaces such as aluminum, sterile sponges, or latex surgical gloves, increasing the danger of transmission via touch [12]. Across multidisciplinary levels, the whole world is waiting a rapid-response research on COVID-19 to return to normality.

The COVID-19 challenge has driven the University of Oviedo to implement concrete actions in the field of knowledge transfer & volunteering area. As key action can be mentioned that in a very short time a PCR COVID-19 Test laboratory has been installed and homologized as part of the scientific and technical services of the University, mainly to support the public health system increasing the testing capacity at regional level and, to facilitate the research and innovation infrastructure to university driven start-ups in gaining new knowledge and technological developments related to the virus (SDG3). Also university equipment like for example 3D-printers have been made available supporting the manufacture and development of two additive respirator applications in the region (SDG12) and other R&D facilities, like the University's Bioterium, has been put on disposal free of charge so that other R&D centers (Idonial Technology Centre) and companies (ArcelorMittal and Thyssenkrupp) have been able to



test their respirator prototypes which have been under construction in the last few months (SDG12). Additionally, unallocated university student residences have been offered to the public health authorities in case of urgent need to accommodate COVID-19 patients (SDG3) and more than 2.000 swabs, 25,000 sanitized masks (made by *Mascarillas Solidarias Asturias*) and other clinical materials have been delivered (SDG3). Additionally, the University collaborated actively in the promotion of initiatives like the collection and donation of clinical materials and protective clothing for public hospitals (SDG3) and NGOs' at local level (SDG11): 128,400 pairs of gloves, 6110 masks and 70 glasses have been provided

Besides the University of Oviedo is awarded in May 2019 the distinction as promoter of Fair Trade. IDEAS Comercio Justo Organization delivers the accreditation seal. The University has focused on projecting values to society, such as: Fair Trade (ODS1), sustainability, and respect for decent working conditions. The University of Oviedo has demonstrated a strong and active academic commitment to Fair Trade, solidarity-based economy and trade relations. The promotion of Fair Trade in the University is the result of the coordinated efforts of many people to transmit to its community an awareness of Fair Trade, focusing on the importance of establishing links between Fair Trade and responsible consumption in our society [13]. In order to obtain this certification, the University met a variety of requirements such as the dissemination of an institutional declaration on Fair Trade, the development of educational programs, and the offer of Fair-Trade products on its campuses [14, 15]. Moreover, the announcement of the International Green Gown Awards Finalists in May 2020, has recognized the University of Oviedo under the category "Sustainability Institution of the Year" among other 8 universities in the world [16]. This shows also that the University of Oviedo relies more consequently on Environmentally Preferable Purchasing (EPP) or Green Purchasing (ODS 13) during the procurement of products and services (like for example catering services, snack and coffee machines, laboratory consumables, energy acquisition, etc.) that have a lesser or reduced effect on human health and the environment when compared with other competing products or services that serve the same purpose. Also plastic bottles have been avoided as much as possible during the celebration of university events and specific communication and awareness campaigns have been driven in the last three years through the universities' social network communication channels and institutional website: climate change, water and energy consumption, recycling, women in science, environmental volunteering, and actually how the University of Oviedo interacts with local actors and stakeholders to combat the COVID-19 crises in the region.

Specifically, in the period from 2016 to 2019 university-driven Chairs (approximately 30) have been promoted working closely with local companies in different research and technology fields (circular economy, sustainability, energy transition, mobility, Smart cities, health, etc.), which are co-funding actions for achievement of the SDGs at the University.

Finally, university has to assure students a quick institutional response [6]. The University of Oviedo has achieved this goal also in the COVID-19 pandemic thanks to its quality guarantee system (ODS4).

#### 1.1.5. Concluding Remarks

The 2030 Agenda and the SDGs unify the great global problems for the first time in a single framework that appeals to governments, companies, universities and civil society. They can serve as a roadmap to address the most pressing needs in this global, interdependent, health,



social and economic crisis. The European Parliament itself has understood it this way and appeals in its latest resolution to coordinated action to fight the pandemic and its consequences.

Within this global and shared response, regarding the health crisis, universities undoubtedly have the leadership in the knowledge and social transfer (figure 3), since they are the main generators of talent and human resources for the health system, research and innovation, so necessary to develop new advances and discoveries in the fight against the actual pandemic. Second, taking into account the economic crisis, universities contribute significantly to the sustainable economic development by equipping their graduates and young researchers with the necessary skills and knowledge to enter in the labor market; they stimulate entrepreneurship through the creation of spin-off and startup companies; and they improve the competitiveness of companies thanks to technology transfer agreements (patents, utility models, confidentiality agreements, validation). Finally, regarding the social crisis caused by the COVID-19, they have been and will continue to be the engine of development and social improvement, reducing inequalities through inclusive education, intercultural cooperation, social inclusion, volunteering work and alliances with NGOs and other institutions at local, national and international level.



Figure 3. University knowledge and social transfer

The 2030 Agenda provides a perfect guide to remedy many of the environmental and social behavioral factors that have contributed to the origin, spread and especially the effects of this pandemic on the world population. Therefore, achieving its goals will be key to fighting future pandemics.

Situations such as those caused by the COVID-19 crisis leave their impacts and learnings in the environment. And this is what has happened at the University of Oviedo. Although it is a face-to-face high education institution, the experience of online teaching and assessment has left its effects and has trained the university for the potential challenges that the future may hold it. Daniel [7] recently told about the increase of online learning in tertiary education in the future.

From the experience at the University of Oviedo, in the pillar (a) of Teaching and Training, the new technologies have not come to replace face-to-face teaching, but as a mechanism to support and improve the communication of the different involved collectives, mainly among students and teachers.



In R&D and knowledge sharing, research groups have immediately set to work for seeking solutions to the new challenges that the pandemic has imposed and have made available human and technological resources to society. But they probably can count with future research, because they are already alerted to a possible mutation of the virus, and they should share their findings in search of achieving sustainable research [10].

Regarding management, all university decision-makers have continued to function electronically, prioritizing the safety of the university community and guaranteeing the quality of all its functions.

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# Chapter 1.2: Experience in Organizing the Work of Kazakh National Agrarian University During A Pandemic Covid-19

Tlektes Yespolov<sup>6</sup>, Kanat Tireuov<sup>7</sup> and Marina Alexeyeva<sup>8</sup>

In the article, the authors describe the measures taken to manage the university during the COVID-19 pandemic. All measures are written in detail to prevent the spread of the disease among university employees. Information is also given on the features of the organization of the educational process and the passing of exams in this period. Kazakh National Agrarian University is one of the few universities that was able to organize online consultation for farmers during quarantine, as well as hold many online scientific events with the participation of leading foreign scientists. In the article, the authors talk in detail about the online activities carried out and share their organization experience. Separately, it is noted that the university has carried out its work to fulfill its contractual obligations to plant an intensive garden using Dutch technology and building a Korean "smart" greenhouse.

## 1.2.1. Introduction

The spread of coronavirus has changed the usual way of life in many countries, and Kazakhstan is no exception. After detecting patients with coronavirus on its territory, the leadership of Kazakhstan took appropriate measures. By a decree of President K.K. Tokayev, from March 16 to May 11, 2020, a state of emergency on preventing coronavirus infection in the republic was introduced [1]. In order to protect the life and health of citizens of Almaty city and prevent the spread of coronavirus infection (COVID-19) in the city quarantine was introduced on March 28.

The Covid-19 pandemic has forced many universities to reconsider their policies for organizing the educational process. All universities were forced to organize online education. In terms of distance learning, Kazakhstan lags far behind Europe and even Russia. And it's not so much about the number of computers per capita as about the ability of people to use gadgets and applications to get online education. Not to mention the discipline and self-study skill. The sudden forced transition to online created difficulties not only for students, but also for teachers, who urgently began to learn to teach children over the Internet.

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# 1.2.2. Methodology

In this article, the authors used the method of systems analysis to transfer complete information related to the activities of the university during quarantine. The authors showed the university's ability to work despite quarantine.

# **1.2.3.** Features of the organization of the university's work during the Covid-19 pandemic

Kazakh National Agrarian University as a one of the main university of Kazakhstan with a 90 year history met new challenges associated with the Covid-19 pandemic worthy. In connection with the introduction of quarantine, the management of KazNAU took appropriate measures: an operational headquarters for crisis management was established, and an action Plan was approved. 95% of employees were transferred to remote work or went on vacation.

Since March 14, all students, undergraduates and PhD students have been transferred to distance technology and sent to their main place of residence.

To conduct classes, teachers used all available information and communication technologies (automated information system "Platonus", open software for web conferences "BigBlueButton", Zoom program, Skype, e-mail, telegram, and others).

For all disciplines, electronic educational and methodological complexes of disciplines (syllabuses, materials, lectures, assignments) were uploaded into the Platonus automated information system.

Employees of the Institute of Information Technologies of KazNAU have developed the necessary teaching materials for teaching staff such as memos, instructions on using platforms for webinars during distance learning, etc.

The management monitored the organization of the educational process and the quality of educational and methodological support on a daily basis.

Senior students were sent to the internship at the place of residence with mandatory compliance with enhanced standards of sanitary and epidemiological safety. All students were given a task to collect actual data for the last 3 years on agricultural formations to develop a business plan.

At the end of the semester, students, undergraduates passed the midterm control and were allowed to take the final exam online. They could choose one of three exams:

- a. final grade will be based on average current performance;
- b. in test form;
- c. in case of disagreement with the first two options, it will be possible to undergo free training and pass exams during the summer semester.

State exams and defense of thesis, master's thesis will also be organized online with the participation of the chairman and members of the certification committee.

Repeatedly Chairman of the Board, Rector of the University, Vice-President of the National Academy of Sciences of the Republic of Kazakhstan, laureate of the State Prize in Science and Technology named after al-Farabi Tlektes Yespolov addressed rural entrepreneurs, every resident of the village, household owners, summer residents about the need for effective use of land and other available resources [2]. These requests received a lot of feedback and suggestions from farmers, entrepreneurs, heads of state organizations, local Executive bodies, etc.



The University continued to actively participate in various events organized by the state. On may 1, 2020, after heavy rain and stormy wind, a break occurred on one of the dams of the Sardobin reservoir, located in the Syrdarya region of Uzbekistan.

Already on May 2, large water covered the villages of the Maktaaral district of the Turkestan region of Kazakhstan. In connection with the flooding of several settlements in the Turkestan region, a man-made emergency has been declared.

In the early days of the disaster, a university headquarters was established to assist the affected areas. It included experts in the field of water, land, forest resources, agronomy, horticulture, soil science, animal husbandry, veterinary medicine, etc.

Close ties were established with regional and district agricultural departments, local agricultural enterprises, individual entrepreneurs and farmers.

Experts from the situational center and the University's Water Hub answered questions in a timely manner and conducted daily online consultations.

Our specialists went to the field to provide practical assistance. The Governor's office of the region asked to involve young volunteers in the work of flood relief, as well as the distribution and delivery of humanitarian aid. Volunteers from KazNAU students became part of the volunteer staff and provided assistance to the victims of the Turkestan region.

The President of the Republic declared 2020 the year of volunteers [3]. At KazNAU, centers namely Parasat, "Yeriktiler Ortalygy", "SanalyUrpaq" club were created, where students were trained in the direction of volunteer work. Now our students organize volunteer work in their villages: they help veterans, the elderly people, large families, etc.

After the accident, our volunteers were directly involved in the delivery of drinking water, food, essentials and assistance to flood victims.

In addition, university staff transferred a one-day salary to residents of the affected area.

In an emergency, KazNAU switched to a new format for advising farmers and exchanging relevant information (Extensions). Scientists go live and conduct online conferences for farmers on all issues of the agricultural sector twice a week.

Weekly, more than three thousand rural entrepreneurs from all regions of Kazakhstan take part in the conferences. Farmers, students and those interested in agricultural development issues can receive answers to their questions live.

This work is carried out on a systematic basis by the situational center of the university. The university's website has an AgroDamu page where rural entrepreneurs send all their questions. Apart from questions from farmers and entrepreneurs, there were proposals for cooperation in carrying out research and advanced training.

During quarantine, preparatory work for the spring field work was carried out. After quarantine, spring-field work was conducted in the educational experimental farm of the university.

This year, 75 units of agricultural machinery, which is involved in the educational and experimental farm of the university, were purchased at the Kazakh-Belarusian Agroengineering Center.

On fields of more than 500 hectares, corn, soybeans, potatoes, winter and spring crops were sown. Demonstration fields have been created for holding Field Days for agricultural producers.



## 1.2.4. International cooperation during the Covid-19 pandemic

Prior to the announcement of quarantine, Non-profit joint-stock company Kazakh National Agrarian University and the Dutch Fruit Solutions Kazakhstan (DFSK) group of companies entered into a joint activity agreement (consortium agreement). Within the framework of this agreement, an intensive garden using Dutch technology was created at the educational and experimental farm of KazNAU. Productivity of fruit and berry crops is 4-5 times higher than local ones.

Dutch Fruit Solutions Kazakhstan provided the University with: planting material of apple, pear, cherry, plum, blueberry, strawberry, red currant, asparagus; irrigation and fertigation systems; anti-hail net; trellis system; sprayer; accessories for installing posts and nets.

Within the framework of this project, knowledge will be exchanged through the introduction of common innovative concepts in specific conditions. In Kazakhstan, practical stages for candidates-producers in the Netherlands such as general events, presentations for investors, participation in international projects will be organized.

Kazakhstan has set up a state program to create 5 vaccine candidates for the COVID-19 pandemic (SARS-CoV-2) coronavirus infection. Earlier, domestic scientific organizations in a short time developed vaccines against avian and swine flu, nodular dermatitis and the vector vaccine against brucellosis. In total, 28 types of vaccines have been mastered and the technologies of diagnostic test systems have been developed, some of which are delivered to foreign countries.

In order to counter future pandemics and panzooties of infectious diseases, as well as to train relevant specialists, the international center for vaccinology, Vaxine Pty Ltd (Australia), has been established at the University. To date, the most important project is the creation of new technologies against COVID-19, which are currently being conducted with our Kazakhstan partner - the national scientific center for especially dangerous infections named after M. Aikimbayev to the government of the Republic of Kazakhstan. In addition, this center conducts research on an allergic vaccine for people.

Due to its fundamental difference from others in the technology of production, method of application and type of formed immunity our proposed vaccine candidate can make a valuable contribution to obtaining a safe and effective COVID-19 vaccine in Kazakhstan.

This year, an agreement was signed on the creation and operation of a demonstration project of a Korean "smart" greenhouse in the Republic of Kazakhstan at Kazakh national agrarian University (Almaty, Republic of Kazakhstan).

Within the framework of intergovernmental agreements, KazNAU and the Fund for commercialization and introduction of agricultural technologies (Iksan, Republic of Korea) reached an agreement on the construction of a "smart" greenhouse on the basis of an educational farm. Investments were attracted from the Republic of Korea Fund in the amount of 1.5 million US dollars. It is planned to produce up to 450 tons of vegetables annually. The area of the "smart" greenhouse is 10,000 m2 or 1 hectare, and the territory of the greenhouse is 5,000 m2 or 0.5 hectares. The greenhouse infrastructure includes: electricity, gas, telecommunications, water and sanitation, necessary for the construction and operation of the Korean "smart" greenhouse.

During the quarantine period, the parties prepared project documentation and held online meetings to organize the construction of this greenhouse. We also worked on obtaining permits from state authorities.



### 1.2.5. Summary

During the quarantine period, all administrative and technical staff of KazNAU worked remotely. Online meetings were organized to discuss issues related to the activities of the University and its departments. If online meetings at the University were previously not very popular, then during the quarantine period, all staff used such online platforms as Skype, Zoom, etc. Working remotely did not negatively affect the University's activities.

At the moment, Kazakhstan is implementing the state program "Digital Kazakhstan", which is aimed at improving the standard of living of each resident of the country through the use of digital technologies [4]. Our University is also actively involved in the implementation of this program on its own scale. This, in turn, helped the University to effectively cope with the tasks set during the quarantine period. In our opinion, if our country faces such global problems as quarantine in the future, our University will be able to continue working without problems through online technologies.

Working in the conditions of crisis and forced isolation allowed the Kazakhstani Universities to master in practice modern information and communication technologies and thereby reach a new quality level of training.

We are sure that thanks to unity, restraint and perseverance, we will survive this difficult period and come out victorious from the situation!

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# Chapter 1.3: Managing Socially Accountable University during COVID-19 Pandemic

**Ouajdi Korbaa<sup>9</sup>** 

During the COVID-19 pandemic, universities has faced unexpected situation as well as in its internal functioning as in their relationship with the external partners.

The lockdown impacted heavily the situation of the students and the staff as well as the continuity of the delivered services. Hence, the management of the universities had to be reinvented in such situation mainly to respect their roles and commitment to the society.

## 1.3.1. Introduction

The First COVID-19 patient in Tunisia was discovered 3 months after the first case in Wuhan and more precisely on March  $2^{nd}$ , 2020. Today (May 19<sup>th</sup>) we have around 1050 cases and 50 deaths. We even had 5 consecutive days with zero new case, but the curve started to rise again with 2 to 6 cases daily 3 days ago, see figure 1.



Figure 1. Pandemic evolution in Tunisia [1]

Actually, Tunisia had a great chance that the government took, very early, drastic decisions to face this pandemic. Indeed, 10 days after the first case, the Universities, colleges and schools were locked out (March 12 2020) And the whole country has been locked down by March 20<sup>th</sup>, 2020 where only 1 million and half people were expected to continue working (government, police, first need administrations and industries) among around 11 million citizens.

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# 1.3.2. COVID-19 pandemic: Emergency vs. Sustainability

The first weeks of the lockdown were very difficult to manage the university and reorganize or even to reinvent the administration mainly because all the administrative staff was locked down!

Only the administrative managers and executives were working in the administrative buildings and the others as well as professors were invited to work from home which was not an easy stuff basically because never experienced before in such a magnitude. During this period, rectors and deans made several meetings to discuss the new situation and what to do in such situation.

During such a crisis, it is obvious that it is hard not to say impossible to think sustainability: heads were simply elsewhere. But, as strange as it may seem COVID-19 is good for nature!

Indeed, universities were empty which means less water and energy consumption, less waste, no air conditioner which is a huge energy consuming mainly during hot months: nature was taking a breath.

So, university leaders had to manage the emergency, to discover and identify the new challenges. This need is exacerbated for universities which highlight the responsibility towards the society. Indeed, being a socially accountable university forces leaders to very quickly move from emergency to strategy.

This phase needs an accurate state of play to be able to make the right diagnosis and plan the good strategy.

## 1.3.3. Managing Socially Accountable University

# A. Diagnosis

Among the multitude of problems generated by the pandemic, three seemed to be the most important:

- Switching brutally and massively to E-Learning
- Worry and inquiring about the fate of foreign students trapped in Tunisia
- Participate to the war against COVID-19

These problematics are at the heart of the vocation of the university as socially accountable. Indeed, keeping in touch with all students to assist and reassure them and their families is part of the social role of the university. Also, helping the country to face this crisis using its know-how and technology is the very reason for the existence of the university and its teaching and research components.



## **B.** Actions



Figure 2. Helpdesk group for E-Learning

*Switching to E-Learning.* This mission has as objective to maintain the relationship with the students locked down home and reassure them as well as their families about the fate of the courses and the diplomas. Nevertheless, professors were not ready to switch to total distance learning and some were completely not familiar with eLearning platforms and or software.

For this, the Pedagogic Innovation Cell of the university of Sousse worked very hard to identify the needs very quickly and to organise distance lectures to professors for eLearning discovering and mastering. A Facebook group (Helpdesk for E-Learning) has been created, see figure 2, to ensure un quick interaction with professors. Also, no software was imposed to professors (Moodle, Microsoft Team, social media, etc) to reduce technological constraints or teachers/ students apprehension.

**Enquiring about foreign students.** Number of foreign students live and study in Tunisia and the majority of them did not travel home because of the absence of repatriation procedure of their countries. So, with the lockdown, their situation could be very difficult morally, physically and from a logistic point of view. Therefore, the university and the students' associations and also the red crescent identified these stuck students, contacted them to know their needs and organized collections to supply them.

*Helping the country to fight COVID-19.* Lot of initiatives were launched by universities and mainly the technology institutions associated to medical schools to think about "war effort" against COVID-19. These efforts were regrouped into an initiative called "yes we Breath" [3] and implyed groups of students hosted by the technology and engineering schools and sometimes financed by private banks and industrial companies lead to manufacture several devices.

a. An oxygenation device was designed by the engineering school and validated by the medical school. Then prototypes were produced inside the university to be used in the emergency services.



The Sustainable University Effort during COVID-19 Pandemic



Figure 3. respiratory device during prototyping

b. 3D printed protective visors: hundreds were manufactured and distributed to hospitals all around the country and mainly the hospitals COVID circuits



Figure 4. Helpdesk group for E-Learning

c. Transforming diving masks to respiratory devices for hospital emergency services: hundreds were manufactured and distributed to hospitals all around the country and mainly the COVID circuits



Figure 5. Transformed diving masks

d. A disinfection portal was designed by the staff of the institute of technology, then produced and delivered to the university hospital





Figure 6. Desinfection unit

Also, a Decision Aided National Plateform called "COVID-19 Tunisia" [2] has been created by students and professors of the university to help the Health Ministry to acquire a tool for visualizing the pandemic situation in the country and for decision support.

These examples and many other shows how the university put its scientific and technological know-how to serve the society and the country during this crisis. And sharing with other universities their experience to improve their efficiency [4].

# C. And Now?

While preparing this state of art, Tunisia started, 2 weeks ago, the deconfinement planned in 3 phases

- May 4<sup>th</sup>: Universities reopening (administration only with 50% of capacity)
- May 19<sup>th</sup>: Second phase 75% of staff capacity
- June 1<sup>st</sup>: Professors and students are back and courses resume.

Hence, we expect getting back to a "normal" stead state by the end of June. With usual and common problem and concerns. However, the transition is not smooth nor obvious and it is very important to understand that the problematics are changing again and new challenges are appearing like:

- How to organize lectures ou exams while respecting the mandatory social distancing?
- How to teach during very hot months without air conditioner (not recommended because of pandemic) which is at the same time good for environment but bad for professors while wearing masks.
- How to manage waste especially because the fear of handling possibly infected items

# 1.3.4. Conclusion

As we can see within 4 months university changed several times its objectives and faced different challenges and had no other choice than to adapt and reinvent itself.

This is why it is very important to capitalize this momentum of solidarity and also not to forget initial problems like sustainability.



Indeed, during these last months, university temporarily forgot to make efforts about environment and sustainability (put in the background) and improved its involvement in society. It is therefore essential to revive what has been set aside and keep what has been learned.

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# Chapter 1.4: The University of Szeged and the Impacts of the COVID-19 Pandemic

Dénes Mátyás<sup>10</sup>, László Gyarmati<sup>11</sup> and Ildikó Csóka<sup>12</sup>

The spread of COVID-19 has had radical impacts on the operation of higher education institutions. The University of Szeged, one of the leading universities in Hungary, Central Europe, adapted itself to the unprecedented pandemic situation in all its main pillars of operation: education, research, "third mission" activities, and high-quality medical care. Measures and actions included: transition to remote work, switch to online education, COVID-19 research projects, establishment of an epidemic hospital, H-UNCOVER nationwide screening, sustainability efforts and energy usage reduction. Thanks to conscious strategic planning, challenges could be handled efficiently, and quality performance was uninterrupted. Certain tools and practices are worth of consideration even in post-pandemic times as potential areas for development.

## 1.4.1. Introduction

The COVID-19 pandemic has had radical impacts on the operation of higher education institutions. The present paper intends to give an insight on how the University of Szeged, one of the leading universities in Hungary, Central Europe, adapted itself to the new and highly unusual circumstances caused by the pandemic in order to ensure its uninterrupted quality performance. For that aim, it first provides a short introduction of the University of Szeged, and then it discusses the most significant measures and actions taken during the pandemic in the Institution's main areas of operation.

## 1.4.2. University of Szeged, Center of Science and Innovation

The University of Szeged (Szegedi Tudományegyetem, SZTE) is one of the largest higher education complexes in Hungary, a research university with 12 faculties where about 21,000 university students enrich their knowledge including more than 4,000 international students. The Institution offers quality education on all levels (BA/BSc, MA/MSc, undivided, doctoral, higher-level vocational and postgraduate specialist training programs) in the fields of agriculture, arts and humanities, economics and business administration, informatics, engineering, medicine and healthcare, pharmacy, dentistry, social sciences, natural sciences, law, education and music.

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International full-time programs have been offered at the University since 1985; currently more than 60 programs are in its portfolio in English or in other foreign languages. SZTE is active in 700 research areas with 19 doctoral schools, and it runs or participates in numerous national and international research groups covering all scientific fields.

Being the main intellectual center and the largest institution in the Southern Great Plain region in Hungary (with more than 8,000 employees, including 2,200 teachers and researchers), the University of Szeged is in close cooperation with the society and the economy of the region and the country. It considers its main responsibility to play active part in facilitating regional social, economic and cultural development, while protection of the environment and sustainability are also banners of its policy. SZTE's vision and quality policy are built on harmonizing the following four pillars: education, research, "third mission" activities, and high-quality medical care.<sup>13</sup> All these areas have surely been affected by the COVID-19 pandemic, but thanks to excellence operation and conscious strategic planning, challenges could fortunately be handled efficiently.

## 1.4.3. Before and After the Introduction of the State of Danger

In Hungary, state of danger was declared by the Government on 11 March 2020 (Government Decree 40/2020) [4]. That meant the introduction of various measures with the aim of preventing the spread of the novel coronavirus infection. At the same time, citizens were encouraged to stay home and avoid personal contacts as much as possible, as it generally happened in other countries affected by the pandemic as well.

Certain measures had been taken at the University of Szeged already preceding the introduction of the state of danger (concerning e.g. travels to the territories affected by COVID-19, visits of international delegations, students' attendance or non-attendance of lectures etc.), issued in circulars by the Rector and the Chancellor and/or by the SZTE Coronavirus Operative Committee. The mentioned Committee was also formed still before March (in February), while a professional group had been set up and operational even earlier (from January) so that the situation could be addressed timely, effectively and in a comprehensive manner, including its medical, legal, administrative, technical and IT aspects.

Information letters and circulars kept being issued also after the declaration of the state of danger so that university citizens (students, teachers, researchers, administrative staff) be continuously updated and well informed. With a similar aim, a "Focus: COVID-19" section was made available at the University's website both in its Hungarian and English versions.

As a general and overall goal, SZTE aimed with all its preventive actions – certainly not much differently from other institutions – to minimize contacts to the greatest degree possible.

<sup>&</sup>lt;sup>13</sup> SZTE being a competitive, high-quality institution is proved also by its excellent results on global rankings. To mention only some of its positions: it is the 1<sup>st</sup> Hungarian institution according to *QS World University Rankings* (501-510<sup>th</sup> on the global list) [1]; it is the greenest HEI in Hungary in *UI GreenMetric Ranking* since 2010 (74<sup>th</sup> in 2019) [2]; it is among the 101-200 best universities and 1<sup>st</sup> in Hungary on the comprehensive list of *THE Impact Rankings* examining the economic and social impact of HEIs (moreover, SZTE is the only Hungarian institution ranked among the 300 best universities in the world in all 17 Sustainable Development Goals, with 1<sup>st</sup> or tied 1<sup>st</sup> places for 13 SDGs in Hungary) [3].



#### 1.4.4. Impacts on Work and Employment

The objective to keep contacts minimal had the University face challenges, among others, regarding work and employment. SZTE's primary aim was to continue its quality functioning in the new circumstances as well, and it considered as of highest priority to do so by maintaining possibly all employment relations.

Major measures in this regard included the transition to remote work for as many employees as possible. Such transition required that appropriate home office conditions be ensured for all university employees able to perform their work remotely. That meant serious IT background developments not only in the electronic administration and study management systems at SZTE (Coospace, Neptun, Modulo) providing online administration, the publication of study materials, channels for student–lecturer, student–student and lecturer–lecturer communication, but also in the teleconference infrastructure in order to enable the use of highly practical programs and applications (e.g. Coospace, Zoom, GoToMeeting) so that online lectures, seminars, meetings, Faculty Sessions, Senate Sessions etc. could be smoothly delivered.

At the same time, an eventual re-arrangement of some work activities may have also been necessary in some cases and at some faculties, institutes or departments. That implied an intention to put different emphasis on certain activities respect to the amount of focus they had received before the outbreak of the pandemic (e.g. literature review and publication activities vs. laboratory work, and similar temporary changes of perspective needed due to the new working conditions).

### 1.4.5. Impacts on Education and Research

The pandemic and the state of danger brought radical changes in the area of education as well and lead to a prompt need to switch to online education. That necessity arose quite suddenly, but fortunately the University had already been preparing – and thus had already had detailed plans – for the introduction of the online education system also independently of COVID-19 (even though it was certainly to make improvements in this regard more gradually and in a longer run). Among others: online education developments were continuous, online learning materials and methodologies were available and/or under development, the concept of blended learning was unknown neither for educators nor for students. All that did considerably help the shift to online education go fast and smoothly as well as the spring semester studies continue as originally scheduled.

With the COVID-19 pandemic, some 21,000 students were suddenly to acquire their course materials online in over 15,000 courses. To make this massive scale change possible in a coordinated way and to support the successful delivery of the spring term, an SZTE Operative Committee on Online Education was formed on 12 March. The spring break, primarily scheduled for 10-17 April, was moved to 14-22 March in order to provide enough time to make the necessary preparations for switching teaching and learning online from 23 March. Faculties, institutes and departments also prepared their online education action plans. Developments made to the education and administration systems (Coospace, Neptun, Modulo) to ensure that they meet international standards in online education have already been mentioned above. A COVID-19-specific chatbot was also launched on the University of Szeged Facebook page providing information about changes in teaching and learning due to the pandemic and the state of danger (concerning the length of the semester, thesis defense sessions, and so on). The university library



(SZTE Klebelsberg Library) made further extension of their electronic services and freely available e-resources. Besides all that, the institutions of public education of the University of Szeged did of course switch to online learning as well.

Some "special" resources available at the University of Szeged, which proved to be highly useful in online education, are also worth mentioning. Such a resource is for example Coursera for SZTE that offers free-of-charge access to a wide range of courses and course materials (as well as certificates upon successful completion) thanks to the cooperation agreement with Coursera, the world's biggest online educational platform with nearly 4,000 courses in 19 languages from the best universities and companies [5]. Coursera contents can successfully complement SZTE curricula and be integrated fully or partly into SZTE courses, thus providing exceptional opportunities during "normal" and pandemic times alike. Another unique resource definitely to mention is constituted by the online courses, trainings and virtual mobility opportunities provided by one of the first European Universities alliances, endorsed by the European Commission, called European University Alliance of Global Health [6]. EUGLOH involves 200,000 students from five leading European universities (Université Paris Saclay, Lund University, University of Porto, Ludwig-Maximilian University of München, University of Szeged) and aims to promote European values and identity as well as to revolutionize the quality and competitiveness of European higher education by creating an integrated multicultural campus to increase students' employability, mobility and adaptability to future challenges, and building the European University of the future: innovative, interdisciplinary, inclusive and integrated in local research and innovation ecosystems.

As regards research activities, these were mostly uninterrupted at the University of Szeged. Although university buildings could not be visited by students<sup>14</sup> (except for certain students in their final year in specific study programs, some doctoral students, and students with a public servant status with SZTE), researchers basically kept having access to university facilities - following the appropriate health and safety precautionary measures of course. SZTE's participation in more than 30 research projects on COVID-19 is also important to note. Among these, several projects are joint researches (with the Hungarian European Clinical Research Infrastructure Network - HECRIN Consortium, the Biological Research Center of the Hungarian Academy of Sciences in Szeged etc.), and they have various research foci including prevention, diagnosis, treatment of mild and severe cases, rehabilitation. Apart from these, a COVID-19 Epidemiological Analysis and Modelling Response Team supported by the Ministry for Innovation and Technology is also operational at the University. Furthermore, the five partner institutions of EUGLOH just won a research and innovation grant in July with the project entitled "The European Alliance for Global Health - Transformation through Joint Research and Innovation Action" (EUGLOHRIA) which aims to develop, besides education, the research and innovation dimension of the Alliance with a focus on global health crises and pandemic research (especially COVID-19 research).

<sup>&</sup>lt;sup>14</sup> Hungarian students were also required to leave university dormitories and return home short after the declaration of the state of danger.



### 1.4.6. Impacts on Healthcare

The University of Szeged is the knowledge center of the Southern Great Plain region in Hungary and it feels responsible for the health standards of the population of Szeged and of the region. The Albert Szent-Györgyi Health Center, as part of the University, successfully coordinates healthcare-related activities in research and development, clinical and pharmacological examinations, basic and further training in medical disciplines, patient therapy. It provides patient care as a priority activity for approximately 250,000 people, while its progressive patient care services reach more than one million people in the region.

During the COVID-19 pandemic, the general goal of the Albert Szent-Györgyi Health Center and the University remained to provide patient care both for infectious and non-infectious patients. At the same time, it is certainly also true that with the break-out of the pandemic and the introduction of the state of danger focus fell primarily on emergency healthcare treatment so that contacts between doctors and patients be minimized. Within the Health Center, an epidemic hospital got established in March with beds for patients suspected or diagnosed with upper respiratory infections, including intensive care beds with artificial ventilation support. Some weeks later, an emergency unit with over 100 beds was set up also in two halls of the ELI-ALPS Research Institute in Szeged for the treatment of patients in critical conditions, in case the epidemiological situation would require, in order to reach the number of beds defined by the epidemiological plan of the University and the public health emergency protocol.

Moreover, the University of Szeged was one of the four Hungarian medical universities (together with Semmelweis University, the University of Debrecen, and the University of Pécs) that participated in the H-UNCOVER nationwide coronavirus screening program to test a representative sample of about 17,000 people in Hungary. Besides the successfully delivered H-UNCOVER project, SZTE provides also further testing in the region (for healthcare workers, university staff, social care institution staff and residents etc.), and the Institution is ready to participate in the next eventual rounds of nationwide screenings, should they become necessary.

Some other initiatives important to mention during the state of danger include hotlines and helplines launched at the University: for instance, the student information hotline (from 10 March) with information available 24/7 concerning the coronavirus disease and health-related issues both in English and in Hungarian language, or the psychiatric and psychological helpline provided by the Department of Psychiatry of the Albert Szent-Györgyi Health Center offering support for psychiatric and psychological patients and their family members in relation to the coronavirus pandemic.

### 1.4.7. Impacts on Sustainability

Sustainability is an area of high concern for the University of Szeged where some positive impacts of the pandemic situation can surely be observed, e.g. in the decreased energy usage of university buildings. To give a concrete example, at SZTE's education and congress center, the József Attila Study and Information Center, electricity usage dropped by 53% compared to that of the same period in the previous year (March-June). This amount of energy saving equals to 124 metric tons of  $CO_2$  emission reduction in that particular building.

Green developments continued during the recent months as well. Thanks to the successful cooperation with the Ministry for Innovation and Technology, the University obtained five electric cars as well as two fast (22kW) chargers, enabling the charging of four vehicles at the



same time, to substitute some of the most driven, less efficient diesel cars. Using these electric cars in urban areas can enhance the reduction of airborne dust concentration, which has a positive effect on air quality in Szeged. With this improvement, the calculated annual  $CO_2$  emission of the Institution's car fleet dropped by 16,000 tons, which is equivalent to a 15% reduction of direct emissions caused by the use of cars.

As discussed above, the COVID-19 pandemic crisis changed some "traditional", inperson teaching methods at universities from one day to another, leading to numerous innovations and developments. Eventually, this digital transformation resulted in a decreased need of travelling, commuting, electricity and HVAC systems use by students, academic, research and administrative staff.

# 1.4.8. Concluding Remarks: Beyond the COVID-19 Pandemic Crisis?

The state of danger was terminated in Hungary by the Act LVII of 2020 [7]; at the same time, a state of epidemiological preparedness was introduced by the Government Decree 283/2020 [8]. Both documents were issued on 17 June and entered into force on the following day. At the University of Szeged, measures changed accordingly (concerning remote work, travels, the entrance to university buildings, the organization of events, the reception of international visitors etc.), and currently (July 2020) the Institution plans to start the fall semester with regular, in-person education – although the situation may still easily change as it is well known. All relevant information continues to be published on the University's website in order to keep university citizens updated, just as the majority of the impacts and measures described above are also available there [9].

If it is possible to talk about some positive impacts of the unfortunate pandemic situation, these will surely concern among others: enhanced digital capacities, new ways of teaching, new tools for communication and collaboration, enhanced online library use, decreased energy usage in various university buildings. It is also worth mentioning that, according to students' feedbacks, a certain flexibility in the study schedule and flexible access to course contents, active communication, varied study materials, visual and auditory media and video homeworks were generally positively received in terms of online education. Besides these, e-methodologies, open book examinations and similar aspects may also be worth of consideration as potential areas for future development as much in online as in in-person education. Moreover, the digital transformation offers an opportunity also for the further improvement of sustainable operation by considering tools and practices worthwhile to keep after the pandemic situation in order to maintain energy efficient solutions and decreased  $CO_2$  emission in the long run.

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# Chapter 1.5: Supporting Teaching online During COVID Finland and Chile experiences and Chile experiences

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The Sustainable University Efforts during COVID-19 Pandemic have been enormous, some Universities where better prepared that others but all of them have to implement measures and programs to adapt to the new environment, is important to reflect and share the experiences so we could share them and learn from each other in a collaboration effort. Green Metric sustainability ranking team has provide a platform and organize relevant discussions. In both the experiences in Seinajoki University of Applied Sciences in Finland (SEAMK) and in Universidad Tecnica Federico Santa Maria (USM) in Chile the main take away from the process where to improve constant communications with students and the faculty, train the teachers and help them to improve online classes using tools that allow them to be more engaging and keeping the motivation of students where key factors for a successful transition from presence class to online learning.

## 1.5.1. Introduction

During the past months countries in the world have been affected by COVID-19 infection rates, this had direct effects in education worldwide with and estimated of more than 1.6 billion students in more than 180 countries affected by school closures due to the pandemic. Different countries were affected in different degrees and at different stages of their academic calendars [1].

During this unprecedent period most Universities implemented responses has fast has possible, with this sudden shift from presence classes to online classes or simply with cancelation or delaying of its activities.

In figures 1,2 and 3 we can observe how the lockdown of schools around the globe evolve. It was gradually reduced upon the summer in the norther hemisphere.

During this period, we monitored the events, the implementation of responses in the norther hemisphere in Finland and in the southern hemisphere in Chile.

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The basic response during this period was to switch from presence learning to distance learning, around 19.7 million students of the 220 million higher education students were already in online programs [2], and the universities that provided this programs had a technical and cultural advantage in implementing the change from presence classes to online classes.

Even before COVID-19, and during the past decade there has been a high growth and adoption in education technology, with global edtech investments reaching US\$18.66 billion in 2019 and the overall market for online education projected to reach \$350 Billion by 2025 [3]. Whether it is language apps, virtual meetings, e-learning platforms, virtual tutoring, learning analytics, virtual classroom engagement, steam, video conferencing tools, or online learning software, there has been an acceleration and improvement of their use by teachers, with a significant increase in usage since COVID-19.

Furthermore some of the most prestigious institutions in the world along with many institutions have decided to continue the next academic year in online mode, such has Cambridge University, Harvard University, UC Davis, Berkeley, Princeton University, and so other universities in the world [4].

This big increase in the use of online learning now arise some big questions about the possible adoption of complete online learning programs will after the pandemic, and how much every institution could shift in a permanent base presence programs to distance learning would definitely impact the worldwide education market.



Figure 1. Global monitoring of schools closed in March 1 2020 (Unesco.org)





Figure 2. Global monitoring of schools closed in April 1, 2020 (Unesco.org)



Figure 3. Global monitoring of schools closed in June 1, 2020 (Unesco.org)

## 1.5.2. Covid Higher Education Response.

The higher education institutions response to COVID-19 was related to four main areas, improving measures in order to assure healthy environment, adapting the teaching learning methods, the mental health and the finance adjustments.

The Covid Response in Higher Education is related to four main aspects.

- Health response
- Learning response
- Mental Health Response
- Financial response



## A. Health environment

The pandemic started in February, so some universities implemented a series of measures in order to reduce possible spread of the virus. These responses where related to the impact of the virus in the particular countries but followed similar paths, and the education institutions policies were also related to the home country general policies to COVID.



Figure 4. Chile and Finland evolution of cases. Chile is in Wintertime and delayed the initial spread



Figure 5. Evolution of Chile and Finland death cases proportional to population equivalence.



			,
SEINAJOKI UNIVERSITY OF APPLIED			
SCENCES	FINLAND	SANTA MARIA	CHILE
PREVENTIVE MEASURES		PREVENTIVE MEASURES	
Sanitizers avilability in public places		New admission Students Virtual	
<ul> <li>Social Distancing</li> </ul>	February	Selection	February
Class Suspension Online Mode		Exchange Students Returned to their	
Class Suspension – Online Wode	March	countries (79% of them)	March
Exchange Students Return to their		Class Suspension – started Online	
countries (39% of them)	March	Mode	March
Campus access restrictions	March	Campus for staff restrictions – Access	April
Campus Closed	April	Temperature access control	April
Campus re-opened for staff	June	Campus Closed for Staff	April
		Online Sports Classes	
		Develop Ventilator Machine prototype	
		for chilean market	May
		FAB LAB created thousands of Facial	
		Masks to give to hospitals	May
NEVT STEDS	August /	NEVT STEDS	August /
NEAT STEPS	December	INEAT STEPS	December
Finland in Opening mode		Chile will sustain Lock down mode in	
Finand in Opening mode	August	mayor cities	July
Start Presence Classes and online			September
classes in blended mode	September	Possible re-open campus	/October
No Exchange Students *2020 - 2021			
The Exchange Students 2020 - 2021		No exchange students (2020)	
Social Distancing policies (Less			
students per class room)		Quick Test Covid procedures	
Special Cleanning procedures		Social distancing plans	
Mask Use (Mandatory Optional)		Mask use mandatory	
Adapt the launch cafeteria, wider			
corridors, others measures			

Table 1. Different health related measures taken by the universities (Own elaboration)

# B. Learning

The pandemic quick spread in Europe and a month later in Latin America forced Higher Education Institutions to switch their normal learning setting to online learning and distance learning modes.



SEINAJOKI UNIVERSITY OF APPLIED		UNIVERSIDAD TECNICA FEDERICO	
SCENCES	FINLAND	SANTA MARIA	CHILE
Teaching / Learning measures		Teaching / Learning measures	
Class Suspension	March	Classes Online Mode – March – May	March
All programs online mode	April	Zoom platform for online classes	March
Teachers adpoted distance learnings	April	Basic online Trainning for teachers	February / March
Online study groups	April	Different departments approaches to online learning, diferent solutions in teaching adjustments.	
Partial class Online / Distance Vs Online Learning	April	Trainning – Zoom + Moodle (DEO)	
Trainning teachers on Moodle (BBB – Big Blue Bottom - Moodle)	April - May	Call Center for Techers Support	
Technical support tools – Microsoft Teams	March-June	Connectivity Schollarships (1.000 internet mobile plans and lending computers (300)	
Creating a support teaching Pedagogical Team	March - April	tv.usm.cl broadcast conferences and support online activities	
Moodle platform		Moodle – all courses online	
NEXT STEPS	August / December	NEXT STEPS	August / December
Back to Classes	September	Online Classes until September	
Classes will be: Presence mode, Online Mode, Blended mode and distance learning		Wacom – tablets were distributed to Physics and Math teachers (With Trainning)	
Develop Online Version of Classes	August	Assistant teachers to support teachers and online classes	
Improve Engagement with field activities that will be broadcasted		The laboratories and practical courses (with intensive use of labs and technologies were change to 2021 and replace by other courses	
Survey for teachers – SEAMK			
Exchange Students one Semester or one year online			
Reimburse fees to those who can not get a Visa to go to Finland			
Bought Microsoft, equipment easy to teach online,			
Video straming systems enhacements, (will broadcast the activities)			

Table 2. Responses to learning are indicated in table 2.

*Technological Tools.* For the online Classes and meetings platforms chosen for Seamk Finland was Microsoft teams and for USM Chile was Zoom.

The learning platforms utilized by SAMK and USM was Moodle, but the alternative most use learning platform is Blackboard.

There are many support Technological tools that can help to enhace the online learning experiences, using this is very advisable and there is a need to train the academics in this tools, some very used tools could be Education Perfect, Teded, Newsela, aleks, mathsbot, Byju,



bookshare, Kahoot, Quizlet, among others [5]. Gamification is another important methodology that could help improve the learning experiences and engamement of students in remote teaching.

*Students Survey on learning mode transition.* A survey was conducted among Seamk University students, that involved 189 answers in order to get feedback from the students and help improving the process.

How Motivated where you with your studies after switching to online mode



Where you stress after switching to online mode





How did you evaluate the process of switching to online mode ?



How do you evaluate the quality of online teaching versus presence teaching?



### Quality of teaching :

1	Improved	5.1 %
2	Worse	46.1%
3	The Same level	53.8%

#### Koetko opetuksen laadun muuttuneen sen...

-

- 1 = Erittäin paljon huonommaksi
- 2 = Huonommaksi
- 🛛 3 = Ei muutosta

How do you evaluate the use of technology?



#### Use of technology :

Ose of teenhology.				
1	Improved	5.1 %		
2	Worse	46.1%		
3	The Same level	53.8%		
Miten tekniikka on toiminut				
	2 = heikosti			
3 = en osaa sanoa				
≡ 4 = hyvin				
5 = erinomaisesti				



*How to stay motivated*? One of big challenges for students and even for teachers during the transition was to stay as motivated as regular presence classes, and some recommendations are>

- Advice and help the students to implement a Routine
- Set short constant learning targets
- Have a good place to do the work (not the bed, noisy place, uncomfortable)
- Quick teachers' answers are important to keep students motivated
- Good Communications (events, calendar, remindings, explanations, expectatives)
- Motivated the connection with Other Students
- Remember constantly what the competences are and learning objectives of the class.

# C. Mental Health

Studies undertaken by the World Health Organization found that globally 35 percent of students struggled with a mental illness. The most common was major depressive disorder (21 per cent), followed by general anxiety disorder (19 per cent).

There should be some plans and task to help mitigate stress from students and teachers, teachers should be tracking and identifying students that have lower their performance or are clearly not participating in order to help students.

Some conseuling and training should be address regarding this matter.

## **D.** Finances

Some Universities will be stress with the financial situation since a lot of the measures are affecting their finances. In general Universities will be charging the same to students for their online classes has for the presence classes.

Universities should take into account investments related with new technology, rooms, implementations and other Covid responses and take the financial mitigation decisions that are necessary to adapt to this increase in cost and also the decrease of income for example for not being able to received has many exchange students, for example International Education Association of Australia warned about a A\$6bn-A\$8bn hit in University revenues if Chinese students could not attend the first term [6]

# 1.5.3. Conclusions:

In this uncertain environment it is important that learning continues always and that we adapt, even if we are not able to teach in person.

Since the mobility of many students will be reduce online programs and distance learning ar the natural responses, however if this is not done in a proper way there is a students perception that the quality of learning is less and that the learning outcomes are lower, but this is not the same for every teacher or class and some of the students declare that they learned more on this new online (5.1%) this is basically because their teachers were better in online teaching and edtech tools.

This first period of switching to onlien teaching was done on a rapid changing paste, next academic year in the case of Finland and second semester in the Case of Chile will improve in methods and outcomes but there is an opportunity of improving more if the right tools and trainning acompanies this process.



Communication is fundamental during all this process, the programs must be adapted to consider online versus physical activities or a combination of both of them.

Some mayor shift to online education could be derived from the COVID-19 pandemic episode, now less than 10% of the higher education students programs are online, some traditional universities have a significant advance in online learning with high percentages of the students enroll in fully online programs.

Universities will need to increase their technological infrastructure, more bandwidth, increase networks security, provide streaming services and platforms and tools software licenses in order to support the learning process, any time, anywhere and any way, certainly online, distance and active methods are part of the solution.

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# Chapter 1.6: Teaching, Learning and Working during COVID-19 Pandemic: Riga Technical University case

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The situation with COVID-19 Pandemic, has led to rapid change in Higher Education. Universities are aligning their strategies, processes and resources to create safe and functional study, research and work environment. To ensure continuous learning process universities all around the world are adapting their studies by providing their students with online education [1], [2]. It has led to even more change in the Higher Education by accelerating innovation and digitalization in universities [3]. Riga Technical University has defined three main priorities during the COVID-19 Pandemic to ensure continuous study, research and valorization processes. These main priorities are - rearranging the on-site study process to online, evolving rapid innovation and research with aim for commercialized products and ensuring adapted and safe working conditions for all employees. To support these priorities Riga Technical University has shifted resources, by putting emphasis on digitalization, ensuring the employees safety by assigning remote work and providing additional support for employees and students with distance learning. The main lessons learned from the COVID-19 Pandemic at Riga Technical University are - emphasis on digitalization and employee training; blended approach for on-site and online study process will remain; collaborative study courses with other universities will be integrated more in the study process; rapid innovation and research projects in response to crisis is essential; and there will be change in international collaboration and networking.

### 1.6.1. Introduction

Riga Technical University positions itself as a Sustainable University by introducing the United Nation Sustainable Development Goals in the study and research processes, being part of United Nations Global Compact initiative and participating in such sustainability rankings as UI GreenMetric and THE Impact Rankings. In 2019 Riga Technical University was ranked among the 100 greenest universities in the world in the UI GreenMetric ranking in the 95th place and remains the only Latvian higher education institution rated this high [5]. Riga Technical University works purposefully to improve infrastructure in accordance with the principles of sustainability, changing habits of students and employees, as well as using innovative green products and technologies created by RTU scientists in Ķīpsala campus infrastructure [6]. The foundations of sustainability have provided great support to the university's efforts to define the priorities for overcoming the crisis.

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The emergency state in Latvia was announced from 12<sup>th</sup> of March to 9<sup>th</sup> June in which government of Latvia prolonged the emergency state once but eased some restrictions that have allowed to organize on-site consultations and final examinations for students, taking all precautionary measures. After the end of the emergency state in Latvia, some restrictions are still in place and are being reviewed regularly based on the spread of the COVID-19 in Latvia [4]. From the start of the emergency state all Universities in Latvia, including Riga Technical University has shifted from on-site to online studies.

In accordance to the restrictions, Riga Technical University has extended the spring semester till mid of August. It has been done to ease the study and examination process for both students and employees. The crisis has affected also the start of the autumn semester – it is planned to start at mid of September.

## 1.6.2. Rearranging the Study Process

After the emergency state in Latvia was introduced, Riga Technical University adapted the study process from on-site to online. The study process still is organized remotely with some exceptions. As a technical university our students have a lot of practical studies and experiments that can be done only in laboratories. For this reason, when the restrictions were eased Riga Technical University adapted the laboratories so the students could attend them in a safe way.

For the study purposes, employees and students are using the e-learning environment – ORTUS, that has been developed many years before. This university e-learning system consists of all necessary information, materials, tests and home assignments for continuous study process. As the students and employees had already used this platform, it was easier to switch to online lectures. In addition, Riga Technical University introduced new electronic interaction tools and video broadcasting possibilities that enhanced the study process even more. The online lectures are provided by using Microsoft Teams, Zoom and Cisco Webex platforms. In addition to university provided study courses, Riga Technical University introduced the Coursera and EdX learning platforms for student and employee use free of charge.

To support the employees that are involved in the study process Riga Technical University developed a support platform with a variety of resources. It includes general information and updates regarding the study process in the university, other fellow employee experiences switching from on-site to online lectures and support platform for employees. To ensure the study process at the same quality the platform consist also from technical support mechanisms, pedagogical assistance and support materials for organizing remote examination.

# 1.6.3. Evolved Innovation and Research Process

During the crisis, Riga Technical University has evolved the innovation and research process by putting more emphasis on crisis platform development, sharing of resources and knowledge, involving more students in the innovation development and prioritizing rapid research projects with high impact on dealing with crisis. One of the priorities was the development of new research platform at Riga Technical University dedicated to fight COVID-19. As scientists mobilize to fight COVID-19 Riga Technical University creates a new research platform, offers specific engineering solutions for individual protective equipment and the use of big data, as well as outlines further research directions [7]. It was the first step for Riga Technical



University to align the resources and knowledge for a specific purpose. The research platform even after the crisis will continue to operate and support researchers.

In addition, sharing the resources has become also important for university as it allows contributing to the research by collaborating with other institutions. The first studies by the Riga Technical University

HPC (High-Performance Computing) Center on COVID-19 have already been conducted. For example, the Latvian Biomedical Research and Study Center, studying the COVID-19 genome, analyzing its sequences and discovering which mutations the virus has experienced in Latvia have used the supercomputer [8].

Involving students in innovation and research process has been a priority for Riga Technical University even before the crisis. A variety of start-up and spin-off companies generated by Riga Technical University is a proof of that. In response to the crisis, Riga Technical University introduced the CrisisLab, which brought together 230 students from 15 universities and colleges in Latvia. The aim of the CrisisLab was to develop solutions to the challenges posed by the COVID-19 crisis in Latvia. Latvian companies, organizations and public institutions came to students with their problems that emerged from the COVID-19 crisis [9].

The strategic priority to develop a research platform that contributes to the research and innovation to deal with COVID-19 crisis has already shown positive impact and results. For example, Latvian scientists find traces of COVID-19 in wastewater. The study is carried out by Riga Technical University together with the Latvian Biomedical Research and Studies Center (BMC) and the Institute of Food Safety, Animal Health and Environment (BIOR). Scientists are developing a new monitoring method that will help determine the transfer of coronavirus in wastewater and the environment [10]. A team of scientists and engineers from the Design Factory of RTU has created a prototype for an automated lung fan. It is simple enough in production and easy to use, in order to help patients with breathing problems caused by COVID-19 efficiently. Cooperation with a number of companies to start production is already under way [11]. Riga Technical University student developed a prototype – special safety bracelet for those infected with the coronavirus is able to perceive the medical indicators such as pulse, body temperature, the amount of oxygen in the blood, etc. As well as to determine the location of a person with an accuracy of 2.5 m [12].

## 1.6.4. Adapted and Safe Aorking Conditions

Following the National emergency restrictions caused by COVID-19, Riga Technical University developed crisis management team and regularly organized meetings regarding the restrictions in Latvia and precautionary measures in the university. All university employees if possible are working remotely and are provided with necessary technical support if needed. All on-site meetings were postponed or organized online trough Microsoft Teams.

It was observed that in online meetings employees are more engaged but find it more difficult to organize planning meetings that includes brainstorming and wide discussions. While employees were adapting to the new conditions, the online meetings were longer than planned, but time employees are attending shorter meetings that are more structured and meaningful, allowing them to focus on direct job responsibilities.

As Riga Technical University has high international student number there were additional safety measured introduced in the student dormitories, libraries, sport facilities, laboratories and



other premises. University is actively working with our international students to help them during the crisis in any way possible. All faculties are equipped with the information posters and basic safety products such as disinfectants, gloves and face masks. Before entering dormitories, students are obligated to take the temperature. With these and many more safety measures university has been able to provide a safe environment both for students and employees.

# 1.6.5. Conclusions and Lessons Learned

The main positive outcomes from the crisis is that Riga Technical University has become more agile regarding the study, research and valorisation processes. The crisis has given many advantages for universities that were capable to adapt and allocate resources for the main priorities defined. Riga Technical University main priorities during the crisis are ensuring continuous study, research and valorization processes. At the same time providing the appropriate and safe environment for them. The safety and professional development of students and employees has played an important role during the crisis.

The main lessons learned during the crisis from study process perspective are that on-site and online study process should be developed as a blended approach. Digitalization already plays important role for university, students and employees not only in the time of crisis and investing in the employee digital competencies should be a priority. Collaborative courses with other universities will provide more interdisciplinary knowledge for students.

By introducing research and innovation platform Riga Technical University aligned resources and knowledge to deal with the COVID-19 crisis. The platform gives the opportunity to involve researchers, students and society (companies, public institutions etc.) with a common goal. From university perspective adaption of rapid innovation and research projects that deals with the crisis, gives the opportunity to have high impact on the crisis. It also shows which projects and researchers are the best to adapt and quickly provide the best solution in the changing circumstances. Universities should introduce long-term financial instruments that supports such short-term project development that can be commercialized.

The working conditions in the university have shifted, by introducing more of the remote work for employees from different fields, not only the professors and lecturers. The importance of data safety and working conditions for employees have risen even more in the time of crisis. In addition, the culture of on-site meetings has shifted, employees are more engaged in the online meetings. The main challenges that have risen from online working are that employees need to prepare more for the online meetings, they need more technical support. From the networking perspective - it has become more complicated in conferences or seminars to establish new contacts due to the very large number of participants.

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# Chapter 1.7: UNNES Sustainable Campus Policy in the COVID-19 Outbreak

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The vision of Universitas Negeri Semarang (UNNES) as cA House of Science which Develops Civilization" is to become a Conservation-Oriented University with International Reputation. UNNES has 3 principals of conservation efforts, the first pillar is natural resources and environment, the second is values and characters, and the third pillar is art and culture. The realization of a sustainable campus is one of UNNES' commitments to realize those conservationoriented principals, especially in the pillars of natural resources and the environment. One of the sustainable campus benchmarks is UI Greenmetric's performance and ranking results which have increased every year and UNNES is always one of the top 10 best at the national level. The COVID-19 pandemic demanded changes in UNNES policy in implementing campus activities. UNNES policy against COVID-19 has covered academic and non-academic policy changes which its implementation is governed by the unit of preventing COVID-19 outbreak. This unit has a person in charge of "medical services", "information technology and publications", "prevention, infrastructure and surveillance", "environmental sanitation", and "logistics, distribution, and inventory". Academic and non-academic policies include academic and general services that are conducted online, a moral appeal statement against COVID-19, 55th Anniversary of UNNES, and praying together online for Indonesia, UNNES caring activities, and the Virtual Commemoration of Kartini Day and Earth Day. This change of policy is a form of responsibility and contribution of UNNES as a sustainable campus in handling the COVID-19 pandemic so that this outbreak can be overcome immediately and the Indonesian people might be able to prepare for the new normal.

## 1.7.1. Preface

The three pillars of UNNES conservation as " A House of Science which Develops Civilization " became the foundation for realizing the Conservation-oriented and Internationally Reputable University. The three pillars are "values and character", "art and culture", and "natural

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resources and environment". As a sustainable campus, UNNES has shown good performance and high commitment for always be in the top 10 best sustainable campuses nationally and the last 3 years has been in the top 100 world best versions of the UG Greenmetric ranking [1][2][3][4]. The leadership commitment to realize the conservation-oriented campus can be seen from the one strategic goal of the UNNES Business Plan 2020-2024 on sustainable campus programs. The main performance indicators and activity performance indicators of this program are detailed and measurable so that each unit would understand its obligations as the effort to achieve the targets. Monitoring and evaluation of the ongoing campus performance are carried out internally and externally. Internally, monitoring and evaluation are carried out through inter-unit competition in the Green, Clean, and Healthy (H-BAT) ranking program, which is integrated with UI Greenmetric indicators. The H-BAT ranking is conducted twice a year, which is in July and December periods. Externally, monitoring and evaluation are carried out through UI Greenmetric 's performance and ranking, which is announced annually in December.

During the COVID-19 outbreak, campus sustainability indicators remain a priority activity output despite the changes in the policy and planning. The COVID-19 epidemic is known to be a global pandemic which has been affecting almost all countries [5], it has been affecting all aspects of life from the health, the economy, the religion, the governance, the food to the education. The nature of this virus is very easily transmitted, either through droplets [6] or air [7]. The success rate of the treatment by the countries which has a quick response in the initial identification and conducting quarantine for the infected people was proven right to hold the rate of spread of the infections and reduce mortality [8].

One type of institution which has high risk and potential as a place to spread the virus is university [9]. To control the spread of the virus, UNNES with more than 35 thousand students changed some of the *tri dharma* activities through new policies, both academic and non-academic. The implementation is carried out by a special alert unit of COVID-19. This unit includes five responsible parties, they are "medical services", "information technology and publications", "prevention, infrastructure and surveillance", "environmental sanitation", and "logistics, distribution, and inventory".

The new policies related to academic and non-academic covering (1) academic services and general services are conducted online, (2) a moral appeal together against COVID-19, (3) 55th dies Natalis of UNNES and praying together for Indonesia online, (4) UNNES care activities through the Laziz Charity House, (5) the inauguration of UNNES officials online, and (6) the commemoration of Kartini Day and Earth Day online. Those policies are based on the instruction of the government, both the Ministry of Education and Culture, the Ministry of Research and Technology BRIN, as well as the Ministry of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia. The focus of the policies' implementation is to address and minimize the spread of COVID-19. The circular letter of the Ministry of Education and Culture No. 20 of 2020 [10] concerning about the work system of employees in the new normal order has been implemented as a reference to the Rector's updated regulations. The supplementary guidelines for research and community service during the pandemic were issued by the budget user of Deputy for Research and Development Strengthening the Ministry of Research and Technology/National Research and Innovation Agency. This supplement is an inseparable part of the XII edition guidelines and serves as a guide for conducting research and community service at the UNNES academic community during the pandemic. The circular letter



of Menpan-RB related to the Adjustment Systems of State Civil Apparatus Performance to prevent the spread of COVID-19 in the government environment has become the reference of the new policies which are enacted in campus sustainability of UNNES.

#### 1.7.2. The Academic and General Services Are Conducted Online

Before the COVID-19 pandemic occurred, UNNES had implemented online learning through the Elena application [11] in approximately 20% of the lectures. The 2019 National Work Meeting of the Ministry of Technology Research and Higher Education, has provided recommendations to the universities to develop curriculum. To develop the curriculum, UNNES starts implementing blended learning for several courses in the study program. The blended learning strategy includes the preparation of learning objects and classroom management by the lecturers, the facilitation of online classes, and interaction on online learning (student-learning objects, lecturers-students, and inter students). The blended-learning of UNNES is a combination of face-to-face lectures and online lectures in parallel. The quality of this learning is controlled by the Quality Assurance Agency. Online lectures have been facilitated through the Elena e-learning system developed by the Information and Communication Technical Implementing Unit which have been integrated with other UNNES systems.

During the COVID-19 pandemic, the Elena application ha been used fully online by almost all the lecturers so that it is needed the additional system capabilities to accommodate all learning processes. To prevent and anticipate the spread of the coronavirus to become more widespread, UNNES has been gradually implementing full online lectures. The first stage was conducted for one month starting from March 16th until April 11th, 2020. This decision has referred to the circular letter of the Minister of Education and Culture of the Republic of Indonesia Number 3 of 2020 about the prevention of the COVID-19 in the Education units [12] and the Letter of Secretary-General Education and Culture per 12th March 2020 related to the delay of the activities which involve a lot of people [13]. Rektor of UNNES has appealed to all UNNES academicians and educators to optimize the learning methods through Elena and participate actively in the prevention of the coronavirus.

The pandemic condition has worsened so UNNES has extended the academic and general services online through the Circular Letter Number B/1738/UN37/TU/2020 on the 6th April 2020 [14]. The extension has been done because (1) The decision of the Head of National Disaster Management Agency No. 13A 2020 on the Extension of Status o Specific Emergency Disasters Outbreaks of Corona Virus in Indonesia [15], (2) the Circular Letter of the Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia Number 34 of 2020 concerning about the amendments to the Circular Letter of the Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia Number 19 of 2020 about the System Adjustment of the Apparatus State Civil's performance in Prevention of COVID-19 at the Governent Agency Environment [16], (3) Circular Letter of Director General of Higher Education Number: 302/E.E2/KR/2020 concerning about the Learning Period of Organizing Educational Programs [17], (4) Circular Letter of the Rector Number: B/1413/UN37/2020 concerning about the Precautions and Prevention of COVID-19 Spread Infection in the Academic Field and General services in UNNES Environment [18], and (5) Circular Letter of Rector Number: B/1502/UN37/WS/2020 on the Employee Work Arrangements for the Prevention of COVID-19 Spread [19].



Academic services including lectures, guidance, and online exams were extended until May 29th, 2020 [20]. The lectures can be implemented through Elena, LMS as well as other applications according to each condition and agreement between the students and the lecturers. Practical lectures are postponed and designed with a block system or replaced by other assignments with the guidance of lecturers. The alternative of thesis work and completion has been encouraged to use secondary data, changing the scope of the study, retrieving the online data, literature studies, projects working and publishing by online, or other alternatives. The thesis and dissertation examination (closed examination) are conducted online according to the Examination Quality Procedures (PM-AKD-20) and use the application which is agreed by the examiners, students, and the committee of the examination. The students with learning period until the Even semester 2019/2020 are extended to the Odd semester 2020/2021.

The COVID- 19 pandemics which has expanded to various countries, including Indonesia encouraged UNNES to conduct the Community Service (KKN) with the online system. The online KKN implementation is effective to prevent the transmission of COVID-19. KKN team only consists of 3-5 persons, the students are minimally from two faculties with 3 priority tasks, which are prevention education, treatment, and mitigation COVID -19. The community service is together against the COVID -19 (BMC) year 2020 involving 5143 students at 30 provinces which covers 190 districts/ municipals, 914 sub-districts, and 3068 villages. The briefing of KKN was conducted virtually. KKN BMC is expected to be one solution that is right for fighting COVID-19.

The general service policy has been implemented by the circular letter from the Rector of UNNES about the employees' work arrangements in the context of preventing the spread of COVID -19 within UNNES. The activities setting of general services is the setting related to work from home (WFH) by the Circular Letter of Rector Number: B/1502/UN37/WS/2020 on Employee Work Arrangements in the Context of COVID-19 Spread Prevention in UNNES environment [19]. The implementation of WFH aims to prevent the spread of the coronavirus by the appeal of the President of the Republic of Indonesia to study, work, and worship at home. For UNNES employees, the policy was implemented from March 23th 2020 to April 11th, 2020 and it could be extended according to the leader's decision. The WFH implementation aims to minimize/avoid physical contact among humans so that the risk of the transmission can be reduced. A form of caring for the health is realized by doing physical distancing (keeping the physical distance), the use of masks, and wash hands with soap for at least 20 seconds. The employees who work at home are required to activate their mobile phones during work hours and do the tasks which they are responsible for. The employees come to work alternately and must apply the health protocols such as the use of masks and hand sanitizer. As the pandemic condition is worsening, the implementation of WFH is extended until 21 April 2020 and/or follow government policy.

# 1.7.3. A Moral Appeal Statement Against COVID-19

The moral appeal against COVID-19 was initiated by 68 UNNES professors and was carried out online as a form of togetherness and care to accelerate COVID-19 handling [21]. This moral appeal is a form of solicitation of humanitarian movement, togetherness attitude, and social caring in the accelerating of the COVID-19 handling. The COVID-19 spread which has been increasing rapidly has caused many fatalities, material, and immaterial losses for the global



community. There are nine items of the moral appeal i.e. (1) "Inviting all components of the Indonesian nation to unite and reinforce our attitudes, intentions and intelligent action as an effort to accelerate the handling of COVID-19 in Indonesia by giving priority to the safety and the health of the public, citizens and Indonesian nation in a fair way and non-discriminatory by upholding human rights, religious values, cultural values and national diversity"; (2) "Inviting all components of the nation to increase national resilience by prioritizing the harmony together, mutual support by enhancing mutual cooperation culture, building solidarity to work together in synergy as an effort to accelerate the handling of COVID-19, as a collective responsibility of all components of the Indonesian nation "; (3) "Supporting the government in strengthening the coordination, control and supervision of the acceleration implementation of the process COVID-19 through the synergy among the ministries/agencies and local governments, as well as communicating the handling of COVID-19 to the public"; (4)"Participating in guarding the acceleration process of program implementation COVID-19 with the spirit of togetherness and social conscience, so that the steps of the activity which have been carried out by the government run fast, precise, focused, and integrated in the program to accelerate the handling of COVID-19": (5)" Inviting all components of the nation to comply with the government's recommendations to prevent the spread of COVID-19 by keeping others at a distance and avoiding direct physical contact with others for the sake of health, safety and the common good of the whole Indonesian people and nation"; (6) " Providing support and the highest possible appreciation to all medical personnel who have struggled by risking their health and safety in the unconditional handling of COVID-19 based on sincerity and professionalism to protect the health and safety of all Indonesian people and nation"; (7) " Giving appreciation to all people, volunteers, and social forces which have shown an attitude of togetherness and social care in participating in the acceleration program of handling COVID-19"; (8) " Inviting all components of the nation to increase the attitude of togetherness, social care, mutual cooperation and participation in preventing, detecting, and responding to COVID-19 which has afflicted all communities, Indonesians and world citizens"; and (9) " Inviting all members of the Assembly of Professors, University Senates, and all Leaders at the university level to the level of study programs to continue increasing the attitude of togetherness and social care in providing material and moral assistance in accelerating the handling of COVID-19 which is afflicting the community and nation Indonesia ".

# 1.7.4. UNNES 55<sup>th</sup> Anniversary & Joint Prayer for Indonesia by Online

UNNES residents attended a joint prayer by online on 30th March 2020 online. The joint prayer was the peak of the 55<sup>th</sup> UNNES Anniversary/Lustrum XI series. The COVID-19 pandemic in Indonesia has forced the series of dies Natalis events, which every year is held royally on 30th March, had to be changed. Some events that involved large numbers of people had been canceled to minimize the victims of the COVID-19 pandemic and were replaced by joint prayer via live streaming. UNNES residents had joined the joint prayer from their homes [22]. The joint prayer was led by Maulana Habib Lutfi Bin Yahya who is a charismatic scholar from Pekalongan, who is also the UNNES Trustees Council. The simultaneous prayers from home were offered to Allah the Almighty for UNNES and Indonesia to avoid the COVID -19 disaster. UNNES has implemented several policies to reduce the spread of COVID-19 i.e. students have been studying at home through the online system, spraying the university buildings



with disinfectants, making sterilization booth, producing the hand sanitizers and masks for UNNES members and residents in the UNNES campus environment.

# 1.7.5. UNNES Caring Activities for Students and Communities Affected by COVID-19

Through Rumah Amal LAZIS, UNNES had received the aid package of basic food from PT Industri Jamu dan Farmasi Sido Muncul Tbk for the big families of UNNES who have been affected by the pandemic COVID-19. The aid packages were distributed to the student representatives, lecturers, and educators (Figures 1 and 2). UNNES had shared 2,073 packages of basic food for students. UNNES has been conducting the WFH, but many students had come from other cities and outside Java who are not able to return to their houses. Those students commonly come from Aceh, Papua, Sulawesi, Riau Islands, and other provinces, as well as the foreign students from Thailand who are living in the dormitory. Some students from Java were not able to return as their hometowns were included in the red zone. Packages of basic foods were distributed to every faculty and the faculties would regulate the distribution to the students by applying the protocol of health. The number of students who had received the package of basic food is as follows. Faculty of Education as many as 272 students, Faculty of Language and Art as many as 537 students, Faculty of Social Sciences as many as 179 students, Faculty of Mathematics and Science as many 288 students, Faculty of as Engineering as many as 211 students, Faculty of Sport Science as many as 174 students, Faculty of Economics as many as 269 students, and Faculty of Law as many as 143 students. UNNES campus of sustainability is ready to as a cooperate with all parties including the PT Industri Jamu dan Farmasi Sido Muncul Tbk to do researches and innovation related to the COVID-19 pandemic prevention. The monitoring of the students has been conducted regularly to determine the health and the obstacles that have been faced including in the process of online learning.



Figure 1. The Basic Food Packages from PT Industri Jamu dan Farmasi Sido Muncul Tbk for big families of UNNES who are affected by the COVID-19 pandemic





Figure 2. Assistance in Basic Food Packages through student representatives who are affected by COVID-19

UNNES caring activities for the people who have been affected by COVID-19 were also conducted by the UNNES Functional Food Science and Technology Center through the social service by distributing masks and packages of food sources of animal and vegetable protein in the form of *bandeng presto*, omega-3 salted eggs, freshly processed tempeh. Ginger syrup supplement, turmeric, and tamarind herb, and research drink Zicuma herb which was distributed to enhance the body immunity. The recipient community groups are the boarding schools in Gunungpati and Mijen Semarang, they are yaituDurrotu Ahli Sunnah Wal Jamaah, Riyadlus Sholihin, Darut Tholabah Al Maliki, Roudlotusy Syifa', dan Husnul Khatimah Elderly Homestead Gunungpati Semarang. Ikatan Alumni Resimen Mahasiswa (IARM) commissariat Batalyon 902 UNNES with the active members of the Student Regiment also did the social service to help the students who have been affected by COVID-19. The 100 packages of assistance in the form of groceries, vitamins, masks, and hand sanitizers which were given to the students and the local society of UNNES.

#### 1.7.6. Virtual Commemoration Day of Kartini and Day the Earth

In commemoration of the Kartini Day 2020, UNNES has implemented 3 agendas, namely the ceremony of Kartini Day by online, wearing the traditional clothes and congratulating (inspirational sentences and words of wisdom) by online, and online seminar. Dharma Wanita Persatuan UNNES held an Online Seminar with the theme "The Role of Women in Countering the Global Pandemic COVID -19". The seminar speaker was the wife of the Rector UNNES, the wife of the Governor of Central Java, and the chairman of the Center for Health UNNESwho is also part of the special team unit to fight COVID-19.

As a Conservation-oriented University, UNNES has regularly organized the Earth Day commemoration with a variety of themed activities preserving the natural resources and the environment. This is the real effort to instill the awareness of the whole academic community of UNNES on the importance of preserving natural resources and the environment. Unit Pelaksana Teknis Pengembangan Konservasi UNNES has designed the program " Earth Day Commemoration" in 2020 but the design had to be changed totally into online activities for the



pandemic conditions COVID-19 with the objective remains the same which is instill awareness of the importance of natural resources and the environment.

UNNES continued to consistently commemorate Earth Day on 22nd April 2020 despite the COVID-19 pandemic atmosphere. The form of the commemoration of the Earth Day was conducted into two events without collecting mass, i.e. uploading the twibbon of Earth Day which was followed by 1 500 participants of UNNES academic community, and uploading the photo activities of WFH based on the theme that related to the Earth Day both of lecturer, staff education, and students UNNES and the photos are collected are selected then compiled in youtube [23].

# 1.7.7. Conclusion

UNNES implementation of conservation insight involves three pillars, i.e. 1)value and character, 2) arts and culture, and 3) natural resources and the environment. The Vision of Conservation Insights and international reputation means that the targeted reputation by UNNES should refer to and is based on the conservation insight. UNNES as the "Home of Civilization Development Science " will realize a sustainable campus as a logical consequence of a conservation-oriented vision. The commitment of UNNES to realize the conservation insight is supported by the existence of a campus sustainability program contained in the UNNES Business Plan 2020-2024. UNNES makes serious effort to improve the quality and quantity of campus sustainability performance which in turn will determine UI Greenmetric's ranking. Since following the ranking, UNNES has been always in the top 10 best nationally. During the COVID-19 pandemics, UNNES has conducted a variety of changes in policies for the implementation of the activities of Tri Dharma to secure all parties who have involved either the faculties, the educational staff as well as the students. UNNES's new policy against COVID-19 covers academic and non-academic policies. The COVID-19 pandemic is dynamic so that in future they need to anticipate and predict changes in policy is needed. The academic policies related to the learning process need to be designed in such a form so that the quality of the process and the outcomes of the learning process by the indicators of the main performance and indicators of the work performed. The method changes using the online system but the process and the results are expected to remain of high quality. The urgency of certain policies in the future needs to be anticipated as a form of responsibility and contribution of UNNES which is a sustainable campus in responding to the dynamics of the COVID-19 pandemic.

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# Chapter 1.8: Green Campus Handling at UNS during the COVID-19 Pandemic Period

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Since 2013, Universitas Sebelas Maret has been continuously committed to realizing a green campus in order to achieve indicators in various fields as stated in the UI Green Metric where for several years UNS has shown consistent improvement. These fields are: energy, waste, water, transportation, and education. The writing method uses qualitative descriptive, supported by primary and secondary data including various UNS policies through the Letter of the Rector. In the field of setting and infrastructure, UNS shows open space ownership of 92%, with 76% of green space. During the COVID-19 pandemic, the areas that were significantly affected were energy, transportation, water, waste, and education. Some renewable energy has been used at UNS such as lithium, solar cells, and windmills. The use of motor vehicles has decreased by more than 90%, resulting in a decrease in carbon emissions. Water use and waste production are decreasing. The use of paper and ink is much reduced. Various assignments, lectures, thesis examinations, meetings, and graduations are conducted online. Waste that is usually generated by learning laboratories and canteens, is all reduced. The amount of research is adjusted. Online learning, both sycrounus and asyncrounus, significantly reduce energy use. The recognition of Community Service Program with COVID-19 handling activities seemed to be of great interest to students carried out individually at their respective locations of residence. Various webinars will also continue to be held and participated by the UNS academic community, both locally, nationally, and internationally.

#### 1.8.1. Introduction

In the early 2020, the world experiences a global pandemic due to the outbreak of COVID-19. This pandemic further exacerbates the era of disruption with fundamental changes, which have a significant impact on all aspects of life. Negative externalities arise due to the implementation of the lockdown policy or regional quarantine, which in Indonesia we are familiar with the term PSBB (Large-Scale Social Restrictions).

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The impact of these government policies can be felt by all sectors of community life. The affected sectors include: the health sector, the service trade sector, the transportation sector, and even the education sector. The education sector from the lowest to the highest levels is forced to make adjustments.

Universitas Sebelas Maret (UNS) Surakarta as an element of public higher education in the city of Surakarta, receives significant impact, moreover the character of the main campus of UNS is located in the city center. The number of UNS students is around 37,000 and there are 3,500 lecturers and education staff. They need and use supporting infrastructure in the campus environment which has a total area of about 210 ha spread across 11 campus locations. In addition to campus infrastructure, the academic community is also supported by infrastructure around the neighborhood / residential areas. The condition of this pandemic greatly affects the existence of infrastructure in both the internal and external environment of the campus. For infrastructure in the neighborhood, have been abandoned by the students in the last 2 months, since the beginning of March 2020. Boarding facility, laundry, supermarket, photocopy center, typing, rental, and several facilities that offer services, are greatly affected by this pandemic. Activities around the campus become quiet; likewise with infrastructure on campus. Classes, sitting groups, public spaces, laboratories, and even canteens are not used.

The above condition begins with the issuance of the Letter of Rector Number 1231 / UN27 / HK / 2020 concerning Self-Awareness Regarding Corona Virus Outbreak (COVID-19). The Rector began to call on all members of the community, to better maintain health and hygiene, reduce various activities / visits abroad, and conduct self isolation for those who had just returned from abroad. This was followed by a variety of other Information Letter related to restrictions on activities on campus, online learning, and Community Service Program recognition with activities related to handling Pandemics to prevent the spread of COVID-19 to be more widespread. The active role of UNS in handling and limiting the spread of COVID-19 was also shown in the funding policy for research and service related to methods and efforts to overcome this pandemic. UNS Teaching Hospital is also one of the COVID-19 patient referral hospitals.

The method of writing this article is descriptive qualitative with observation techniques, literature review, and literature study. The aim of this article is to describe the various policies of the UNS as a green campus in response to the condition of the COVID-19 Pandemic.

## 1.8.2. Result and Disscussion

Universitas Sebelas Maret condition as a green campus has also been massively and significantly affected by the COVID-19 pandemic which is currently being experienced by more than 212 countries in the world. There are restrictions on activities in all cities, even the state also restricts learning activities, administration, and also community service research in various schools and colleges. This was responded by UNS with the issuance of policy / appeal through the Letter of the Rector Number 1480 / UN27 / HK / 2020 regarding Early Precautions, Preparedness and Anticipatory Measures to Prevent COVID-19 Infection Spread in Universitas Sebelas Maret. In addition to the Letter, there are also UNS policies contained in the Letter of the Rector, among others, regarding Early Precautions, Preparedness and Anticipatory Measures to Prevent the Spread of COVID-19 Infection [1]; the Rector's policy on Community Service Program during the COVID-19 Pandemic period [2]; The Rector's Policy regarding measures for



handling Academic activities in the even semester of the 2019/2020 academic year [3]; and the policy of extending the limitation of activities on Sebelas Maret campus to 15 June 2020 [4].

Based on all letters submitted, all members of the community are required to limit interactions by conducting online learning. This limitation of interaction is done by using various digital platforms to avoid crowds of people, for educational activities, research, or community service. Educational activities, for example, are carried out by rescheduling for laboratory-based activities, research activities are carried out by adjusting to the collection of P2M data involving the community as well as overseas travel. While community service activities will continue to be carried out without reducing the benefit of UNS as an institution that encourages change and progress, by recognizing Community Service Program activities with COVID-19 handling activities that can ease the burden on the community in their respective regions while maintaining strict health protocols. Some study programs also encourage the making of face shields and donate them to several health centers (figure 1). The scope of these activities is in the fields of public health, economic security, food security, community education / counselling, social and empowerment and other related fields. Restrictions on activities and mass gathering in an effort to reduce the spread of COVID-19 are based on the belief that there is a strong correlation between environmental degradation, infectious diseases, and human population density. The lack of focus on handling a pandemic on this matter can lead to the birth of a blind spot policy which is actually counterproductive to the goals of sustainable development and human health security due to reactive policies [5].

Sustainable Development Goals (SDG's) as a global agenda for 2030 is a sustainable development effort in overcoming the ongoing crisis throughout the world in the form of human population pressures leading to unprecedented environmental degradation, climate change, social inequality, and other negative consequences throughout the planet [5]. One of the real effects is the pandemic that we are currently facing. The negative impact caused by the pandemic is very systemic. Health and economic aspects are the biggest aspects affected by the spread of COVID-19.







Figure 1. The making and submission of Face Shield in several study programs at Universitas Sebelas Maret Source: UNS Document, 2020

Through the results of literature studies, it is known that although there are many negative impacts, it turns out there is a positive impact of COVID-19 on the aspects of human life that is a reduction in air pollution emissions that can be seen through satellite imaging in several countries affected by the plague [6]. Reductions in global carbon emissions occur extremely, though only temporary. Conditions at UNS before the pandemic, the micro climate at the main campus of UNS Kentingan is still good (see figure 2) with the total carbon footprint or total greenhouse gas at UNS around 14,344 metric tons and it is believed that conditions at the time of the pandemic were even better that the estimated total carbon footprint fell by more than 90%. Carbon emissions from motor vehicles accounted for half of global carbon emissions, in addition to carbon emissions from industry and aviation [7]. This condition not only made the air and micro climate of the UNS campus better, but also increased the diversity of fauna that enriched the UNS arboretum garden, especially since the beginning of the year, through the Letter of the Rector, it has been banned the use of disposable plastic packaging and plastic bags [8]. The reduction of household waste from surrounding settlements is discharged through Wastewater Treatment Plant (WWTP) at Kentingan UNS campus [9], also reduces the WWTP burden. Although organic waste from the leaves of the entire UNS campus is still abundant due to the area of green area both covered by forests and green shrubs covering an area of 1,598,715 m<sup>2</sup> or around 76% of the total area of the UNS campus, the efforts to manage organic waste have also been increased.

Reducing carbon emissions has also become an inevitable trend and a consensus throughout the world. Low carbon promotion can help achieve emissions reduction goals, promote economic development, and social progress. The results can provide useful insights for policy makers to implement effective regulations and for decision makers to implement sustainability initiatives [10].



From the condition of extreme global emission reduction due to a pandemic, it is important to be aware that this extreme reduction from global pollution tends to be temporary, and will return to the highest level if restrictions are reopened, because they do not reflect structural changes in the economic, transportation or energy system [7]. Therefore, it is necessary to have a real, structured, systemic, serious, and simultaneous effort throughout the world and in all fields to reduce activities that impact carbon emissions in the fields of transportation, and industry.

Regarding carbon emissions, another effort undertaken by UNS is the diversification of renewable energy. Currently UNS has prepared one new energy source, namely windmills, in addition to solar cells and lithium that have been used previously. This is in accordance with the opinion [11] that a successful strategy on renewable energy has had a positive impact on reducing carbon emissions.

Nowadays, there are 65 countries in the world that are preparing a strategic plan for the 2024 roadmap related to the Global Health Safety Agenda (GHSA) to prevent, detect, and respond to infectious diseases. This is in line with the second and third SDG's agenda on food security and human health [5].



Figure 2. Green Condition of Universitas Sebelas Maret Main Campus before the 2019 Pandemic (a. Headquarters, b. Drinking Water Supply System, c. Domestic WWTP, d. Environmental Quality Testing

Lab.) Source: Satellite Image Photos, 2019

In terms of food security, students use campus laboratories as an effort to develop various plants through hydroponic techniques. It has been developed by the guided farmers in Ngargoyoso, Karanganyar by empowering local farmers, assisted by using digital / online marketing.

# 1.8.3. Summary

UNS will strive to continue to increase commitment and real efforts in realizing the green campus. The green campus attribute not only encourages the realization of a green campus, but also becomes a campus that encourages environmental activities for the sustainability of the earth



and new generation through the use and development of renewable energy, increasing the area of green land, water conservation, reducing waste, reducing carbon emissions, and research activities and service that has a direct impact on society. Even though the current pandemic does not decrease the efforts of UNS in realizing the global ideals of realizing the earth for future generations. However, it is undeniable that some efforts related to environment and sustainability have slowed down a bit as a form of division of focus on changing concepts of learning and health conditions which are interconnected.

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# Chapter 1.9: Sustainability Efforts and Optimizing Teaching, Learning and Working during Pandemic at The University of Medan Area

Dadan Ramdan<sup>28,</sup> and Ida Fauziah<sup>29</sup>

University of Medan Area (UMA) is one of private university in Medan Sumatera which has a good concern towards green campus. A number of efforts have been done in the campus to realize sustainability campus. As participating in UIGMWURN in 2017 the efforts were aligned with 6 green metric criteria and at the time campus UMA was granted as the 29<sup>th</sup> most sustainable campus in Indonesia. The rank has been improved in the last 2 years and in 2019 UMA ranked as the 17<sup>th</sup>most sustainable campus in Indonesia (303<sup>th</sup> in the world). Facing the COVID-19 pandemic learning and teaching process at the UMA has shifted from a combination of presence and online class into fully online class. In spite of some emerging difficulties such as network stability and higher expenses UMA keep conducting the process to reach the learning outcomes. Besides improving the quality of online provided platforms, UMA supplies internet quota for the teaching and learning purposes to help stabilize the process eventhough carried out from home. Other knowledge enrichment are shared via webinars and to undergo the social distancing, UMA limits the number of active working staff at the campus by classifying staff into 3 groups, namely Active working staff, work from home staff and duty free staff.

## 1.9.1. Introduction

University of Medan Area (UMA) started participating UIGMWURN in 2017. This ranking system encourages the university to gain theefforts realizing campus sustainability. The 6 criteria of assessment in UIGMWUR help universities to optimize sustainability goals particularly. The university has a good concern towards green campus. Previously the university has got an appreciation for mini conservation park within the campus from the ministry of forestry.

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Figure 1. UMA Achievement in UI GreenMetric World University Rankings 2019

Located in suburban area, this comprehensive university has a good ratio of open space area compared to the area that is covered with buildings. The building at the UMA was set to obtain sufficient daylighting and good ventilation to keep the atmosphere of teaching and learning comfortable.Electricity lighting features has been provided by LED bulbs installation since 2017.

UMA also has replaced electricity appliances with low energy consumption electrical instruments. Solar panel installation is aimed to partially substitute fossil energy usage in order to minimize greenhouse gas emission in the campus area [1]. In addition, UMA provides Zero Emission Vehicle (electric cars and bicycles) for internal transportation, the campus also set to be a friendly atmosphere for bicycle users which proven by the existence of bicycle line at the edge of the streets inside the campus and bicycle parking facilities.

Furthermore, the university also has a decent respect in handling waste. In line with some researches which have been conducted by UMA researchers/lecturers, UMA has implemented the program of reduce, reuse and recycle for a decade. The objective has been augmented by some subjects in certain department such as biology which has some subjects in the scope of waste management such as bioremediation, liquid and solid waste management as well as some environmental subjects as AMDAL (environmental analysis) in student subjects/curriculum.Organic waste is regularly processed into organic fertilizer by composting process. The program is not only applied in the campus environment, but also for communities outside the campus.





Figure 2. Organic Waste Management at UMA

## 1.9.2. Teaching, Learning, and Working

COVID-19 outbreak which started in December 2019 has sent the world into pandemic conditions in a couple of months. It changes many protocols in people daily lives as well as higher education institution. It was a great transformation on how the education was carried out. For the purpose of preventing coronavirus transmission [2] UMA has applied several hygiene protocols, for instance grouping staff into 3 categories namely active working staff, work from home-staff and duty-free staff. Besides this policy UMA also performs body temperature measurement and face mask-wearing ordinance for those who intend to enter the campus area, hand sanitizer and handwash provision in several points, social and physical distancing practice and vitamin and supplement distribution to all active working staff.





Figure 3. Hygiene Protocols at UMA

In order to keep the internal environmental healthy, UMA enforces environmental quality assessment by analyzing environmental parameters regularly which is done by external party from government environmental services and reported and documented annually in environmental evaluation document that is legally signed by authorized official.

The program is manifested in collaboration with other parties such as the government by signing MoU in order to manage the waste in 8 districts in North Sumatera and Aceh. The Program has started in February 2020 and still runs.

# 1.9.3. Teaching and Learning at UMA

Schools as well as Higher Education Institution should immediately change the favorable presence class into online class which has several drawbacks ranging from higher cost for student expenses to get internet package to uncertain education goals achievement, because the easy online model is followed by some risks including uncertain task achievement as students could not be monitored by the lecturers during the classes are going on. On the other hand leaving students without any classes is worst, thus conducting online class and conference is the only choice to prevent great failure in reaching learning objectives.

In particular, most subjects at the UMA have applied sustainability content in the syllabi, especially in engineering, biology and agricultural departments as known that there is a strong relationship between education and sustainable development [3]. Not only in natural science, but social science departments at the UMA also implement sustainability contents as well as a reflection of and refer to SDG's items. It is reported that interdiscipline approach enhance effectiveness to reach sustainability goals in higher education [4]. This standard is written in UMA Internal Quality Assurance System (SPMI) which is set every five years. Hence, the action is implemented in each semester learning plan (RPS), particularly learning outcomes.



SIVERSITIS	UNIVERSITAS MEDAN AREA														
	FAKULTAS BIOL	AS BIOLOGI													
THE DAY NET	PROGRAM STUDI BIOLOGI														
	RENCANA PEMBELAJARAN SEMESTER														
MATA KULIAH (MK)		KODE	BOBOT (sks)		SEMESTER	Tgl. Penyusunan									
Konservasi Tanah dan	Air	AET 321	2		VI (Genap)	6 Maret 2018									
Pengembang RPS		Koordina	Koordinator RMK			Ketua PRODI									
		Dr. Ir. Sumihar Hutapea, MS			Ir. Ellen L. Panggabea, MP										
Capaian	CPL-PRODI														
Pembelajaran (CP)	1. M	Menjunjung tinggi nilai kemanusiaan dalammenjalankan tugas dalampengelolaan dan pemanfaatan sumber daya hayati maupun lingkungannya													
	berdasarkan agama, moral, dan etika. (S2)														
	2. Bekerja sama dan memiliki kepekaan sosial serta kepedulian terhadap masyarakat dan lingkungan. (S6)														
	3. M	3. Menunjukkan sikap bertanggungjawab atas pekerjaan di bidang keahliannya secara mandiri. (\$9)													
	4. M	aguasai pengetahuan dan teknologi budidaya yang efektif (danpraproduksi, produksi, panen hingga pasca panen) dalam sistem pertanian													
	be	kelanjutan untuk mendukung	lanjutan untuk mendukung erancangan, pengelolaandan penerapan bismis pertanian serta mampumenyelesaikan masalahpertanian berkelanjutan												
	ya s M	g berbasis limu dengan metode penelihanyang benar dan tepat guna. (P1)													
	5. 14	ng memperhatikan dan mene	pumenerapk an pernskuraniogis, stitus, sistematis, dan inovati talamkorteks pengembangan atau implementasi ilmu pengetahuan dan teknologi nomenerabilen dan mengengenera pilai bumping tangangan bidangan bidangan patanjan. (VIII)												
	6 M	yang mempentatuan dan menerapkan man numanota yang sesuai dengan bidang pertahlah. (KUI)													
	7 M	<ul> <li>Mannumenelola sumbar dava lahan secara ontimal khususnya ada lahan nerkehiman (khususnya kelana sawit dan karet) nangan dan hortil</li> <li>Mannumenelola sumbar dava lahan secara ontimal khususnya nada lahan nerkehiman (khususnya kelana sawit dan karet) nangan dan hortil</li> </ul>													
	un	initia mencanai permanfaatan lahan secara herkelanintan (KUD)													
	8. M	8. Mampumerumuskan solusi untuk menyelesaikan masalah pertanian dengan memperhatikan faktor-faktor lingkungan dan ekonomi, guna													
	m	meningkatkan produktivitas pertanian secara berkelanjutan (KU4)													
	СРМК														
	1. Mampu menjelaskan pengertian, definisi serta kaedah-kaedah konservasi tanah dan air														
	(K	TA)													
	2. M	ampu menjelaskan tentang d	ipu menjelaskan tentang degradasi lahan dan cara penanggulangannya												
	3. M	ipu menjelaskan fungsi tanah dalam usaha tani konservasi													
	4. M	apumenjelaskan perubahaniklim, pema san global dan bencana alam													
	5. M	apumenjelaskan bahaya erosi dan pengendaliannya													
	6. M	npu menjelaskan proses sedimentasi danpengendaliannya													
	7. M	npu menjelaskan bencana longsor dan penanggulangannya													
	8. M	npu menjelaskan masalah banjir dan upaya mitigasi banjir dan pengelolaan DAS													
	9. M	ampu menjelaskan metode k	onservasi tanah (vege	tative,	teknis/mekanik d	lan kimia)									

Figure 4. Semester Learning Plan of Biology Department of UMA

University of Medan Area organized online class by providing internet quota for students. It is not that difficult at the UMA since UMA has set the e learning since 2018. But previously it was conducted as blended learning which combine presence and online class altogether in each semester. Despite UMA has its own platform in conducting online classes namely UMA E-learning which configured by module, other platforms utilization is allowed to help optimizing learning objectives achievement and preventing any possible difficulties in running online classes.

Furthermore UMA also has (Academic Online Campus) AOC platform since 2017 which enable the study plan and evaluation system to be conducted online. This system also ensures that student's marks and GPA are reported on-time otherwise the system will reject the reports instead. Thus the system inevitably enforces staff to work as required thus it will enhance their working performance.



Figure 5. Online Class at UMA



Not only for academic but also for administrative purposes UMA has set up several applications to minimize the use of paper in the campus since 2015. The assessment for academic administrative staff performance has been carried out by using online tools as well as for administrative document archive management, distribution and communication. In addition library catalogue management, staff presence recording and logistics management also carried out by online. Hence, conducting online style in this pandemic era is not a big challenge at the UMA as it has started for years. Besides all of the tools UMA also have a trading sites called jualbeli UMA which help to promote all of UMA academic community products marketing.



Figure 6. Jualbeli Website of UMA

# A. Research and Community Services

Another challenge emerges from research and community services which still need to be run eventhough the campus have to close during pandemic. Facing this unwanted condition, lecturers and researchers in UMA keep doing their best efforts in publishing articles. Along with this UMA conducts a number of webinars to enhance research proposal quality to win (Directorate of Research and Community Service of Indonesia) DRPM selection system for funded research. Moreover each department at the UMA carry out various webinars as a way to keep community services running. It is proven by the multiply of research total quantity in 2020 which were higher than the accumulation of previous three years. In particular research topics related to sustainability are significantly increase (149 proposals) than those in the three accumulated years (110 proposals from 2017-2019).





Figure 7. Webinar Events at UMA During COVID-19 Pandemic

_												
NO	TAHUN	SKIM	AKULTA	KETUA	ANGGOTA	JUDUL	DANA		LUARAN			
1	2019	DIYA PDUPT	7	Dra. Sartini, M.Sc	Ir. Ellen L. Panggabean, MP	Sensitivitas Cendawan Colletotrhicun capsici dan	Rp	17.000.000	Artikel, seminar			
						Fusarium oxysporum Asal Cabai (Capsicum annum L)						
						Terhadap Fungisida						
2	2019	DIYA PDUPT	8	Dr. Abdul Kadir, M.Si	Dr. Isnaini, SH, M.Hum	Model Kebijakan Penetapan NJOP PBB Sektor Pedesaan		10.000.000	Artikel			
					Nina Angelia, S.Si, M.Si	dan Perkotaan (PBB P2) di Kota Medan						
3	2019	Pro A	3	Hery Syahrial	-	Implementasi Pembelajaran Manajemen Strategi			Artikel			
						Melalui Entrepreneurial Self Efficacy Pada Perguruan						
						Tinggi Swasta di Kota Medan						
4	2019	DIYA PDUPT	2	Dr. Ir. Siti Mardiana, M.Si	Prof. Dr. Ir. Retna Astuti K, MS	Analisis Media Pertumbuhan dan Produksi Beberapa	Rp	14.250.000	Artikel			
						Varietas Jamur Tiram Pada Media Kombinasi Serbuk						
						Pelepah Kelapa Sawit dan Serbuk Gergaji Dalam						
						Meningkatkan Kadar Protein Jamur Tiram						
5	2019	82 Artikel	3	Yuni Syahputri, SE, M.Si	Mayhana Bilqis R, SE, M.Acc, Ak.,	Faktor-Faktor yang Mempengaruhi Terwujudnya	Rp	7.205.000	Artikel			
					CA Sari Nuzullina	Akujntabilitas Kinerja di Instansi Pemerintah (Studi						
					Rahmadhani, SE, M.Acc. AK	Empiris Pada Pemerintah Kabupaten Deli Serdang)						
6	2019	Mandiri	3	Dyah Sugandini	Priyo Susilo	Revisit Intention : Studi Pada Community Based Tourisn	Rp	18.000.000	Artikel			
					Wan Suryani	di Yogyakarta						
					M. Irhas Effendi							
					Muafi							
7	2019	Mandiri	1	Yunita Syahputri Rambe, ST, MT		Identifikasi Bangunan Sejarah Untuk Rencana		-				
						Peningkatan Kawasan Wisata Sejarah Pada Kecamatan						
						Medan Labuhan						
8	2019	82 Artikel	1	Andre Hasudungan Lubis, Sti, M.Sc	Wan Rizca Amelia, SE, M.Si	Analisis Penggunaan Aplikasi Instagram Sebagai Sarana	Rp	2.150.000	Artikel			
						Untuk Belanja Daring di Kalangan Remaja						
9	2019	82 Artikel	3	Sari Nuzullina Rahmadhani, SE,	-	Pengaruh Marjin Laba Bersih dan Pengembalian Atas	Rp	7.205.000	Artikel			
				M.Acc. AK.		Ekuitas Terhadap Harga Saham Perusahaan Industri						
						Barang Konsumsi						
10	2019	Mandiri	1	Syarifah Muthia Putri, ST, MT	Dr. Ir. Dina Maizana, MT	Manajemen Optimal Pada Sistem Listrik Smart Grid	Rp	16.821.000	Artikel			
11	2019	Mandiri	1	Dr. Dina Maizana, MT	Syarifah Muthia Putri, ST, MT	Analisa Efisiensi Energi Sistem Smart Grid	Rp	10.684.000	Artikel			
12	2019	82 Artikel	3	Eky Ermal M, SE, M.Si, MA. Fin.	Vina Arnita SE, M.Si	Pengaruh Pasar Tradisional Terhadap Perkembangan	Rp	10.000.000	Artikel			
						Pendapatan Daerah di Pulau Samosir						
13	2019	82 Artikel	4	Beby Suryani Fithri, SH, MH	•	Pendekatan Integral Penal Policy dan Non Penal Policy	Rp	5.000.000	Artikel			
	1	1	1	1	1	la cala de la construcción de la						

Figure 7. Research and Community Services of Lecturers of UMA

# **B.** Student Events and Activities

UMA students have a great passion in green activities such as waste processing into beneficial products, i.e. handbags, accessories and key chains. They are also involved in several conservation program such as tree planting as well as forest, birds and herpetofauna conservation. During the pandemic era the activities were conducted through online webinar.





Figure 8. Student Creativity Program at UMA, Accesories from Waste (Kolanci)

Activities related to sustainability are recorded and updated regularly in UMA sustainable website <u>www.greenmetric.uma.ac.id</u>.

# 1.9.4. Conclusion

UMA's participation in UI GreenMetric World University Rangkings for three years in a row definitely has given big impact toward the development of University of Medan Area. Environment sustainability as the main focus of Greenmetric becomes the parameter in the management of UMA. Some of policies at UMA that have been implemented this far regarding the six criteria of GreenMetric, particularly during COVID-19 Pandemic are in the field of teaching, learning, and working, research and community service, and also student events and activities. In the future, UMA is expected to be able to contribute more and to give positive impact toward various field that are relevant to the needs of this current time.

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# Chapter 1.10: On the Path Towards Adaptation to New Normal: A view of emergency efforts in maintaining quality education in time of COVID-19 outbreak

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The event of global disease outbreak due to COVID-19, while created significant challenges for higher education, it also has given us an important lesson. This article depicts the fundamental attitudes of Institut Teknologi Bandung's university governance during several early months of COVID-19 outbreak in Indonesia. The depiction is generalized from the day-to-day management within the university organization. We look into details of event during short time period of time of the so-called Work from Home and large-scale physical distancing regulation. Data is collected from formal correspondence among university sub-units, questionnaires, and expert interviews. The responses of the university in teaching and learning during the second half of the semester are explained in this paper, with shifting towards partial online offerings. We found that by strengthening the Information Technology, we are able to perform university business as usual, including increasing the capacity, functionality and availability of existing IT system, as well as the use of digital signature as the legal aspect of business activity.

#### 1.10.1. Introduction

The Coronavirus 2019 (COVID-2019) pandemic has had extensive impact on the global higher education sector. Various university in the world responses to this complex challenge. A recent study of 20 university response from around the world [1] explained that while a group of university did very little to respond and opted to meet their government's minimum standards, most university were already partially prepared for this endeavor given the University had some blended or fully only offering [1].

The pandemic outbreak in Indonesia started as Indonesia announced its first two positive cases on 2 March. Institut Teknologi Bandung (ITB) have taken measures to close the university in the mid of March 2020. The unit task force (Satuan Tugas, or Satgas) of ITB was formed to handle the COVID-19 impact to the university activities. Rector notes on the COVID-19 pandemic outbreak was published in 23<sup>rd</sup> of March [2], noting that the efforts of reduce the outbreaks are (1) minimizinhg movement in ITB, (2) maximizing the social distancing, and (3) ensuring the cleanliness of campus facilities. Those efforts are taken while not ignoring the outcome quality of education, research, and public services in ITB.

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We are writing this article, since we want to make a (rather) scientific archive to document our own effort. We may use it later as formal technical references. The purpose of this paper is to give more thorough explanation on the short presentation in UI GreenMetric Webinar series titled ITB's new normal adaptation [3]. In addition, it is to verify that ITB's existing developmental roadmap is valid, particularly the Quality Assurance (QA) system and its learning support. To verify that major effort is still needed to facilitate 'transformation', in particular to all staffs, in serving the novel inquiry of educational business processes in the era of new normal.

The scope of the paper includes the chronological events of handling COVID-19 impact, university leadership, learning infrastructure, and strengthening the Information Technology.

# 1.10.2. Approach and Source of Information

We apply descriptive approach to execute the presented article according to currently executed action research. In this way, a concluding explanatory and any possible gap of knowledge are being quested. In order to for such explanatory and knowledge we combine and synthesize facts from the available sources of information. This work relies on the following sources of information:

- 1. Official documents describing existing resources and capacity, in particular the established QA system, on-line learning tool, and administration of education.
- 2. ITB state of emergency described according to official correspondence on topics related to the COVID-19.
- 3. Campus-wide opinion in perceiving the level of preparedness in conducting and supporting online lectures.

In Figure 1 we show the schematic visualization of approach applied in preparing this paper.



Figure 2. Schematic visualization of approach applied in preparing this paper

From such sources of information, we wish to verify that ITB's existing developmental roadmap and management efforts are valid, particularly the QA system and learning support. Figure 2 displays the period of event covered in this paper.





Figure 2. Period of event (2020) considered in this paper

#### A. ITB existing QA document, learning tool, and education administration

At present, ITB relies on an internal document of internal QA system (*Sistem Penjaminan Mutu Internal* - SPMI) established since 2006. The QA unit maintains continuous updates of such a document, including those archived in 2015 and 2019. As of the 2019 version, there are 18 standards of internal QA system where three of them (#7, #8, and #9) are relevant to students' learning, respectively entitled Process, Assessment, and Practical. The statement enforcing provision of online materials, including learning materials delivered as accessible online video, has been mentioned in ITB standards number 7.

On the other hand, ITB has been since 2009 initiated an innovative facility for students learning called 'blended learning' program. The program relies on an open source learning platform facilitating various educational activities. Staff training (particularly for academic and IT personnel) is regularly conducted throughout the time. This program is also continuously developed until early this year. Throughout its development and utilization, ITB blended learning program undergoes numerous updates. This is particularly in form of migration of system and decentralization of organization. The popularity of the utilization of the system among staffs is apparently considered low. The latest level of utilization recorded is only 64%.

Organization-wise, ITB blended learning program makes both significant progress and recognition. Having started with a program under the Directorate of Education, the program spins off to the so-called Agency for Educational Research and Development Studies in 2010. It takes five years since its first launching until it turns into part of a government-funded distance learning program in 2014. A new organizational unit is formed a year later in 2015 named e-Learning unit to accommodate this. Another five years are taken until early 2020 when the new leadership is the organization. A stronger setting of the unit is founded turning e-Learning unit to the Directorate of Education Development. A new platform of online teaching and learning provided by the the Directorate, Edunex (www.edunex.itb.ac.id) has also been developed to accommodate the necessity of online teaching and learning.

It is also necessary to convey here that the education administration has also been transformed. There has been a plan to introduce secured digital document technology for ITB degree certificate. The plan is launched in early 2020. Later the execution is accelerated due to the COVID-19 outbreak.



#### B. The state of campus emergency

National state of emergency is officially announced in from the 29<sup>th</sup> of February, 2020. Much earlier than this on the 28<sup>th</sup> of January, 2020, ITB management has issued a formal notice to campus members regarding preventive actions against COVID-19 outbreak including suggestion for self-quarantine (see: Figure 2). The state of campus emergency begins since the 2<sup>nd</sup> of March, 2020 due to the release of campus-wide Protocol of Health Protection. In Figure 3 the cumulative formal campus-wide correspondence (total number of official letters) related to COVID-19 between the 28th of January and the 15th of May, 2020 is shown. The period of emergency response occurs between the 13th and the 27th of March, 2020. It is the period where extreme gradient of correspondence takes place.



Figure 3. Cumulative formal campus-wide correspondence (total number of official letters) related to COVID-19 between the 28th of January and the 15th of May, 2020.

A campus-wide outlook is carried out in time of emergency. The outlook is generated by means of students and staff's opinion particularly in responding to the existing teaching operation. The primary issues are to obtain insight on how students expect to have the lecture and how the lecturer serves the teaching from the students' perspective. At the time of the preparation of this paper, over 4500 students are participated in the survey. These samples (N) represent about 26% of ITB student body of about 17,000 at all levels, i.e. undergraduates and graduates.

In Figure 4 the four primary indications from the questionnaire is exhibited. It is seen from Figure 4 that the most typical mode of lecture is online meeting. This could be interpreted that the lecturers tend to convert the existing offline classes into online platform. On the other hand, students prefer to have recorded and/or re-playable course materials. In addition to that, students' access to the internet is apparently limited. In the case of learning facility, most of lecturers prefer to use third party platform, instead of ITB owned online course infrastructure.



#### 1.10.3. Insight and Perspectives

We have seen that the existing resources and capacity are sufficient. This includes QA system, on-line learning tool, and administration of education. However, low utilization is observed. As the system has already been established for more than 10 years the utilization by ITB staffs is only 64% by early 2020 prior to COVID-19 emergency period. A much lower figure is observed from students' view where only 44% of lectures are conducted with support of ITB online learning facility.

Apparently, the culture or habit of running a course as business as usual, i.e. direct meeting, continues to preserve during the event of emergency. It could be said that the lecturers tend to convert the existing offline classes into online platform. Although access to internet remains problem by a large number of students, almost all of courses are conducted as online meeting. With the students' preferences in expecting to have re-playable course material and recorded presentation, the presence of repository of course segments becoming an obligatory and inevitable facilities to provide. This pushes ITB and any organization to move their normal activities to be online-based activities. The rector notes on new normal adaptation – culture transformation is aimed to minimize new cluster of COVID-19 outbreak [4]. The research and public services that may have potential to increase the outbreak must be carried long distance; otherwise, it may be carried on campus with restricted requirements. The learning and teaching of the students are also needed to be carried online by utilizing the learning management system.



#### **1.10.4.** Concluding Remark: Strengthening Information Technology

The followings insights are drawn particularly in responding to the push of evolving ITbased activities with university business.

**Change of Capacity of existing IT system**: In the beginning, some of the capacity need is decreased. Many people going online, but most of them work from home or outside the campus, so network traffic is decreased. But, soon after the people activity starting on campus, network demand will be increased and probably will higher than the normal condition before COVID-19. Another sample is the increasing demand for IT storage to store course materials.

**Change of Functionality of IT system:** In the COVID-19 condition, "new" ideas or "old but not urgent ideas" become a high priority to implement. Applying video analytic to analyze the distance between people becomes an important new IT capability.

**Change of Availability of IT system**. Everybody needs IT to keep survived in doing many daily activities. So, IT must be always available, 7 days a week, 24 hours a day without any interuption. The reliability and availability of the IT system must be very high. If possible, everybody needs 100% system availability.

**Digital Signature:** In many cases, organization activities need legal aspect as integral part of the activity. Applying traditional signature in a document is not practical in COVID-19 condition, so organization must apply Digital Signature system.

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**Part II:** 

# Sustainable University and Food Sufficiency during COVID-19 Pandemic







# Chapter 2.1: From Crisis to Opportunity: Linking the Need for Local Food Sufficiency with University Social Responsibility to Build a Resilient Society

Chang-Hsien Tai<sup>32</sup>, Herlin Chien<sup>33</sup>, Shang-Hua Chou<sup>34</sup>

In the face of the coronavirus pandemic, much work needs to be done to reevaluate the trajectories of development that the world has been following, arguably, since the end of the Second World War. Perhaps a path that leads to opportunity can be found within this crisis; but for that to occur, serious discussion must first take place. Two issues, which may have been neglected for too long, are at the center of this present discussion; namely, "Local Food Sufficiency" and "Environmental Security". For many years, academics have been pointing out the risks that are inherent in the globalized mechanisms of food production and distribution. Concerns have also been voiced about the impact that our present models of growth are having in the environment. The COVID-19 crisis has reminded us of the need to address these questions. This paper argues that related approaches adopted and promoted by National Pingtung University of Science and Technology (NPUST) have the potential to address these questions, at least in part. However, it also argues that in order to bring the necessary changes about, a concerted effort must be made; an effort that institutions of higher education, based on practices of University Social Responsibility, should all be involved in. By taking measures to implement such practices, institutions will help contribute to the resilience of local communities in the face of crises while simultaneously contributing sustainable economic activity and Environmental Security.

## 2.1.1. Introduction

To help encourage the public to maintain positive spirits in the worst of times, several American political leaders, including John F. Kennedy in 1959, and Al Gore and Condoleezza Rice more recently [1], have made use of the Chinese characters for "crisis" to inspire the notion that every crisis has an inherent silver-lining. Their noble intentions, however, were based on the mistaken understanding [2] that the two individual characters that the word for crisis is composed of should be understood individually as "danger" and "opportunity" (wei-ji/危機). Nevertheless, in the face of the coronavirus pandemic, this type of "danger-opportunity" gloss

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might again be what we all need to redirect our resources and transform our institutions in preparation for a post-coronavirus era—an era in which we strive to be more resilient in the face of future crises, whether they be man-made or natural.

One of the main issues that needs to be tackled with urgency during the COVID-19 pandemic is that of local food sufficiency. Although worldwide food systems are still functioning [3] to the point that we are not witnessing headlines of major collapse or massive food shortage, the World Food Programme (WFP) nevertheless estimates that there will be a doubling in the number of people facing acute food insecurity in 2020, compared to the year prior [4]. We are also seeing shortages of migrant harvesters in some developed countries, such as the UK [5], in consequence of the restrictions that have been placed on international travel. Such circumstances prompt us to re-evaluate existing food security measures and reflect upon the inherent risks associated with heavy reliance on foods imported via global supply chains. Meanwhile, this call to re-reevaluate local food sufficiency echoes the increased attention the issue received in the wake of the 2007/08 international food crisis, where many countries suffered from volatilities in the world food markets [6]. Both crises emphasize the need to avoid the straightforward, binary decision to choose between the two extremes of either relying solely on locally grown foods or completely globalizing production chains.

Further, the environmental benefits observed in association with involuntary reductions in exported and imported goods during the pandemic, such as reported improvements in air quality and temporary drops in CO2 emissions [7], underscore certain considerations which have been forwarded with respect to the redesigning of future food security policies; in essence, an answer to mounting pressures to address issues of climate change and sustainable development. This is what Hertel and Baldos referred to as the "twin goals" of food and environmental security [8]; goals which ought to be pursued in the coming decades as major sustainability challenges burgeon in consequence of increasingly integrated crop commodity markets as well as increased levels of fossil fuel and GHG emissions related to the transport and distribution of food – from field to fork.

Starting by highlighting the advantageous position National Pingtung University of Science and Technology (NPUST) during the pandemic on account of its local food production activities, this paper argues that opportunity can be found in every crisis. As a member of UI GreenMetric World Universities, NPUST is committed to the idea that institutes of higher education around the world should adopted university social responsibility (USR) practices to equip society with the tools necessary to deal with unexpected crises-and tools which can be used to build resilience within local communities. In terms of ensuring food security and taking preemptive measures to avoid future crises, a form of hedging could be created by developing certain levels of local food sufficiency while still allowing international food trade to take place on a parallel track. In this respect, sustainable universities have the potential to make a contributions. NPUST recognizes that there is indeed an opportunity to expand its social impact beyond its environmentally friendly campus by using its expertise to help transform local communities and increase resilience towards crisis while simultaneously pursuing environmental objectives. The section below outlines the contributions NPUST has made and opportunities it sees with respect to the linking of local food sufficiency and university social responsibilityproviding details on how, based on sustainable development goals (SDGs), the university has committed itself to four visions which guide its research and development activities in ways that



contribute to the building of resilient societies. These visions, namely 1) smart agriculture, 2) ecological industry, 3) platinum society, 4) blue economy each play a role in the university's work to reconcile the twin goals of food security and environmental security.

# **2.1.2.** The Need for Food Sufficiency in Times of Crisis: From National to Local Levels A. Extant Literature on Food Self-Sufficiency vs. Local Food Sufficiency

In the extant literature, food self-sufficiency (FSS) has been broadly discussed at the national level, with recommendations being made for scenarios of domestic production and consumption. In a case study on Russia by Wegren and Elvestad [9], the authors differentiated between self-sufficiency and food security while arguing that, as a result of Russia's increased self-sufficiency in food and seafood production, it will now be quite difficult for western food exporters to recapture market share in the country -thus highlighting the functional role that economic pressure plays in this question. Other researchers [10] followed similar lines of argument as they identified potential hotspots for future crop production deficits, while detailing the problematic nature of food import reliance, and the vulnerability of such regions as Africa and the Middle East with respect to food supply shock. However, few studies were conducted under the assumption that there is now an imminent threat. Yet with both global and domestic disruptions in food production and distribution occurring during times of unusual crises such as the current COVID-19 lockdown scenario, local food sufficiency (at a local scale rather than national scale), can offer supplementary benefits, by filling in supply gaps and minimizing threats of food insecurity. In the case of Wuhan, where the first COVID-19 cases were detected, experts of the USAID Bureau for Resilience and Food Security (RFS) commented that the reason food security could be maintained was primarily a result of emergency food donations distributed from Shouguan in Shandong Province [11]. Building on this, experts further advocated for diverse and decentralized food supply systems which are linked through secondary cities to ensure food security in locked down area. With respect to the recommendations made to develop a diverse food supply landscapes, this paper argues that such landscapes should include local food sufficiency systems that can be built into each local community during times of non-crisis, so that an additional buffer will be in place ahead of time.

#### B. Benefits of NPUST's On-Campus Food Production during Lockdown

Due to tight border controls and comprehensive tracing, Taiwan was able to keep its cases extremely low (total of 441 confirmed cases by May 27, 2020 [12]) and avoid island-wide and even citywide lockdowns. Had such lockdowns occurred, however, NPUST would have been in an advantageous position on its green and sustainable campus, with staff, students and neighbors still able to benefit from the foods cultivated by this institution of higher education. Although university food production can only meet a limited part of overall campus or local food demand, it nevertheless provides a case demonstration of how local food production practices, which are conducted for more reasons than simply bringing food to the market, can supplement the international food trade system, for starters, and eventually lead scenarios where greater numbers of localities are food self-sufficient (or at least heading in that direction). At times of crisis such as the present one, having such supplemental sources of foods may be all that is necessary to fill the gap and reduce anxieties about food shortages on local levels; after all, as we are now witnessing, disruption in supply chains does not equate to total shut-down.



In terms of NPUST's contributions to local food provisions, during the pandemic, the Department of Plant Industry's Sustainable Farm and Greenhouse served as an essential source of vegetables, with advertisements going out via email to announce the availability of affordable priced vegetables (approximately US\$ 1 per bag) to its community of 13,000 students and staff members. The Department of Animal Science is also making contributions through sales of eggs, milk and chicken –all of which are produced on campus. Meanwhile, the university is also involved in a variety of food processing activities, and although some of the ingredients are imported, many of them are produced locally. These activities are on-going and serve as continous sources of revenue for the university, with average monthly sales standing at around US\$23,000. Some of the top individual sales items include Job's tear milk (US\$2,000/month), milk pudding (US\$1,700/month), vegetable yoghurt (US\$1,300/month), caramel pudding (US\$1,000/month) and fresh NPUST egg (US\$700/month).

Though it is true that some of the abovementioned food production would be commercially viable in a competitive market and therefore could be regarded as "regular economic activity", much of it is not. That is to say, much of the food production carried out at NPUST is carried out with research and education based considerations in mind –and if it weren't for these considerations, much of the food production and processing would not take place. In essence, the "alternative purpose" which has been given to food production activities is adding new value to the performance of the activity; and this new value is allowing for the off-setting of much of the cost. It should be recognized that, coming from a purely economic point of view, these factors are going to play a very important role in the creation of food sufficiency in cases where the food production would not have stand-alone viability.

Food Sufficiency will not be accomplished if local resources are not invested into local food production. If, however, it appears to be economically un-expedient to invest resources into local food production rather than other activities, the former is unlikely to occur. Trade, on wider and wider scales, allows, and even encourages, these kinds of economic decisions to be made. And of course, there are many who argue that these kinds of decision allow for greater levels of economic efficiency and increased prosperity. Nevertheless, the complicated systems and relationships that are necessary for wide-scale trade also come with inherent risks –risks which have been detailed ad nauseam. Meanwhile, with the current COVID-19 crisis, some of those risks are starting to feel too close for comfort for many; which is why this crisis should be taken as rallying call to re-examine the issues and explore different approaches towards mitigating future risks by implementing strategies that can increase the potential for the adoption of Food Sufficiency practices.

Some of these practices have been the object of focus at NPUST for half a decade now. Beginning in 2015, NPUST has been taking an increasing number of steps to develop strategies designed to directly address numerous challenges related to this very topic, while giving direct consideration to the Strategic Development Goals forwarded by the United Nations. Although NPUST is primarily an institution of higher learning, it has, and continues to make both direct and indirect contributions to local food production. By improving techniques in ways that allow food production to become more efficient and more accessible, NPUST is working to create the type of conditions necessary for Local Food Sufficiency to be accomplished in a greater number of localities.


#### C. Linking the Need Local Food Sufficiency with University Social Responsibility

Recognizing both the value and risks associated with the highly globalized food trading systems of today, one can't help but feel a little bit divided on the issue. Nevertheless, when crises hit, attitudes change very quickly -and there are, it would appear, more than a few potential crises queuing up right now, just waiting for their turn to "give it a go". And so, even for those who would argue for the globalized model, the value of a decent insurance policy should be appreciated. The questions that arises, however, is the same questions that everyone struggles with when taking a policy out: "how much coverage do I need? How much can I afford?". They are reasonable questions; after all, evaluating risk is reasonably difficult. For now, however, at the very least, it should be recognized that some is better than none. The experience of the present COVID-19 crisis has taught us that much, it would seem. And it has also reminded us that crises can actually come, and they will not always remain in the "world of theory", where we would prefer them to stay. Which is why we would argue that this present crisis should be taken not only as a reminder to apply effort towards answering questions related to Local Food Sufficiency, but also as an opportunity to promote Environmental Security. And as it turns out, these two goals have a lot in common. One of those commonalities, is that they are rather big. A second one is that they are rather important. Being as big as they are, it can be appreciated that they will require large amounts of resources - however, we would argue that their importance justifies it, and so we would also argue that institutions of higher education should step up to the plate and use their relevant knowledge and capacities for technological innovation to take these issues on. It is in essence a call for the application of University Social Responsibility. And as the section above highlighted, to some degree, when done correctly, the costs associated with the desired activities can be offset by the new value that is created through the processes of giving alternative or additional purposes to the activities in question. Which is why, even though "University Social Responsibility" might sound like a burden to some, it actually can be quite a pleasant endeavor. To re-enforce this notion and encourage its wider adoption, the following paragraphs highlight some of the approaches that NPUST has been using to work towards the goals mentioned above while also giving special consideration to a number of the Sustainable Development Goals championed by the UN.

With local food sufficiency and environmental security considerations at the core, four years ago NPUST laid out four visions for development; namely, 1) smart agriculture, 2) ecological industry, 3) platinum society, and 4) blue economy (see Figure 1)— and, as the information below will highlight, they are already having real-world impacts on neighboring local communities with respect to the challenges and objectives being addressed in the present discussion. Those involved also see potential for much more wide-spread contributions to be made through the future expansion of these types of USR programs.

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Figure 1. Four Visions of NPUST

First, with respect to the vision of "Smart Agriculture" (Figure 1, top left), it should be said that this was quite a natural trajectory for NPUST to pursue. Founded in 1924 as a higher education institution focused on tropical agriculture (original name: Kaohsiung District Pingtung Extension School of Agriculture), NPUST has spent nearly a century conducting research on topics related to agriculture. In more recent years, however, with the recourses of many colleges and departments to draw on, the university began integrating the expertise of multiple disciplines to allow agriculture to develop with compound levels of sophistication- and the knowledge and technology that has been gained is being used to train people in the industry and provide smarter solutions for food production, processing and distribution. Some of the notable contributions that have come about thanks to the resources invested into the "Smart Agriculture" vision include the System of Rice Intensification (SRI) rice cultivation method, which is able to save huge amounts of water and reduce reliance on and heavy usage of chemical fertilizers. Work is also being carried out to develop automated "E-Cars", designed with farming capabilities that would all for minimal human involvement. Additionally, smart fish farming technologies are being developed that combines big data with water quality monitoring sensors and automated feeding systems. These are but a few examples of the work being done on this front – and with the new opening the NPUST Center for Smart Agriculture (May 28, 2020), there will be even greater opportunity for development in this innovative field in the years ahead. Not only are these integrated technologies helping to promote Local Food Sufficiency by increasing efficiency and reducing need for human capital, but they are also making tangible contributions to several Sustainable Development Goals, including SDG 1 on no poverty, SDG 2 on no hunger and SDG 12 on responsible consumption and production.

Second, the vision of "Ecological Industry" has been directing attention to the two main questions of how to better protect our national resources and how to mitigate against disaster



(Figure 1, top right). The activities that have come about as a result of the focus that has been given to these issues have also contributed to SDG 6 on clean water, SDG 7 on clean energy, SDG 9 on industrial innovation and SDG 13 on climate change. For instance, the farmland Soil and Water Conservation (SWC) method developed by the university's Soil and Water Conservation Technique Education Center is helping local communities to increase the utility of limited land while also minimizing human impact on the environment. Additionally, the developments made in this area, including slope technology integration systems, can assist in the creation of tourism farms. As in the case with the foods that are produced by the university, creating alternative value-adding purposes for food production processes helps offset some of the costs and allows for local food production to be carried out according to a separate set of economic considerations. This, naturally, also means additional sources of local food in times of crisis. The revenue and expectations of tourists also mean that environmentally sustainable agriculture practices can, and have been, be adopted by the farm operators.

Another important question to consider with respect to food sufficiency, of course, is related to the food production work force. Recognizably, in today's society, there are several key factors which are having a concerted influence in this area, including occupational choice, migration patterns and the aging of society. Currently, many developed countries are experiencing aging trends - and this reality is well appreciated by NPUST, whose neighboring cities and counties are among fastest aging places in the country [13]. When looking at food production, it could be pointed out that many of those who are involved in crop cultivation are representative of older segments of society. The children of these farmers, for the most part, are choosing to go to the cities to pursue different lines of work. There is no single solution to this trend; however, one way in which to help ease related pressures is to do our best to ensure that our experienced members of society are in the best of health and physical fitness. This brings us to NPUST's third vision of "Platinum Society" (Figure 1, bottom left). It should be noted that this vision was not designed specifically for those working in agriculture, but has application for all of those entering into the latter years of their lives and careers. "Platinum Society" is a vision that aims to craft healthier lives for the elderly and provide them with stronger social support systems. These objectives are being pursued through the creation of innovative kinetic technologies, smarter exercising routines, and healthier, more functional food and supplementary products which can boost immune systems and contribute to longevity. The ultimate aim is to keep our seniors healthy, physically fit, and comfortable so that they can continue doing the things that give them meaning for as longs as possible. Together, these efforts are also contributing to several SDGs, including SDG 3 to promote health, SDG 5 on gender inequality, SDG 10 to bridge the rural-urban gap, and SDG 16 to promote a peaceful and harmonious society with intergenerational social justice-they also have potential to be expanded on and applied throughout NPUST's various USR programs.

The final vision of "Blue Economy" (Figure 1, bottom right) is one that is also very much related to the questions at hand. This vision works for the simultaneous promotion of conservation and development through the creation and application of sustainable practices. Based on the central philosophy of this vision, the university has been conducting a variety of innovative projects with surrounding rural communities. Among these, the Under-Forest Economy Project, which works to develop sustainable economic activities such as mushroom cultivation and chicken raising in forested areas, was recently named winner of the *Global Views* 



*Monthly's* first ever USR Awards (2020) [14]. With the introduction of eco-tourism, the Satoyama International Initiative [15], and other USR projects, university's ten neighboring aboriginal communities have also been able to enjoy the benefits of new and sustainable economic activities which have been helping residents to rebuild their hometowns and their ways of life in the wake of the damage caused by a major typhoon disaster. "Blue Economy" activities often look for ways to transform economic models in such ways that can encourage environmental or ecological security through the promotion of new forms of economic activities; for instance, transitioning aboriginal communities away from eagle hunting by introducing eagle watching tours. By adopting the various principles inherent in the "Blue Economy" vision, such as circular economies and local production, NPUST and its valued local partners are working for the co-creation of sustainable cities (SDG 11) through the development of economic activities, which can be accomplished only through the development of long-term local partnerships, are helping to create a situation of greater resilience for local communities in times of crisis by increasing levels of food self-sufficiency and environmental security.

## 2.1.3. Summary and Concluding Remarks

In conclusion, this paper begins with the argument that within situations of crisis, opportunities can be found. Specifically, we argue that the COVID-19 pandemic, as unfortunate as it is/was, should be taken as an opportunity to pursue economic and production models which are more conducive to Local Food Sufficiency and Environmental Security. In the midst of the pandemic, the advantageous position NPUST's found itself in as a result of its on-campus food production highlights the benefits of having some level of Local Food Sufficiency. These practices, however, are not new to NPUST. For many years, the university has been pursuing the development and application of activities which fall under the umbrella of University Social Responsibility, including the promotion of local food production. Based on its experiences, and with considerations given to the present crisis, this paper argues that institutions of higher education have a bigger role to play when it comes to the development of models and practices that can help local communities become more resilient when disruptions in global food distribution mechanisms occur. It also argues that this can and should be done with environmental objectives worked into the equation. Through the application of its four university visions, NPUST is working to create new models of development for the local agriculture sector in order to protect natural resources, promote healthier and happier lives for the elderly, and innovate rural communities. By combining the forces of the four visions highlighted in this paper, NPUST as a higher education instruction rich in knowledge on sustainability and innovative technology, looks forward to expanding its social impact beyond the campus. Based on its outlook, with the hosting of first International Sustainable Development Conference (ISDC 2020) in November 2020, NPUST hopes to create the opportunity to engage various stakeholders in the co-creation and reinvention of society in such a way that it will be more resilient in the face of crises and more well-positioned to recover more quickly and more fully if and when a disaster like this one occurs again.



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# Chapter 2.2: ITS Eco Urban Farming: Endeavor to Provide Self-Secured Healthy Food Demand for ITS Campus Society

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Urban Farming or organic plants farming in ITS has big role as non-profit business activity and center of social engineering activities under guidance of ITS Smart Eco Campus Program. The aim of this project was converting idle space in campus into productive land and beneficial for academic staffs and and encircling campus. Type of organic vegetables harvesting from ITS Urban Farming are most likely present as water spinach, spinach, mustard greens, pokcay, peas, figs, cosmos leaves, gedi leaves, pumpkin, eggplant, chili, butterfly pea flower, and that includes some fruity plant like ripe mangos, bananas, and soursoups. ITS Urban Farming has been providing daily needs of healthy vegetables for campus surroundings, moreover it also openly used as research site for university researchers. This practice provided as source of inspiration for taking care of the nature and encouragement to the young generation to put some efforts on entrepreneurship in agricultural business development, and as on-site learning place for organic farming. During COVID19 pandemic where there are many limitations on daily activity, ITS Urban Farming is still able to provide daily healthy raw foods since the vegetables have high nutrition and vitamin, and it also prevent any artificial chemical additives for the period of planting season. The healthy vegetables supply from UF literally help provide food secureness in ITS campus area.

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# 2.2.1. Introduction

Institut Teknologi Sepuluh November (ITS) is located at the city of Surabaya, East Java, Indonesia and the institution will be celebrating its 60<sup>th</sup> anniversary this year. ITS comprises four different locations in which the largest campus area is placed at Sukolilo consisting around 187 ha in the east side of Surabaya. The area is situated near coastal area and once was found as wetland zone. Since 2011, ITS generated ITS Smart Eco Campus Program to accomplish sustainability by taking advantage of science and technology in order to abide by nature in harmony.

The Smart Eco Campus Program involves of environmental-sustainable water management, environmentally harmless waste management, environmental-friendly transportation and energy management, and sufficient green campus area. The open green space in ITS has expanded for more than 40 percents of total campus area and it has been preserved in high caution to maintain the natural biodiversity of plants and animals covering Sukolilo district. It consists campus forest plan area, some parks and untapped open spaces according to ITS masterplan.

In 2013, the advancement of ITS Eco Urban Farming was started by using 300  $\text{m}^2$  of undernourishment land in campus area. Since then, ITS Eco Urban Farming has became one of the non-profit business activity in ITS campus and center of social engineering activities under guidance of Smart Eco Campus Program.

# 2.2.2. ITS Eco Urban Farming

# A. The Advancement of Urban Farming

At present, food security in Indonesia is still considered as high priority problem. One of the cause of this hindrance was the low production of food raw materials and it considered as distantly under national demand. The increase in population was not compensated with the availability of food supply. The shortness of farming land and less of farm-working human resources had turned into ironical as Indonesia was once known as vast agrarian country [1].

Many modern countries such as Japan, US, Taiwan, and South Korean started to develop science and technology to acquire smart farming, including Urban Farming (UF). UF is one kind of activity to benefit unexploited land with restricted space such as farming, fishing, animal husbandry and forestry with the purpose of offering the needs of food, aesthetic and healthy life for urban citizen.

Vision of future city has been placed urban farming as integrated part of 'sustainable city' [2]. By acknowledgement, the people of Surabaya have organised the urban farming activities as well. Some researchers at Semampir district were done to display the role of urban farming. Although the result indicated that the activity could not resolve big city main predicament directly just yet, however it was able to minimize some symptoms such as poverty, malnutrition, lack of food and the need of open green space [3].

The establishment of ITS Eco Urban Farming in 2013 was funded by New Zealand government through submitting grant proposal in result of the idea of the necessities for land farming in the middle of the city, resembling Surabaya which retains population of 3 million people approximately. The purpose of this founding was converting idle space in campus into productive land and beneficial for academic staffs and and encircling campus. The landfilled UF



area would be able to be used as foundation for building and infrastructures in future. By implementing the plan, ITS will be able to reduce the cost of filling the land so as to comply with ITS masterplan. The UF location and its condition can be described in Figure 1.



Figure 1. Urban Farming Location

The aim of Urban Farming practice was providing a constant healthy food supply, particularly organic vegetables in ITS campus area, as campus income generator, as source of inspiration for entrepreneurship in agricultural business development, and also as on-site learning place for organic farming, which is widely open for ITS students, general public and designated farmers who want to start sustainable farming. ITS UF is capable of being as pilot project for organic farming practice in urban area. It consists some methods as green house, semi green house, and open field. As addition, it has more specific target related to ITS Tridharma commitments which are developing research in organic farming technology and create mutual research cooperation in field of organic farming and biotechnology wherein students, lecturers, researchers from ITS and outside ITS can use with such ease.

## B. The Improvement of ITS Urban Farming

ITS Smart Eco Campus Urban Farming is using organic farming system and is driven by environmental care awareness and people healthy lifestyle. In Indonesian National Standard (SNI) 6729:2013 definition, organic farming is holistic production management system to improve and develop agriculture ecosystem healthiness, biodiversity, biological cycle and soil bioactivity. The implementation of practical management which focus on input usage of waste from land cultivation, with consideration to adaptation capability of local environment [1]. The organic farming provides vegetables safe from agrochemical pollution from fertilizer and pesticide, avoids the usage of genetically modified seeds, and emphasize on addition of organic compost, plant nourishment, natural enricher and legum plant rotation.





Figure 2. Land Development and UF main plan

In 2013, the former unused wetland area was prepared in 300 m<sup>2</sup> field and the first green house was built using knocked down system. This building can be moved simply, hence when the field will be prearranged onto other buildings in regard of ITS masterplan, the green house can be transported to other place without difficulties. Seven greenhouse buildings and three open space farms were made in 2014. Later on, an underground tank to preserve rainwater for watering the plant was granted by a company from Japan. In 2015, hydroponic planting was constructed for student of Department of Biology for research on plant growth and Department of Physics Engineering for research on water sprinkle automation. Subsequently, the research elaborated UF into aquaponic system until the year of 2017. Next, the cost for operational and maintenance was re-evaluated and unfortunately it took massive amount of expenditures cost. Therefore, hydroponic system was dismissed in 2018 and transformed completely into organic farming on upper ground soil. Some pictures of UF preparation since 2013 can be noticed from Figure 2 above.

# 2.2.3. Benefit and Role of ITS Urban Farming

ITS Urban farming, nowadays, has become prominent supplier of organic vegetables in daily needs of ITS campus living. Type of organic vegetables harvesting from ITS Urban Farming are most likely present as water spinach, spinach, mustard greens, pokcay, peas, figs, cosmos leaves, gedi leaves, pumpkin, eggplant, chili, butterfly pea flower, and that includes some fruity plant like ripe mangos, bananas, and soursoups. Some of them are shown in Figure 3. Three times a week, on Monday, Wednesday, and Friday, the vegetables were harvested regularly. The market was opened using social media WhatsApp group by short announcement at 10am and every purchaser started making orders. The idea is first order, first served. Most likely, all products were sold 30 minutes before the market was opened. The number of vegetable packs harvested every month may reach 450 packs, as it shown in Figure 4.





Figure 3. Some vegetables harvested from ITS Urban Farming



Figure 4. Harvesting value of ITS Urban Farming

Financially speaking, the gross income of ITS UF is still low since the size of supporting field has not been upgraded to balance margin. The operational cost is still under attention of Smart Eco Campus Unit. However, other useful application emerged significantly. The UF has become one of education and research laboratory for some departments in ITS, especially Department of Biology. Many students, guests and publics have been coming to the farm and learned about urban farming in the middle of Surabaya city, as it shown in Figure 5. These accomplishments have inspired people to maintain and preserve the environment in their daily living and encourage the young generation to put some efforts on entrepreneurship in agricultural business development, and as on-site learning place for organic farming.



Figure 5. Visiting ITS Urban Farming

#### 2.2.4. Urban Farming during Pandemic

The vast spreading of corona virus disease 2019 (COVID-19), turning into pandemic, has forced the Indonesian government to announce national non-natural disaster status on 14<sup>th</sup> of March 2020. The decision made by ITS complied with hard result of university closure since 15<sup>th</sup>



of March 2020. ITS COVID19 Technical Preparedness Team was formed in haste and foresee any activities to anticipate the virus spreading [4]. In further, ITS fabricated the concept of donation-production-contribution to produce hand sanitizer and personal protective equipment providing the medical workers necessitates and many other innovative medical products.

The government appealed to do Work-From-Home (WFH), physical distancing, lesser activity in public, and implementation of area quarantine had made critical change on almost every aspect in people's life, including the modification of food supply chain pattern. Food supply is one of the utmost important part of the chain that cannot be delayed and need to be taken care of high priority.

Food security, according to the law of food no 18/2012, is accomplishing food secureness or nation to individuals, which can be considered on adequate food availability in numbers and quality, safe, vary, healthy, equally, and accessible also act in accordance with religious, faith, and local culture, so that the citizen can live in good health, actively, and sustainably productive. Food security depends on three things which are availability, accessibility (physically and economically), and stability in all times and all places [5].

During pandemic, some of the cleaning workers are doing their activities in campus, and campus UF workers as well. They can maintain physical distancing while doing their work and oblige to obey health protocol such as wearing maskers and keep clean. The conservation of vegetal farming can be done thoroughly thus the UF will be kept supported and harvesting can be organized. This news was well accepted by the loyal purchasers of UF organic plants who live nearby or surrounding the campus, as the cause of boundary from buying groceries at local market or supermarket.

The availability of healthy organic vegetables with accessible price for the duration of pandemic was welcomed by the consumers enthusiastically, proven by its very short selling time [6]. Every harvesting time, 50 until 80 packages of high nutrition and vitamins vegetables were sold. The existence of UF has shown great contribution for food secureness in small scale area to provide ITS campus people needs.

# 2.2.5. Conclusion

City farming system in specified area, known as urban farming, has been developed for about 7 years in ITS Surabaya in which retain as low ground zone nearby coastal region. Urban Farming concept was done by organic planting system to produce healthy vegetables for ITS area consumptive demand. Furthermore, this farming plan has been proved as useful research field and unique means of civil education method.

During present pandemic era, ITS UF is still able to provide daily healthy raw foods since the vegetables have high nutrition and vitamin, and it also prevent any artificial chemical additives for the period of planting season. The healthy vegetables supply from UF literally help provide food secureness in ITS campus area.

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# Chapter 2.3: Food security strategies of UNNES as a sustainable campus in COVID-19 Pandemic Period: Functional foods and land use optimization

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Universitas Negeri Semarang (UNNES) is a sustainable campus that consistently implements conservation insights consisting of values and characters, arts and culture, as well as natural resources and the environment conservation. The COVID-19 epidemic has been declared in Indonesia since March 2020 until now. It has also been becoming a global pandemic because of its spread widely all over the world. Initially, this pandemic had an impact on health, economic and food aspects, and then extended to aspects of education, religion, and government. The community faces the problem of food security which is one of the basic human needs. Almost all community groups face food problems, including the campus community. As a sustainable campus, UNNES has pioneered programs and activities directly related to the food aspect, through the pioneering of center of excellence (CoE) as well as land use on- and off-campus. Various efforts – such as maintaining and guaranteeing food availability and accessibility, as well as food price stability, starting from conducting relevant research, producing to guaranteeing food to consumers – should be contributed to anticipate the unpredictable impact of COVID-19. The functional food CoE and UNNES-Ecofarm have been tried to optimize functional food and land

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use on campus as well as community land around the campus. The continued involvement of the campus in handling food aspects is expected to be a sustainable solution for food security, specifically to meet the needs of the campus community and the community around the campus.

# 2.3.1. Introduction

UNNES carries out various services for higher education institutions and collaborations to realize the vision of Conservation and Reputation with International Insights. The conservation insights include three pillars, namely values and character, art and culture, and natural resources and the environment. The three pillars of conservation insights are considered essential because they are meaningful (1) protect, preserve, and sustainably utilize natural resources and the environment through education, research and community service activities, (2) support government efforts in the management of natural and non-biological natural resources and their ecosystems, and (3) foster mental attitudes, responsible behavior, and awareness of the UNNES community to participate in efforts to conserve superior values and characters, superior arts and culture, as well as biological and non-biological natural resources and the environment in Indonesia [1].

The spread of the COVID-19 epidemic globalized in almost all countries so that it became a pandemic [2] which had an impact on all aspects of human life, starting from health, economy, and food, extending to aspects of education, religion, and government. One of the protocols to prevent the spread of COVID-19 is to limit human mobility because the nature of this virus is easily transmitted through droplets [3] and the latest information says COVID-19 can be transmitted through the air [4]. Sustainable campuses need to come up with solutions and take concrete action to deal with the COVID-19 pandemic and anticipate their impact in the future.

One crucial aspect that needs to be addressed immediately is the aspect of food, namely maintaining and guaranteeing the availability and accessibility of food, as well as the stability of food prices [5]. UNNES has carried out various food security efforts, ranging from research activities, producing to guaranteeing food to consumers. UNNES has a Center of Excellence of Functional Food [6] and UNNES-Ecofarm, which is directed to optimize functional food and land use on campus and community land around the campus. The types of food produced are prioritized for foods that improve the quality of human health and body immunity. Optimization of programs and activities handling food aspects on a sustainable campus is expected to be a sustainable solution for food security, especially to meet the internal needs of the campus and the community around the campus.

# 2.3.2. Functional Food Breakthrough

Through the Institute for Research and Community Services, UNNES consistently makes ongoing efforts to encourage and facilitate groups of lecturers and researchers who conduct superior research following the focus, theme, and topic of national priority research. One of these efforts was realized by forming three Center of Excellence (CoE) UNNES in early 2020, namely the center of Child-Friendly Education, Center of Hybrid Energy, and Center of Functional Food, respectively [7]. Each CoE piloting involves a variety of relevant disciplines. The existence of the pioneering CoE is expected to be able to produce superior products based on technology which can be developed according to the needs of existing communities. During the COVID-19 pandemic, the orientation of each CoE piloting program was emphasized in handling and



preventing the spread of COVID-19. In general, all three of CoE is expected to be able to be a reference for relevant scientific research and learning activities. In advance, the CoE is also expected to encourage and become pioneers in the discovery of new theories/technologies, technologies, and innovations whose benefits can be directly enjoyed by the community, government, and industry.

During the COVID-19 pandemic, the Center of Functional Food pioneering programs and activities were directed to contribute through research and production of functional foods that have proven beneficial for health while having profitable business prospects [6]. The CoE is an inseparable part of UNNES as a "Rumah Ilmu Pengembang Peradaban" – which is always ready to serve the community through educational programs, consultations, training/workshops – aimed at realizing functional food products, intermediate products as well as services from the results of scientific studies that have been done.

The breakthrough that has been produced by the pioneering of CoE is being able to produce milkfish (*Chanos chanos*) product prepared with Low-Temperature High-Pressure Cooker (LTHPC) technology (Figure 1), salted eggs with omega-3 prepared with Express Salt Egg Maker (ESEM) technology (Figure 2), biscuits with added mung bean flour (Figure 3), tempeh variants with variations in base material and additives (Figure 4). The content of flavonoids in various tempeh variants is expected to increase consumer immunity. The goal of the functional food center piloting program is to reveal trace element compounds in various foods or drinks, such as antioxidants, essential amino acids, essential fatty acids, minerals and antiviral compounds, antibacterial and even anticancer compounds through processing interventions.



Figure 1. milkfish product prepared with with LTHPC



Figure 2. Salted eggs with omega-3 prepared technology ESEM technology



Figure 3. Biscuits with added mung bean flour





Figure 4. Tempeh variants with variations in base material and additives (a) Tempe kelor, (b) Bakso tempe, (c) Kripik tempe kelor

The focus of the Center of Functional Food program is to upgrade food and beverage products available in the market to increase the content of specific compounds or bacteria using certain technologies. The content of food and beverage products is upgraded using several technologies, such as fermentation, fortification, and a combination of technologies. Organic seasoning/flavoring products and herbs/supplements are upgraded using a combination of technology. Intermediate products that have been produced are tuber flour, fermented product flour (tempeh flour; instant *semangit* tempeh seasoning, red-rice husk flour as a prebiotic source), and non-fermented product flour. The services that can be served by the CoE include (1) clean production technology and sanitation for efficiency, (2) appropriate technology, (3) packaging without plastic, (4) fermentation-fortification technology, and (5) fermentation-supplementation. Receipt of fortification-supplementation-substitution services or other treatments is carried out using appropriate technology equipment at the Center of Functional Food location to be efficient and hygienic. The CoE has been promoted and is ready to accept orders through pre-orders. Beverage innovation products that have been produced, including high antioxidant content Zicurma sherbet, which is good to improve human immunity. Another product is black coffee and black ginger produced with unique methods and technologies, as well as herbs and powder/crystal drinks (ginger, turmeric, ginger, and guava), and organic supplements (Figure 5).



Figure 5. (a) Jamu Zicurma, (b) Serbat Secang, (c) Beras Kencur, (d) Kunir Asem, (e) Jahe Merah

# 2.3.3. Optimizing the Performance of UNNES-Ecofarm during the COVID-19 Pandemic Period

UNNES land use for horticultural planting has been carried out since early 2019 through the UNNES-Ecofarm program. UNNES-Ecofarm is managed jointly by the Technical Implementation Unit of Conservation Development and UNNES Asset Subdivision. The TIU is



responsible for the operations of aquaculture to marketing, while the Asset Subdivision carries out maintenance of supporting equipment. Cultures developed by UNNES-Ecofarm include (1) planting 2 hectares of durian, (2) propagation of indoor plant ornamental plants, (3) orchid cultivation, (4) maintenance of rare fruit and plant seeds, and (5) Taro (*colocasia sp*) cultivation (6) vegetable hydroponics and fruit. UNNES develops Durian gardens (Figure 6) because the gardens are packaged professionally as potential tourist attractions (agro-tourism) that have economic value, become a tourist destination as well as an educational medium for students and students, local, national and even international communities.



Figure 6. UNNES durian gardens

Many aspects are considered in the development of durian gardens, including aspects of pre-planting, planting, and maintenance, as well as post-harvest, including social aspects in the campus and surrounding communities. Conditions during harvest and post-harvest which will approximately take place in the fourth year (2022) can be packaged into engaging moments/atmosphere for visitors. The social aspect that needs to be pursued is the existence of a garden which also benefits the surrounding community. National superior durian is the choice because it is a commodity that is attractive to farmers and consumers; the price is attractive and stable even at the time of harvest. Some other commodities that are priorities to be developed and have promising markets are longan and avocado. These three types of commodities are suitable to be cultivated in the lowlands and can be pursued to produce optimal harvests.

The Sekaran campus is the main campus of UNNES which is the center of academic, nonacademic, and service activities. As a sustainable university, UNNES land use is predicted to be around 40%, and the rest is not yet appropriately utilized. The land use needs to be designed as part of efforts to increase UNNES income generation and anticipate the enforcement of government regulations related to the withdrawal of sleeping assets or those not utilized by the Ministry of Finance. As a conservation-oriented university, land use continues to uphold the principle of conservation, including land used for tree planting so that the function of the land as



water storage can be preserved. In advanced, green plants help refresh and purify the air, as well as a form of conservation of essential commodities in Indonesia.

Propagation of indoor ornamental plants, orchid culture, and maintenance of tree seedlings and rare plants while done only to meet their own limited needs. Ornamental plants to replace plants in the leadership room are carried out regularly. At the same time, tree seedlings are used for tree planting purposes which are carried out routinely by new UNNES students. Every UNNES student must do tree planting, and all planting and maintenance activities must be uploaded in the *Si-Omon system* (tree planting system). Under-auspices' land-use of taro cultivation (Figure 7) began in late March 2020 during the COVID-19 pandemic. Aside from being a food raw material, taro also produces leaf waste that is of economic value because it can be a raw material for making fertilizer.



Figure 7. Taro cultivation

Optimizing the performance of UNNES Ecofarm during the COVID-19 pandemic was carried out mainly in the Hydroponics House program (Figure 8). The hydroponic house can produce a total of about 30 kg of vegetables per week. Vegetables produced include, kale, green lettuce, red lettuce, green spinach, and red spinach. The quality of vegetables in the House of Hydroponics is equivalent, even some types of vegetables are of higher quality than other producers. Because the productivity of hydroponic vegetables is still minimal, UNNES continues to work towards increasing them through the addition of planting areas and the number of planting holes for net pots. Harvesting was carried out weekly on Tuesday. Most consumers are the internal campus community, and only a small portion is marketed to the community around the campus.





Figure 8. UNNES Ecofarm: The hydroponics house program

#### 2.3.4. Encouraging the Community Yard Utilization

As a sustainable campus, UNNES conducts various efforts to encourage and strengthen food security, especially for the campus community. Universities also play a role in disseminating science and technology through community service activities. One of the critical roles of tertiary institutions in realizing national food security is to transfer knowledge, technology, and innovation to the community. Food security is one of the national development goals, which means that the fulfillment of food for the state reaches the individual [8]. This condition is reflected in the availability of sufficient food including the quantity and quality criteria, safe, diverse, nutritious, equitable, and affordable, and does not conflict with the religion, beliefs, and culture of the community to be able to live healthy, active and productive sustainably. Efforts to diversify food can be made through increasing the availability and consumption of food that is diverse, nutritionally balanced, and based on the potential of local resources.

The Ministry of Agriculture introduces the concept of the Sustainable Food Home Area [9], which is the concept of a residential environment or an activity for community groups who jointly utilize their yards for intensive cultivation. The results of the cultivation become sustainable food sources to meet the nutritional needs of local communities. This concept is exciting and appropriate to be applied during the COVID-19 pandemic because of various policies restricting community mobility that causes people to have difficulty accessing food.

UNNES encourages the local community to overcome disruptions in the food supply chain through yard utilization, both during the pandemic and in the context of welcoming the post-pandemic. The commitment of UNNES is demonstrated through the existence of fostered villages in each faculty work unit. Yard land use activities by the community include growing vegetables organically in polybags, processing tubers flour (Figure 9-10), and planting vegetables in a hydroponic technique.





Figure 9. Yard land use activities by the community



Figure 10. Tubers flour

The sustainable use of the yard by the community is expected to minimize the impact of the COVID-19 pandemic so that national food security conditions are targeted as the SDGs can be achieved.

## 2.3.5. Conclusion

As a sustainable campus, UNNES consistently implements three pillars of its conservation insights, despite facing the challenges of the COVID-19 pandemic. This pandemic has a direct impact on the aspects of health, economy, food, education, religion, and government. Food, which is a basic human need, faces severe problems during the pandemic due to the disruption of the supply chain due to the policy of limiting community mobility. UNNES participated in overcoming the food problem by optimizing the performance of the functional food center and UNNES-Ecofarm. This optimization activity is needed not only to overcome the existing conditions but also as a form of anticipation in the post-pandemic period. The role of sustainable campuses is crucial in efforts to realize food security as targeted by the Sustainable Development Goals.

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# **Chapter 2.4: The Role of UNS in Food Security and Social Vulnerability Reduction in the COVID-19 Era**

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Universitas Sebelas Maret has a comprehensive policy to help students and communities affected by COVID-19. The university has prepared facilities for students to do online learning, online thesis/dissertation examination, and even online graduation. Research, community service, and Community Service Program are also arranged in different formats with the aim of minimizing the risk of transmission. The scope of activities in Community Service Program recognition covers the fields of public health, economic security, food security, community education / counseling, social and empowerment as well as other related fields. In terms of food security, students and communities can learn through urban farming developed in populated settlements. Specifically for students, they can use campus laboratories as an effort to develop various plants through hydroponic techniques. Hydroponics development is carried out by fostered farmers in Ngargoyoso Karanganyar and assisted using online marketing. In the field of research, UNS actively provides advice to policy makers through a study of the level of social vulnerability in districts around UNS. In addition to the university, faculties and groups such as dharma wanita, UNS alumni (IKA), motorcycle group also have initiatives to help students, employees, and the community affected by COVID-19. The forms of assistance vary such as food aid for the needy and assistance in providing food and meal at the Nurul Huda UNS Mosque for the community including students who live around the campus.

#### 2.4.1. Introduction

The number of poor people is projected to increase in 2020 due to the COVID-19 pandemic. Poor population increases because the wheels of economic activity in many sectors experience disruption (shock). The projection made by the minister of finance, Sri Mulyani, shows that the worst scenario of economic growth could be minus 2.6 percent. This negative economic growth also caused the number of unemployed to increase by 5.2 million people.

The pandemic did not only cause a decrease in production but also a decrease in community consumption. Most sectors of the economy experienced a decline, especially in the service sectors, industry, trade, and tourism. The tourism sector is clearly a sector that get the worst impact because of social distancing policies and large-scale social restrictions. Many hotels

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lay off their employees and even most of them are laid off without being paid (unpaid leave). The follow-up impact of the hotel sector also has an impact on the supply chain which not only impacts on transportation but also the agriculture sector.

This picture will clearly add to the social burden that already exists in the community of district / city. An increase in the amount of payments will be lower than a decrease in multiplier to other sectors. The number of poor people and the projected population of the poor will increase by 3.78 million according to the minister's budget and could reach 8.5 million according to the projection of the Smeru research institute.

Based on the conditions of the spread of the plague that had a negative impact, it certainly also had an impact on all the UNS academic community. Students are the most affected group by the spread of COVID-19 in terms of teaching and learning process or in terms of logistics supply. This paper will review how to overcome these impacts and what is the role of UNS to reduce the level of social vulnerability?

# 2.4.2. The Effort to Overcome Market Failure

The market mechanism process will cause the high social costs suffered by the community. The failure of this market mechanism requires further government role through targeted interventions. The government can ensure the mapping of real-time demand and supply of goods and services needed by the people in an area.

The asymmetry of information related to the prices impacts market inefficiency. This inefficiency is exemplified, for example, if there are goods on the market, the price formed is more expensive, while on the supply side the price at the farm level is much cheaper than the price formed on the market. Data released by the National Strategic Food Price Information Center as of March 23, 2020, recorded sugar, garlic, shallot, and red chili commodities started an increase in the range of 5 percent to 36 percent.

Survey data delivered by Indonesian Bank of Surakarta [5] states that the inflation rate in the city of Surakarta is actually negative (deflation). This means that the consumer demand is not proportional to the goods supply. The Consumer Confidence Index (CCI) shows a downward trend from March to May. This declining CCI shows consumer perception of the national economy will not improve for the next six months.

When rely on the market forces, the imbalance in demand and supply of goods will aggravate the people's purchasing power. UNS in its limitation has an idea to bridge the demand and supply by whatsapp social media communication model. Through this media, consumers can access a variety of basic needs such as vegetables, fruits, snacks, herbs, and spices. These goods are obtained from traders in the market by a barter system with the basic needs needed. Marketing through this barter system is runned by Community Service Program students, as part of activities that carried out to the community who lived in the Community Service Program location. Another activities undertaken by UNS is fund raising sourced from food allowances of UNS academics to provide BLT (direct cash assistance to people around campus in a narrow scope) with an amount of Rp 600.000,00 per month for 2 months at the beginning of the pandemic. Dharma Wanita group during the pandemic period provided daily food packages that coVID-19 pandemic.



Regarding to the students ability in Diploma, Bachelor, and Post Graduate programs, it is predicted that they will decline. Therefore, UNS will implement Permendikbud No. 25 of 2020 about the operating standard costs of higher education institutions that apply special fees for students whose function is to ease the burden of study payments. Considering the learning process will also be carried out online as instructed by the Minister of Education and Culture until December 2020, UNS will also provide credit purchase assistance for students.

Concern was also expressed by Dharma Wanita Persatuan (DWP) UNS and the UNS Alumni Association (IKA) towards the UNS hospital. They provided assistance of 600 million to hospitals to be used to support UNS Hospital as a COVID-19 examination laboratory.

#### 2.4.3. Maintaining food security in the area and the environment

The discussion on food security and food access begins with reference to the definition used. The concept of food security refers to availability, distribution, and consumption. According to Ratnasari & Kusumawardani (2015) [4] states all items must work well and support each other. The availability if not followed by distribution and consumption also does not make food security increase. One of the formulations used is the Food Security Index (FSI). The items measured in the FSI are aspects of food availability, food affordability, and food utilization.

Each group of measurement items can be detailed from several aspects, for example on food availability will reach the highest value if it can optimize management from three sources namely: (1) domestic production, (2) food imports and (3) management of food reserves. The aspect of food affordability has the function of making the community able to use effective and efficient distribution channels, as a prerequisite to ensure that all households can obtain adequate quantity and quality of food at all times, at an affordable price. The aspect of food utilization leads to optimal use of food in the body (food utility), by increasing awareness of the importance of diverse consumption patterns with balanced nutrition including energy, protein, vitamin, and mineral, maintenance of sanitation and hygiene, and prevention of infectious diseases in the domestic environment.

The concept of food access is the ability to reach food availability and be able to absorb food. Inability to access indicates inability to reach food. Food access can be considered by considering income inequalities between districts / cities, income inequality between income groups, and the rapid inequality of development between regions.

Based on Ibok, Osbahr, & Srinivasan (2019) [2] and Heflin, Altman, and Rodriguez (2019) [3] conclude that accessibility affects food security. Both studies show that vulnerability factors such as physical disability and past consumption patterns have a significant influence on food vulnerability.

Based on this definition, the impact of a pandemic that has not yet shown signs of ending will be beneficial to reduce the impact that all countries are struggling to keep their citizens from being infected in a massive way. However, the upward trend in positive cases continues, while the number of patients recovering and patients who have died has also continued to increase. Referring to the expert analysis from the Bandung Institute of Technology stated that the pandemic period will be at its peak in mid-April but then corrected to mid-May. While referring to the analysis from UNS mathematics expert and UGM statistics expert, the pandemic period will peak in May. From the three analyzes, they concluded that the rapid decline in the rate of



influence was influenced by public awareness to behave in a healthy and not counter-productive government policy.

For the people, of course, policies must be based on analysis so that what is being done can be appropriate, especially in Central Java. According to some expert views, it is projected that the highest level of spread is in May or early June, so it is predicted that new economic activity will be able to run normally two months afterwards. The central government through the Ministry of Finance has predicted the second quarter of the national economy will experience minus growth. While in the third quarter, the economy is expected to have started to grow positively, although not yet fully normal.

The Food Security Service of Central Java Province reports the results of the FSI calculation and it is known that some regions in Central Java are not included in the vulnerable category in terms of food security [1]. However, some regions in Central Java fall into the category of poor population on average above the national level. There are 14 districts included in the red category including two districts in Soloraya namely Sragen Regency (13.2 percent) and Klaten Regency (12.98 percent).

The impact of the increase in unemployment can be identified from sectoral absorption of labor. The Central Java Province data shows that the agricultural sector is able to absorb 24 percent of around 17 million workers. The industrial sector also absorbs 22 percent and the wholesale and retail trade and car maintenance sectors reach 19 percent. The tourism sector which is usually associated with providing accommodation, food and beverages absorbs 7 percent. The decreasing elasticity of these activities will have an impact on increasing the number of unemployed. The agricultural sector which normally supplies to other sectors (for example tourism) will certainly decrease significantly. If accommodation activities decline by 75 percent, then it can be predicted that demand for goods from the agricultural sector will also decrease.

If labor absorption has an impact of increasesing the unemployment, the role of the government is to ensure these vulnerable groups of people can fulfill their minimum needs. Government policies that are implemented are directed to the affirmative policies. The policy of distributing important items is very beneficial to community today.

From the results analysis that has conducted, it can be seen that an area which has a low level of food security tends to have a high level of social vulnerability. Based on Table 1 known that Sragen Regency has a level of Social Vulnerability Index (SoVI) with a score of 30 which is the highest compared to Wonogiri Regency (27). Two other districts, Sukoharjo Regency (25) and Karanganyar Regency (22) have relatively low levels of SoVI scores.

Sovi's score in Sragen and Wonogiri districts is directly proportional to the percentage of poor people which is 15.48 percent and 13.66 percent. Meanwhile, Sukoharjo Regency has a lower number of poor people than Karanganyar Regency. If it is linked to the level of Human Development Index (HDI) also shows that if the level of SoVI is high, then the level of HDI tends to be low.



Regency	Socio-economic Performance Indicator			
	SoVI	P0*	P2*	HDI*
Sragen	30	15.48	0.63	70.34
Sukoharjo	25	9.52	0.26	73.88
Wonogiri	27	13.66	0.51	66.84
Karanganyar	22	12.97	0.47	73.41

Table 1. Socioeconomic Performance Indicator

Source: Secondary data processing.

These natural problems become a 'homework' to ensure the food availability at the local or national level. From the non-natural side, the factor of technological change is expected to positively influence the increase of production. But on the other hand, there are also non-natural factors like COVID-19 that affecting the national food security.

Why does COVID-19 affect food security? Of course the food producing country or region will maintain the domestic food security at first. This will disrupt the achievement of the second MDG's agenda, that is food security as formulated in the Global Health Safety Agenda (GHSA) [7]. Food security at the rural level was responded by organizing Community Service Program of UNS in COVID-19 era which conducted in the period of May to July 2020 by providing learning methods for hydroponic farming, aquaponics, online shopping systems, the introduction of barter market mechanisms etc, which in the principle made the community more highly capable in spending efficiency for the needs of everyday life.

The differences of food availability stocks between regions must be mapped so that the food availability stocks can be distributed to other regions. During the pandemic, however the distribution facilities and infrastructure were still limited which resulted in high distribution costs. The length of the supply chain causes a quite differences in producer and consumer level prices. While from the consumer side, food is the biggest expenditure in the household.

The differences of food availability stocks between regions must be mapped so that the food availability stocks can be distributed to other regions. The regional government needs to adopt a policy to mitigate the impact of COVID-19, by doing some steps: first, increasing the effectiveness and allocation of distribution of social assistance sourced from the central government and the Central Java Provincial government to increase the purchasing power of the people. Second, the reallocation of local budget to overcome COVID-19 so that the health and economic conditions of the district / city can be maintained. Third, optimizing the use of village funds (Dana Desa) for empowerment in the field of small and medium enterprises, processed home industrial food, and the cultivation of vegetables, fruit, and fish (urban farming).





Source: https://goo.gl/maps/ZZJhcwfrXV8UQxQs6 Figure 1. The Example of Urban Farming done by UNS lecturer at populated settlement

Figure 1 shows the urban farming activities that have been initiated by Djoko Purwanto who is a representative of the Green Campus of the Faculty of Economics and Business UNS. It successfully developed in the populated settlements. The next stage will also be developed in the faculty environment.

#### 2.4.4. Summary

UNS as an institution is expected to be able to contribute suggestions and thoughts to reduce the level of social vulnerability. Some of the strategic steps undertaken include: UNS provides assistance or credit subsidies to conduct online lectures; UNS provides food packages for students who happen to be unable to gather with their families during *Eid*; UNS also provides facilities for students who are carrying out Community Service Program with a certain format. Besides, UNS also undertakes online examination and graduation.

Based on the results of studies on the level of social vulnerability and food security, UNS provides the view that regions that have low levels of food security tend to have high levels of social vulnerability. These results indicate that if the handling policy of COVID-19 is not finished, vulnerable people must get priority to be assisted.

The optimistic side needs to be raised. Some people have followed the government's advice to work and worship from home. Life behavior by complying with health protocols must continue to be socialized to the public so that they become good living habits.

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**Part III:** 

# Sustainable University and Waste Management during COVID-19 Pandemic







# **Chapter 3.1: Sustainable Campuses and Waste Management during COVID-19 in Telkom University Bandung**

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The aim of developing "green campus" in Telkom University is to reduce humans' misbehavior due to the presence of garbage and waste on the campus environment. Telkom University as a campus with large number of staff and students need efforts in conducting waste management. Campus waste management during COVID-19 pandemic became something very important, particularly in keeping the campus environment clean and the civitas academia healthy. In this work, it will be explained about sustainable campuses and how to manage waste during the COVID-19 pandemic in Telkom University. Some programs that have been carried out are the implementation of the 3R system (Reduce, Reuse, Recycle), treatment of organic and inorganic waste, treatment of toxic waste from laboratories and clinics, and treatment of sewerage disposal.

#### 3.1.1. Introduction

Telkom University, also referred to by its acronym of Tel-U, is a private university in Indonesia. The main campus of Tel-U is located in Bandung, West Java on Jalan Telekomunikasi – Terusan Buahbatu, in Bandung Technoplex (BT-Plex) area. The other campus site is located in Gegerkalong Hilir, northern part of Bandung, at the office area of PT. Telkom (Telkom Innovation and Development Center and Telkom Corporate University/Telkom Training Center). Telkom University was formed out of a merger of four higher education institutions under Telkom Foundation. These four forming institutions were Telkom Institute of Technology (IT Telkom), Telkom Institute of Management (IM Telkom), Telkom Polytechnic, and Telkom College of Art and Design Indonesia (STISI Telkom). Telkom University has an area of 50 hectares, and has 7 faculties with 34 study programs, 27.316 student bodies, and 52.872 alumni spread all over the world and it achieved the Best Private University in 2019.

Amidst COVID-19 pandemic, Telkom University still continues conducting its academic and non-academic activities. In preventing the spread of COVID-19, Telkom University has

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conducted disinfectants spraying to the entire campus area. All academic activities during COVID-19 have transitioned to online, starting from the teaching-learning process, practicum, seminar, conference, and other academic activities. However, Telkom University still committed to conduct a research activity. It is proven by creating some innovative works such as Autonomous UVC Mobile Robot, Automatic Hand Washing Machine, Face Mask Inserta and Car Chamber Disinfectant.



Figure 1. Inovative Product Telkom University

# **3.1.2.** Waste Treatment and Recycling Activities

Waste treatment and recycling activities are major factors in creating a sustainable environment especially in campus environment. The activities of Telkom University staff and students on campus will produce a lot of waste; therefore, some recycling and waste treatments programs should be among the concern of the university, i.e. recycling program, organic waste treatment, inorganic waste treatment, toxic waste recycling, sewage disposal, policies to reduce the use of paper and plastic on campus. With 27,000 students and 1,000 lecturers / staff, there will be several problems, especially with the very large campus waste production. The amount of waste produced in one day on campus is around 300 kgs for leaf litter, and 500 kgs organic and inorganic waste. Waste produced varies greatly from paper waste, food packaging, plastics, leaves, and waste produced by laboratories.

# A. Recycling Program for University Waste

In general, waste at Telkom University is treated as follows:

- 1. Separation of organic, non-organic and bottle categories with the appropriate supply of special waste. These rubbish bins are scattered throughout the campus area. With this special trash can, it can facilitate the separation of waste and speed up the recycling process.
- 2. Recycling: composting and combustion

Waste that can be recycled is:

- a) organic waste from vegetation to be composted. The leaves are sorted, chopped using a chopper and routinely operated by a special operator. To secure machines and other equipment, a semi-permanent house has been built. In this house, the composting process and storage of compost are carried out. This compost is then used to fertilize and care for plants and plants in the campus environment. The by-product of the composting process is leachate liquid, which can be used to speed up the period of waste decomposition and also as liquid organic fertilizer.
- b) organic waste from food scraps. This rubbish is collected from locations, especially the canteen, dormitories, and pantry sections of each building. This waste recycling,


treatment is somewhat different from organic vegetation trash, which is given as animal feed which is deliberately maintained at Telkom University's TPS site. At this TPS there are 2 local catfish ponds that are ready to recycle food scraps.

c) organic and non-organic mixed waste can be processed using a single incinerator to reduce volume. This machine operates every day and is operated by two operators. This machine works using a mixture of diesel fuel and water. The output of this processed waste is carbon, which can be used as fertilizer for plants. The use of this machine is the last step after various treatments have been carried out.



Figure 2. Composting Process

- 3. Waste dumped into landfill (TPA) : around 20% of non-recyclable waste is sent to the landfill using special vehicles belonging to the campus.
- 4. Separation of waste is economic value: Bottled, used paper, cardboard waste is separated and sold by sanitation workers and the result is additional income for cleaning workers.

Telkom University has a strong commitment to waste management. Commitments that have been made in the form of guidance and support for students to be creative in developing ways of processing waste.

## B. Program to Reduce the Use of Paper and Plastic in Campus

- 1. Smart trash developed by Telkom University Lecturer and has become a startup in Bandung Tekno Park. The application is **Smash**. This smart trash can will connect garbage collectors with garbage banks spread all over Indonesia. Smash has worked closely with PT. Telkomsel by placing several smart bins. The way it works is that every plastic garbage or drink bottle put into the trash will automatically add credit to the user who made the transaction.
- 2. Tumbler, glass and drinking water supply programs which are part of the program to reduce plastic waste. This tumbler is provided by the Telkom University for all employees, so the use of plastic bottles, both in lectures and meetings can be reduced.
- 3. Book Donation Program. Telkom University academic community can donate books that are no longer used to donate to the library. With this program, the academic community can reuse books that are no longer in use by their owners. Thus, paper consumption in book form can be reduced (no need to buy anymore) and avoid paper waste because of the large number of used books thrown away.



4. Paperless programs are also carried out by developing a comprehensive information system. Every document both academic and non-academic can be downloaded by everyone who needs it. In addition to meeting invitations, inter-unit correspondence, meeting minutes, decrees and others have all been paperless based through the e-memo application. Communication, announcements in units and between units is done through employee mailing lists.

## C. Organic Waste Treatment

Organic waste processing is carried out independently at Telkom University. Officers assigned to manage waste will receive leaf litter that has been collected by the collection team. The first step, the incoming leaves will be chopped first. Then put in the tub to be processed. Then the compost water will flow to the shelter that can be used as biogas. Leaf waste production in the Telkom University environment is around 250 - 300 kg / day. If this garbage is not treated, there will be accumulation of garbage. With this compost treatment system, 100% of leaf waste can be treated.



Figure 3. Composting Process

## **D.** Inorganic Waste Treatment

Inorganic waste treatment at Telkom University is carried out by burning waste using an incinerator. Incinerator is a waste treatment technology that involves burning waste at high temperatures. Of the total inorganic waste generated as much as 75kg per day, around 38kg of inorganic waste can be treated by the Incinerator, and the rest will be disposed of to the TPS.



Figure 4. Incenerator Machine



#### E. Toxic Waste Handled

Two sources of toxic waste produced in Telkom University are from laboratory and campus clinic. The management of toxic waste from the laboratory is carried out by neutralizing the waste from the processing system of Furnace Machine. Two types of waste are generated, namely gaseous waste and liquid waste. The liquid chemical waste resulted from the combustion using the furnace machine is collected in a reservoir. The final treatment of the reservoir will be processed in ITB wastewater system. The graduated/measuring cylinder would be cleaned in a sink where the disposal water would be collected in a reservoir containing a solution of Calcium Carbonate (CaCO3). The full reservoir would be discharged to the grounding tank with a pump. As for the gaseous waste, the combustion process with the furnace machine would produce combustion gas that is sucked by the pump through the exhaust pipe to the grounding tank during the combustion process. The suction pump would return to function after the sink has been used used for cleaning the graduated/measuring cylinder. All the toxic waste from the experiment would be processed and disposed of according to the procedure.



Figure 5. Furnace Machine

Meanwhile, the medical waste at Telkom University Telkomedika Clinic is managed by using the Biofilter system. The wastewater treatment plant at Telkomedika Clinic has a maximum bioilter capacity of 5 m<sup>3</sup> per day while the medical waste produced each day is more than 5 m3. This leads to the needs of 2 (two) units of biofilter reactors. By using these 2 biofilter units, all medical waste produced could be managed according to the Decree of the Minister of Environment of the Republic of Indonesia Number: Kep-58/MENLH/12/1995 concerning the Quality Standards for Hospital Liquid Waste. Figure 6 below shows the location of Telkom University Telkomedika Clinic.





Figure 6. Telkomedika Clinic

## F. Sewerage Disposal

Sewerage disposal in Telkom University has been managed and treated so that it can be reused for watering the plants. It indicated that the treatment could be classified into "Treatment for down cycling" category. The treatment is described below:



Figure 7. Sewerage Disposal Treatment

Figure 7 shows the treatment of wastewater from the pre-treated septic tank so that it can be reused for watering the trees around Telkom University campus.





## G. Tel-U Waste Integrated Management System

Figure 5. TelU Waste Integrated Management System

Referring to TelU team ideation on February and subsequent derivation, an initial diagram has been derived to figure the integrated system. Tel-U Waste Integrated Management System (WIMS) is an integrated waste management system involving all Telkom University civitas academica. The waste management involves the start-up and organizations initiated by the lecturers and students as well as the community around campus, so that it can be monetized.

Tel-U WIMS begins with the collection of waste throughout the campus area (in and around campus) to be then processed through several stages:

- a) Waste separation process: the waste would be separated according to its kind (plastic, paper, glass, etc)
- b) Waste sorting process: the waste would be sorted to see if it still has a sale value. This process involves 2 start-up companies, namely BSFB and Smash Bank Sampah
- c) Waste Processing: the waste would be recycled into compost and be used as incinerator and fish food ingredients.

## 3.1.3. Summary/ Concluding Remarks

Build on approximate 50 hectares of land area, Telkom University (Tel-U) necessarily requires an exquisite and pleasant environment. The calm and peaceful atmosphere down the lush trees is desired by every academician. Therefore, a comfortable learning atmosphere would appear that encourages productivity and creativity of students and lecturers. The condition of Tel-U campus when it was unveiled in August 2013 was still barren in some areas, especially in the northern part. It was very reasonable considering the northern part of the campus was a new open area, compared to the South part.

Moreover, there was still a lack of information that invited academician to care and environmentally friendly. The number of trashes has not spread as well as waste management was not maximized. Most of faculty has launched a non-smoking campus but still, not optimal. Similarly, the use of electricity and paper also not efficient. It is not a piece of cake to realize the enchanting campus. In addition to plant thousands of trees through number of programs such as "Go Green Partnership Program", the academician's awareness also must be raised to not pollute



the environment. Concern for the reduction of 'Global Warming' effect, climate change and increasing emissions of CO2 be the important matter. This is in line with the declaration of 'The Decade of Education for sustainable development' by the United Nations (UN) in 2005-2014.

This encourages Tel-U embodies a Green Campus. The goal is to change behavior and to give more attention to environmental sustainability, especially in the academic community. In addition to create a healthy, clean, beautiful, and green campus environment. And the big goal is to establish a comfortable and conducive environment to support the teaching and learning process. Green Campus defines as the realization of environmental campus and environment awareness by the academic community through environmentally behavior as well as integrating environmental science into policy, management, and activities of the Three Pillars of Higher Education. Therefore, during the last three years, all academic community work together to realize the Green Campus by doing these actions:

- build the lake and fill it with a variety of fish
- build Bio pore, pay attention to irrigation
- Replacement of energy saving lights (LED, Solar cell)
- Planting building with automation
- Forest campus
- Protection of birds, a ban on bird shooting
- Café from Bamboo
- Preparation of a bicycle parking lot
- No smoking on campus
- Construction of roads and parking lots using paving blocks
- build the Gazebo for discussion and learning
- Construction of buildings considering the plenty sunlight and air vents

This achievement is certainly not the final goal, the main objective of Tel-U is increasing the academic community's awareness to care about the environment. Thus, the commitment to maintain an exquisite campus is not only quantitative but also figures more as a necessity of life that protecting the environment is not only a duty of academic community, but as human beings with dignity.

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## Chapter 3.2: Sustainable Campus and Waste Management at Universitas Negeri Padang during the Covid-19 Pandemic

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Waste is the residue of a business or activity that contains hazardous or toxic materials, which, due to its nature, concentration, and quantity, either directly or indirectly endangers the human environment, health, viability, and other organisms. Materials that are often found in waste include biodegradable organic compounds, volatile organic compounds, organic compounds that are difficult to decompose (recalcitrant), toxic heavy metals, suspended solids, nutrients, microbes, pathogens, and parasites (Zulkifli, 2017).

## 3.2.1. Introduction

Higher Education (PT), as an institution, also addresses the problem of waste generated in various academic and non-academic activities. Universitas Negeri Padang is one of the universities in Padang City, which always focuses on activities that support a sustainable campus and waste management. It has been proven that UNP had been awarded a certificate of *UI Greenmetric Category as 50 Most Sustainable University in Indonesia* in 2018 and 2019 (*https://mimbarsumbar.id*). For this reason, UNP commits to the Green Campus movements, including in waste management before and after the Covid-19 pandemic.

There are several types of waste at UNP, which we can classify into five types of waste, namely:

a. Liquid Waste is channeled to the *septic tank* in each building, especially the new building;
 13 UNP New Buildings, which were inaugurated in 2015, and two new Student Dormitory Buildings in 2019.



Figure 1. Model of septic tank prepared in all-new UNP buildings

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b. Waste Paper and Plastic are treated in program usage and select sorting of plastic bottles, promoting digitization programs in academic services and online-based learning while reducing paper waste. During the Covid-19 Emergency Response, all lectures and the academic system are running online.



Figure 2.Means for Waste sorting

c. **Inorganic waste** is managed by sorting inorganic waste through trash cans. For example, at the Faculty of Tourism and Hospitality (FPP), it is recycled by students for practice lectures of making decorative designs from rubbish. The same thing is implemented in the Community Service Program (Pengabmas), especially regarding plastic waste processing in several areas in regencies/cities in West Sumatra Province since 2017.



Figure 3. Paper waste processing by lecturers and also applied in community service activities

d. **Organic waste is** carried out to make bio pores for processing organic waste in the Physics Education Study Program of FMIPA and compost for the demonstration garden of the FMIPA Biology Study Program.





Figure 4.The activities of students and lecturers to make bio pores

e. **Toxic waste**, the efforts made by UNP for new waste management, is by collecting toxic waste. The toxic waste is in the form of lamps and batteries that are no longer functioning, as found in the Faculty of Engineering (FT) (*https: // sumbar .antaranews.com /*).



Figure 5. Lamps Waste ready to be processed at the Faculty of Engineering

## 3.2.2. Waste Recycling

Recycling is the process of turning used materials into new materials to prevent waste that can be useful, reducing the use of new raw materials, reducing use energy, reduce pollution, land degradation, and greenhouse gas emissions when compared to the process of making new goods (Putranto, 2017).

During the pandemic of the Covid-19 period, in order to recycle the waste, waste recycling has been carried out through a variety of activities, including; (a) Media competition movement for learning the results of recycling waste in the PG-PAUD (Early Childhood Education Teacher Education) Study Program, (b) The innovative art of recycling waste in the Fine Arts Education Department in the form of making paintings, bags and sculptures made of trash, (c) giving special *rewards* to Community Service activities by lecturers whose activities are in the form of waste recycling, (d) city dredging on the UNP campus and also concrete



channeling, and (e) Making waste bio pores at FMIPA and bio pores for water absorption, and (f) Making compost for use in the Biology Practicum Garden at FMIPA UNP, which is also in the campus area.

Furthermore, the campus also surveyed how the perceptions of the academic community towards waste management at UNP. The purpose of this survey is to evaluate the effectiveness of waste management so that these results will be used as input for improving the waste management system. The survey results can be seen in the table below:

Perceptions of	Type of Waste									
Waste Management Effectiveness	Liquid Waste		Paper and Plastic Waste		Inorganic Waste		Organic Waste		Toxic Waste	
		f%		f%		f%		f%		f%
Effective	82	91.1	77	85.6	71	78.9	65	72.2	81	90
Not Effective	88	8.9	13	14.4	19	21.1	25	27.8	9	10
Total	90	100	90	100	90	100	90	100	90	100

Table 1. UNP's Academicians Perception of waste management

Based on the table above, it can be seen that the informants' perceptions of the effectiveness of waste management are effective in liquid waste management (91.1%). Meanwhile, ineffective waste management is in organic waste management (27.8%). These results will be used as input for the improvement or improvement of the waste management system at UNP.

## 3.2.3. Closing

The Green Campus Movements has received positive support from various groups, including how the campus recycles various types of waste. Sustainable campuses and waste management are issues that must be responded to by the higher education institutions, considering that tertiary institutions have a strategic role as an element for waste management or waste recycling model. UNP, as a large university in Sumatra, always strives to support the "Green Campus and Healthy Campus," especially during the Covid-19 Pandemic.

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## Chapter 3.3: The Synergy of Eco-campus With Eco-industrial Park : Case study of President University in Jababeka Industrial Park Bekasi)

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Eco-campus which located in the eco-industrial park has different approaches and implementations. This paper elaborates on the case study of President University (PU) which located in the Educational Park of Jababeka Industrial Park (JIP) in Bekasi Regency. The synergy of eco-campus with the eco-industrial park is quite favorable since some of the criteria and programs of both eco-campus and eco-industrial park are principally similar. Eco-campus criteria which measured by UI GreenMetric World University Ranking (UIGWUR) relies on six criteria which are setting and infrastructure, energy and climate change, waste, water, transportation, and education. Eco-industrial park in JIP has been complying green rating of PROPER KLHK which has eight criteria, and it has already achieved beyond compliance rating of the regulations. The programs of eco-campus were implemented by cooperation between PU and JIP with almost all infrastructure and facilities are developed by JIP. By this condition, the rank of PU's eco-campus by UIGWUR criteria is fairly scored. The waste management in eco-campus after COVID 19 pandemics in the period of new normal, besides current regular program, requires more development of improvements in operations, procedures, maintenance, and facilities, especially in management of infectious waste management, social, economic, and education program.

## 3.3.1. Introduction

University as the educational institutions must provide good examples in all fields, especially in the area of environmental management education. With the UI GreenMetric World University Ranking (UIGWUR) tools and guidance, it makes easier for the university to create a sustainable campus, both in terms of policies, infrastructure, and operations related to educations. In order to create an eco-campus, President University has been registered as a member of UI GreenMetric since 2018. Since the President University campus location is in an industrial area that has already implemented the eco-industrial policy, the setting and strategy of eco-campus in President University has a different approach compared to other campuses.

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## 3.3.2. Eco campus in Eco-industrial Park

#### A. Eco-industrial Park in Jababeka

*Jababeka Industrial Park (JIP).* The JIP is a private industrial estate developer company that was established in 1989. JIP has been supported with the world-class infrastructures to promote 1700s of the multinational industries and commercial companies from 30 countries. The aspects of environments had been concerned since JIP in the planning phase in 1989-1991. When it has started operating in1991, JIP has already has the estate regulation, environmental proper wastewater treatment facility, sewerage system, environmental monitoring, and environmental management system.

**Proper KLHK.** The program named Proper is a rating of environmental management performance evaluation of a company regarding environmental management through several measurable indicators

which are determined. This program is implemented by the Ministry of Environment of the Republic of Indonesia since 1995 with the aim of increasing the role of companies in environmental management. In addition, to encourage companies in meeting environmental regulations and added value to the conservation of natural resources, energy conservation, and community development. This ranking consists of the lowest black, then red, blue, green, and gold. Blue rating if all government regulations are met and green rating if it meets beyond compliance criteria which are environmental management systems, natural resource management such as energy, water, water emissions, hazardous and non-hazardous solid waste, and biodiversity [1].

*Global Eco-industrial Park Development.* An eco-industrial park (EIP) can be defined as a developed site area for industrial and commercial that allocated for ensures sustainability development through the collaboration of social, economic, and environmental quality into its site selection, planning and construction, operations, and management [2]. In EIP, the industrial synergies and symbiosis, resource-efficient, and cleaner production (RECP) programs are implemented to develop sustainable city. By this concept, the benefit of economic, environment, and social can be achieved simultaneously.

Development of dynamic models in the Agro-EIP industrial area showed the simulation results that have the potential to reduce industrial waste by utilizing by-products from other industries in a study case study in Bitung City, North Sulawesi [3].

The recent policy initiative of eco-industrial development that promote the integration of environment, social and economic need the concrete form to reduce pollution and waste, seek to increase business competitiveness, create jobs and improve working conditions [4]. The research of 16 EIPs in Europe and USA by in-depth interview approach, discovered the few networking examples between companies or processes utilizing waste and materials recycling. Most EIPs were in a beginning development staging, in which the linkages were still in potential level than realization. A pro-active policy to encourage interchanges where is indispensable [5]. The case study in China's EIPs of a framework component that involved technology, business development, governance, policies, organization and actors into the Circular Economy that focused on industrial ecosystem as a microcosm of a circular economy showed the result that there were many opportunities to apply the framework that promote for incorporating ecosystem services. To implement this framework to other countries, it should provide guidance on how to make decisions by considering the factor ecosystem services [6].



*Eco-industrial Park with Proper KLHK criteria in Jababeka Industrial Estate.* JIP has appointed as a pilot project of Eco-industrial park by KLH in 2000-2001. Many projects were conducted such as capacity building, cleaner production, and good housekeeping training to industries located in JIE, APEL (Awareness and Preparedness at Estate level) declaration, and twinning program with Eco-efficiency Center of Halifax Canada. As a follow up to the Eco-industrial park program in the environmental management system of an environmentally friendly industrial estate, JIE furthermore refers to the provisions of the Proper program of the KLH. JIP was mandatory to join the Proper KLH assessment since 2004 that achieved blue until green rating until present.

The mandatory to contribute in the last assessment is in the period of 2018-2019 was refers to the decision letter issued by Director General of Pollution and Environmental Damage Control No: SK.36/PPKL/SET/WAS.0/4/2019. [7]. The result assessment of 2019 showed that JIP achieved green rating by the decision letter issued by the Ministry of Environment and ForestryNo: 1049 /MENLHK / SETJEN / PKL.4 / 12 / 2019 [8].

In this program, JIP has some achievement stated in its DRKPL [9] (Dokumen Ringkasan Kinerja Pengelolaan Lingkungan / Summary Document of Environmental Management performances) year 2019 that met the green rating of Proper's criteria, include:

- 1. *Environmental Management System*. Certification from URS (United Registrar Standardizations, UK) of ISO 90001:2015; ISO 14001:2015; OHSAS 18001:2007.
- 2. *Energy Efficiency*. Energy efficiency ratio: 15 % with absolute value of 3,429 Giga Joule.
- 3. *Reducing Air Emissions*. Reducing air Emissions efficiency ratio: 19.5 % with absolute value of 927 ton CO<sub>2</sub>-e.
- 4. 3R hazardous waste. Reducing hazardous ratio: 29 % with absolute value of 19,946 ton
- 5. 3R Non-Hazardous Waste. Reducing no hazardous ratio: 8 % with absolute value of 56 ton
- 6. Water Conservation and Reduction of Water Pollution Loads
  - Water Conservation ratio: 5.59 % with absolute value of 57,369  $\text{m}^3$
  - Biochemical Oxygen Demand reduction absolute value is 300,847 ton
  - Chemical Oxygen Demand reduction absolute value is 391,655 ton
- 7. Biodiversity Protection
  - Tree planting along the watershed of Cipegadungan and Ulu River with absolute value of 100 species.
  - Develop types of plants in the nursery with absolute value of 2,318 unit index.
  - Vegetation planting in JIP with absolute value of 2,503 unit index.
  - Develop Eco-park in Jababeka Botanical Garden with absolute value of 2,215 unit index.
  - Develop Eco-week cooperation with Dinas Lingkungan Hidup (Government's environmental services) West Java Province with absolute value of 8000 species.
  - Deer conservation in Bumi Perkemahan (Camping Area) Ranca Upas in Ciwidey District, West Java with absolute value of 3 deer.

## **B.** Eco Campus in President University

President University (PU) is located in the Education Park of Jababeka Industrial Park (JIP) in Bekasi Regency, West Java Province. JIP that had been established in1989 has been



developing 5,600 ha land area, while PU campus that was founded in 2001 has size 1.4 ha only. The site location of PU in JIP can be seen in Figure 1. The size and site location of the campus area is the one major reason that activities of eco-campus require more synergy with eco-industrial park



Figure 1. The location of eco-campus in eco-industrial park

The eco-campus performance assessment based on the UI GreenMetric World University Ranking (UIGWUR) on the President University (PU) campus began to be applied starting in 2018, although previously some environmentally friendly activities had been carried out. Based on UIGWUR criteria consisting of setting and infrastructure, energy and climate change, waste, water, transportation, and education, in 2018 a score of 2,600 out of a maximum score of 10,000. In 2018 PU was ranked 665 out of a total of 719 universities at the international level, was ranked at 58 of a total of 66 universities in Indonesia, and was ranked at 23 out of a total of 28 private universities involved in Indonesia [10]. Whereas in 2019, refer to the UIGWUR's criteria guidance [11] got a score of 2,525 so that it ranks 718 at the international level and was ranked at 58 at the national level in Indonesia.



Figure 2. President University Performance by UIGMWUR



Plotting the scores of PU performances can be seen in Figure 2 for years 2018 and 2019, which showed not achieved good performance, especially in the water criteria that still have zero scores. These fair scores were because some programs that in accordance with the criteria determined at UIGWUR, in the implementation level were carried out in collaboration with and using JIE facilities so that even though the program was implemented it did not meet UIGWUR criteria.

## 3.3.3. The Synergy of Eco Campus in Eco-Industrial Estate

## A. The current synergy

Synergy program between eco-campus and eco-industrial park that has been carried out, among others, is in the fields of environmental management system, water supply, sewerage and wastewater treatment, non-hazardous waste management, education, and community services.

*Environmental management system*. PU follows the environmental regulation of city management issued by JIP that has been certified by ISO 14001:2015. The regulations include the management of water, wastewater, garbage, hazardous waste, transportation, security, green area, building coverage, and fences.

*Water supply*. Water demand of PU is supplied by JIP which provides drinking water for city demand level. The raw water is taking from surface water source from Jatiluhur dam in Purwakarta.

*Sewerage and wastewater treatment*. The university wastewater is discharged into the sewerage system provided by JIP after its quality meets the city standard. PU was invited by JIP as an expert contributor to the consideration of new technology named food chain technology in wastewater treatment for reducing hazardous waste generation and energy consumption

*Non-hazardous waste management*. The organic waste from campus is taken by garbage transportation provided by JIP and then transfer to the composting JIP's facility. The organic fertilizer as the result of this facility is used in JIP's botanical garden.

*Education*. PU was invited by JIP to contribute to the assessment of candidates in Jababeka's Environmental Awards, also invited to contribute as the verifier of environmental document of green rating Proper proposal to KLHK. PU invites the expertise resources of JIP to give lecturing and training to the lecturers, students, and staff in the practical materials. Students and lecturers used JIP's environmental infrastructure facilities for the internship, research, and experiments.

*Community Services.* PU and JIP conducted joint activities to educate surrounding community programs.

## B. The Synergy after COVID 19 pandemic

The synergy between PU and JIP in waste management during the COVID 19 pandemic which was carried out during the period of March 2020-June 2020, technically there was no difference from before the pandemic. It was because, at that time, teaching and learning activities on campus were replaced by online system, so that garbage and wastewater that was generated, and energy use and transportation activities are greatly reduced.

During this time, the activities carried out by PU and JIP were a rising fund and a donation fund with the industrial community to help hospitals that lack safety masks, face shield safety googles, safety boots, safety gloves, and hazmat suits for doctors and medical personnel. In



addition, there is also synergy in the donation and assistance of basic needs to the lower economic community surrounding the city (Figure 3.)



Figure 3. Media Documentation of PU-JIP synergy in social program in the pandemic time

The synergy plan in the period of next new normal, besides the social program and other regular synergies that already well run, may more pay attention to the infectious waste from campus. On-campus, it will be applied to the procedure people screening who come to campus and new procedures of the operational activities and maintenance in class, library, laboratory, meeting, canteen, and toilet, others. The most risk comes from a person or people who already infected the virus but there is no symptom, so these carrier people can infect the others by their waste. In this period, all domestic waste may treat as the infectious waste that needs different management and treatment.

## 3.3.4. Summary

Implementation of sustainable synergy program for eco-campus and the eco-industrial park is working as the mutual benefit symbiosis. Many programs have been implemented by approaching water conservation, environmental management system, wastewater treatment, non-hazardous solid waste composting, education, and community services. Even though the program is implemented since the

infrastructures and facilities developed by industrial park, the rank of eco-campus by UI GreenMetric World University Ranking is fair. During the period of pandemic COVID 19, the synergy is focus on social program for fund and donation to medical safety and basic need to lower economic community. For the next new normal, besides the regular synergy programs, infectious waste management, social, economic, and education synergy may need more be considered.

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## Chapter 3.4: Universitas Diponegoro's Waste Management Syafrudin<sup>56</sup>

Universitas Diponegoro is one of the active universities that has the potential to produce large waste generation. In an effort to improve campus' sanitation and comfort and also to realize Universitas Diponegoro as an adequate green campus, it is necessary to manage waste. Universitas Diponegoro runs a management process in the form of a process of sorting from sources (organic and inorganic), collection (faculty scale), transportation, and advanced processing (sales, delivery to landfill, and composting). The total daily waste generation of Universitas Diponegoro is around 730.15 kg / day with 473,819 kg / day including organic waste and 256,330 kg / day classified as inorganic waste. Organic waste includes food scraps, leaves and wood. While inorganic waste includes paper, plastic, metal, rubber, glass, fabric, and others. For organic waste management, leaves and food scraps are being composted with a total of 336,590 kg / day is carried out at normal times. As for inorganic waste that can be recycled at 93.45 kg / day sold to collectors. Residues from the management of organic and inorganic waste, untreated organic waste, and untreated inorganic waste are then processed to the landfill.

#### 3.4.1. Introduction

Universitas Diponegoro is a large university located in Semarang, Central Java. As an active university, all activities carried out by the campus, both by students, lecturers, staffs, and other parties who visit that certainly have the potential to generate waste. This waste generation requires a management process in an effort to improve campus sanitation and comfort. Thus, the quality of the environment and the quality of activities carried out, both teaching and learning, administration, and other activities will be better. By improving the quality of this environment, Universitas Diponegoro will become an adequate green campus.]

Before the year of 2016, the waste management didn't go well. Waste was generally disposed in a certain location without other process. However, after 2016, waste management at Universitas Diponegoro has improved. The management is carried out in the form of storage, collection, transfer, landfill and burning legally.

## 3.4.2. Literature Review

## A. Waste

Waste according to Law no. 18 of 2008 is defined as the residual daily activities of humans and / or natural processes in the form of solid. Waste itself consists of various types, namely:

- a. Household waste (comes from settlements)
- b. Household-type waste (comes from other locations such as markets, trade centers, offices, schools, etc.)

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c. Specific waste (B3, containing B3 waste, due to disasters, demolition, etc.)

Waste problem starts from the increased number of people and animals as producers of waste which results in an increase of population density in an area. Areas with high population density with only a small open area, can feel that waste is a problem (Suyono and Budiman, 2010). Meanwhile, according to Hardiatmi (2011), waste problems include the high rate of waste generation, the low public concern for waste, and the reluctance to dispose of waste in its place. Such behavior can cause disaster in the rainy season due to blockage of drainage by garbage.

Waste problems according to Mulasari (2016) are divided into 3 parts, namely downstream, process, and upstream. In the downstream, waste generation continues to increase so that garbage disposal also continues to increase. While in the process part, the reality is that both community and government resources are limited. Consequently, in the upstream part, the system implemented in the final processing of waste is not optimal.

#### **B.** Waste Management

Waste management according to Law no. 18 of 2008 is defined as a systematic, comprehensive and sustainable activity which includes the reduction and handling of waste. Waste management includes the process of reducing waste and handling waste. Waste reduction includes the process of limiting waste generation, recycling of waste, and / or reuse of waste. Whereas the handling of waste includes the process of sorting, collecting, transporting, processing (changing the characteristics, composition, and amount of waste), and final processing.

Waste management systems must be carried out appropriately and systematically. These activities will include the use and utilization of various waste facilities and infrastructure related to the containing, collection, transfer, transportation, processing, and final disposal (Sahil, 2016). There are several considerations that need to be considered before managing waste. According to Mahyudin (2010), aspects that need to be considered in determining waste management strategies using analytical hierarchy processes are government policy, the environment, financing, health, and public perception. Meanwhile, Sahil (2016) expressed that there are several factors that hinder the waste management system such as the spread and density of the population, socioeconomic, physical environmental characteristics, attitudes, behavior, and culture of the community itself.

Based on Pratama etc (2017), the purpose of managing waste is to minimize the waste generation from sources before going to the final processing for efficiency. Waste management's priority is for inorganic waste that is difficult to decompose when entered the landfill.

## 3.4.3. Methodology

In this case, several problems that need to be resolved are found, including the amount of waste generation, the distribution and mapping of waste generation, the results of the distribution analysis and mapping of the waste sector, and the scenarios for planning the waste management system at Universitas Diponegoro.

In the process of its implementation, research was carried out at the main campus of Universitas Diponegoro located on Jalan Prof. H. Sudarto, SH Tembalang, Semarang around September to December 2018.







Figure 1. Map of Universitas Diponegoro Main Campus

## 3.4.4. Results and Discussion

## A. Universitas Diponegoro's Waste Management

Universitas Diponegoro has operational waste management techniques which include sorting from sources (organic and inorganic), collection (faculty scale), transportation, and advanced processing (sales, delivery to landfill, composting).



Figure 2. Universitas Diponegoro Waste Management Scheme

The bonded process is a form of improving waste management after 2016. Each faculty is responsible for carrying out the containing and collection process. After the garbage is collected, it is then transported to an integrated waste management site (TPST).

## B. Universitas Diponegoro's Integrated Waste Management Site

According to Peraturan Menteri Pekerjaan Umum No. 03/PRT/M/2013, TPST or integrated waste management site is a place where collection, sorting, reuse, recycling, processing and final processing activities are carried out. Universitas Diponegoro's TPST is a place where all waste generated at Universitas Diponegoro is collected and final management is carried out.



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Figure 3. TPST Universitas Diponegoro

There are several categories of areas in Universitas Diponegoro's TPST based on their functions, including:

- 1. Reception Area
  - An area of 35,56 m2, 4 officers, 2 scale floor scale scales, 2 units of recording equipment, 4 units PPE.
- 2. Enumeration Area
  - An area of 13.04 m2, 4 officers, 1 chopping machine, 2 shovels, 1 unit, PPE 4 units;
- 3. Temporary Stockpile Area
  - An area of 562,17 m2, 5 officers, 5 units of spades, 5 scratches, 5 units PPE unit;
- 4. Packing Area
  - Area of 13.04 m2; 3 officers, 2 units of shovel, 1 unit of tailor, 4922 units of plastic bag / year, 1 unit of trolley, 1 unit of weighing, 3 units of PPE;
- 5. Sorting Area
  - An area of 31,52 m2, 5 officers, 1 unit conveyor belt, 2 units of trolley, 15 units of fiber tub, 5 units of PPE;
- 6. Plastic Counting Area
  - An area of 8,20 m2, 3 officers, 1 chopping machine;

The institutional structure that takes care of Universitas Diponegoro's TPST is directly supervised by the rector and has several fields, namely operational technical fields, operational and maintenance fields, training and development fields, and solid waste and B3 laboratories in the environmental engineering department.





Figure 4. Institutional Structure of Universitas Diponegoro's TPST

## C. Waste Generation of Universitas Diponegoro

Universitas Diponegoro's academic community is divided into two parts, academic and non-academic categories. In the academic section which consists of all faculties, the smallest percentage is owned by the psychology faculty by 3% and the highest is the engineering faculty by 24%. Meanwhile, from the non-academic category consisting of ICT, RSND, Lab. Integrated, Rusunawa, Rectorate, and SA-MWA, the smallest percentage of population is ICT and Rectorate with 3% each and the largest percentage of population is Rusunawa with a value of 47%.

From the entire population in one main campus area, the categories are classified into academic, office, and UKK sectors resulting in a total waste generation of 730.15 kg / day with a volume of 6933,163 l / day.

Tuble 1. Universitus Diponegoro 5 Wuste Generation						
LOCATION -	WASTE GEN	NERATION	GENERATION PER PERSON			
	Weight (kg/day)	Volume (L/day)	Weight (kg/day)	Volume (L/day)		
Academic	536,320	5440,610	0,0146	0,1484		
Office	46,642	436,726	0,0997	0,9332		
UKK	147,188	1055,826	0,0888	0,6369		
Total	730,150	6933,163	0,0188	0,1787		

Table 1. Universitas Diponegoro's Waste Generation

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## D. Universitas Diponegoro's Waste Composition

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The categories of composition applied include food scraps, leaves, plastics, paper, wood, fabric, rubber, metal, glass, and others. Among all these categories, the category of leaf waste has the highest composition at 32.06% while the rubber waste had the lowest percentage at 0.04%.

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COMPOSITION	WEIGHT KG /DAY	PERCENTAGE
Leftovers	226,963	31,08%
Leaves	234,087	32,06%
Plastic	128,651	17,62%
Paper	105,905	14,50%
Wood	12,769	1,75%
Cloth	1,650	0,23%
Rubber	0,292	0,04%
Metal	2,886	0,40%
Glass	5,624	0,77%
Others	11,324	1,55%
Total	730,150	100,00%

Once categorized, the waste is then divided into organic waste, which is likely to be converted into compost, such as food waste and leaves. According to Marfuatun (2013), organic waste is the biggest contributor to waste generation and has great potential to be reused as a useful and high economic value product. Meanwhile, some other waste is inorganic waste. According to Yunita (2013), inorganic waste is the main enemy whose number is increasing and tends to be ignored. This is because inorganic waste management is quite difficult, and because this type of waste does not cause a direct impact on humans. As a result, humans are not aware of the losses due to the existence of this inorganic waste.

## E. Waste Mass Balance

In the process of categorizing the waste, a mass balance calculation of waste originating from the total amount of waste is 730,150 kg / day with a volume of 6933,163 l / day. The calculation of the waste balance is done based on daily data and is driven by the value of total waste weight in kg / day and percentage.





Figure 4. Universitas Diponegoro's Mass Waste Balance

From all incoming waste, it is known that organic waste generated is 473,819 kg / day and inorganic waste is 256.33 kg / day. Both categories of waste are included in the TPST for further management. Where the results of composting the waste amounted to 336.59 kg / day from leaves and food scraps as the source. Then the waste processed to the landfill is 300, 441 kg / day which comes from untreated organic residues, wood, recycled residues, and non-recyclable inorganic waste. As for the recyclable waste from the paper, plastic, metal, rubber and glass category, it is then sold to collectors at 93.45% kg / day. During the COVID-19 pandemic, the number of waste generated at Diponegoro University was known to be only 246,856 kg / day or around 33.81% of the actual generation. While the potential for composted material at this time is 153,378 kg / day.

#### F. Waste Management by Composting

Waste composting is a method of processing organic waste into new materials as well as topsoil (Fatih, 2012). In its implementation at Universitas Diponegoro, raw materials from compost are leaves and food scraps/leftovers. From leaf waste with a total of 234,087 kg / day, compost material obtained was 153,748 kg / day and the remaining residue was 80,339 kg / day. While from the rest of the food scraps with the amount of 226,963 kg / day is obtained compost material of 182,842 kg / day and as much residue with the amount of 44,099 kg / day. All residues with a total of 124,438 kg / day were then processed at the landfill. While during the potential compost COVID-19 pandemic, the for is only 153,378 kg / day.





Figure 5. Waste Mass Balance Used as Compost

## G. Material Recovery Factor (MRF)-Before COVID-19 Pandemic

Total inorganic waste generation at Universitas Diponegoro is 256,330 kg / day. After going through the sorting process, inorganic waste is categorized into waste that can be recycled and cannot be recycled. Waste that can be recycled with a total weight value of 166,827 kg / day is then sold to the shanties (93.45 kg / day) while the residue (73.37 kg / day) is processed to the landfill. While inorganic waste that is not recycled at 89.504 kg / day is processed to the whole landfill site.

Table 3. Inorganic Waste Detail Composition							
TYPE		WASTE WEIGHT	RECOVERY	WEIGHT IN	RESIDUE		
		(KG/DAY)	PERCENTAGE	<b>RECOVERY (KG/DAY)</b>	(KG/DAY)		
			(*) %				
RECYCLE	Mixed	105,905	50	52,95	52,95		
	Paper						
	HDPE	0,412	80	0,33	0,08		
	PP	25,602	50	12,80	12,80		
	PET	26,399	80	21,12	5,28		
	Metal	2,886	90	2,60	0,29		
	Glass	5,624	65	3,66	1,97		
	Total	166,827		93,45	73,37		





Figure 6. Mass Recycle Waste Balance

## H. Results of Managing Waste in Universitas Diponegoro

- a. Waste Generation Reduction in Undip Formula = Waste total in Undip – Recycled Inorganic Waste – Composting Organic Waste Results = 730,150 kg/day – 93,45 kg/day – 336,590 kg/day = 300,11 kg/day
- b. Carbon Footprint Result in Undip Formula = Initial carbon – emission reduction by MRF – emission reduction by composting Results = 134,47 tonCO2eq/yr – 91,7 tonCO2eq/yr – 13,79 tonCO2eq/yr = 28,98 tonCO2eq/yr

Table 4. Oreenhouse Gas Emission Summary							
SOURCES	GHG EMISSIO (ton CC	N TOTAL VALUE D2eq/year)	GHG REDUCTION RESULTS (ton	REDUCTION PERCENTAGE			
	INITIAL	SCENARIO	CO2eq/year)	RESULT			
UNVERSITAS	134 47	28.98	105 49	78 45%			
DIPONEGORO	134,47	20,90	103,49	/0,-13/0			

## Table 4. Greenhouse Gas Emission Summary

## I. Waste Reduction Program In Universitas Diponegoro

- 1. Double Sided Printing
- 2. Use of paper back and forth (on both sides)
- 3. Collecting report or paper in softfile
- 4. Reports, papers or campus assignments that normally use hard files are changed and collected only via email or soft file.
- 5. E-Administration

With e-administration, in its implementation the campus administration no longer uses paper printouts but through the online system provided.

6. Supporting Regulations

The regulation can take the form of a Chancellor's Decree by taking into account obligations and prohibitions that can be applied



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# Chapter 3.5: Sustainable Campus Focusing on Waste Management during Pandemic COVID – 19 at Brawijaya University

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Brawijaya University has established a task force team which has conducted several activities related to sustainable campus and waste management during pandemic Covid–19. The campus activities have been limited to only necessary administrative works, important laboratory works and security related matter. The main activities of Brawijaya University COVID-19 task force were COVID-19 related prevention and precautionary protocols, preventive health promotion, and building habit of doing clean and healthy life for Brawijaya University people. The waste management activity as part of sustainable campus has also still been conducted including outside campus university collaboration.

#### 3.5.1. Introduction

Sustainable campus in term of terminology might be classified as new, but it is not if way of thinking of managing a campus is considered. Anyone or any foundation leader who run a business in higher education would not only expect profit, but a campus should also be able to compete and exist for long time. A sustainable university is defined as a higher educational institution which concerns about minimizing negative effect toward environment, economic, society, and health of people due to operation of functions like teaching, research and other activities which advice people to adapt sustainable lifestyle (1). In fact, sustainable campus might be interpreting in 2 ways, firstly a campus as an institution should sustain in term of long-term existence. Secondly, a campus should be managed under sustainable approach by implementing green environment and green building. The requirements to have green environment might be implemented in several activities like efficient water use, waste management system, transportation and in campus pollution concern, and greening the campus ecology. There are many methods of Sustainable Campus Assessment, like Uni-Metric, Green Metric, STARS, ICSN etc., although all measures put environmental concern criteria but still some differences indicators exists among them (2).

Like in other countries, COVID-19 pandemic condition has influenced the daily life and activities of people, including campus activity. The Brawijaya University campus has been

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lockdown from the beginning of March 2020, meaning that all lectures, examination and seminar are only conducted by using online system, limited administrative work is permitted, only necessary research experiment could be done under special permission. Several activities like sport, social activities, graduation ceremony are among activities that make many people gather in one place are all canceled.

Besides forming a Task Force to face the condition of pandemic COVID-19, several actions have been taken Brawijaya University relating to waste management. The Covid - 19 Task Force was established as the action of campus to prevent, inhibit and minimize the spread of COVID-19 both inside and outside campus. Several activities have been conducted during this pandemic time starting from making hand sanitizer and distribute to all part of buildings, spraying disinfectant, and campaign of wearing mask, hand wash, avoid crowd of people and do necessary individual sport to keep healthy.

Related to waste management in campus, due to decreasing activity and reducing students and staffs of coming into campus, the quantity of waste that produced is also reduced. So, the activity of processing waste is also less than usual. The interesting matter is occurred in the waste management outside campus. Some data from the recycling plant under supervision Brawijaya University shown that pandemic has been influenced the waste management system in community during pandemic.

This paper aims to focus on waste management, we would like to highlight on in and out campuses waste processing practices in order to reduce the negative effect toward environment.

## 3.5.2. Brawijaya University COVID-19 Task Force

Brawijaya University COVID-19 Task Force was formed in middle March 2020. There are many activities have been carried out and even exceeded the assigned tasks. According to the Rector's Decree (3) the task force assignments are:

- 1. Establish the COVID-19 prevention precautionary protocols for Brawijaya University academicians (students, lecturers, and education staff)
- 2. Establish COVID-19 preventive health promotions for Brawijaya University academicians
- 3. Ensuring a culture of Clean and Healthy Behavior in Brawijaya University

For successful implementation of the tasks, the organization of task force has to be assigned. The Brawijaya University COVID-19 Task Force has four major divisions,

- The logistics division,
- The tracing division
- The operational division which includes the health promotion subdivision, the health service subdivision and the psychological support subdivision.
- The public relations and secretariat division.

In the beginning of the task force activities, the focus was on the logistics aspect, of which fulfilling the basic needs to support the physical needs of the COVID-19 infection prevention and control function, by making several products such as hand sanitizer, liquid disinfectant, special made body covering clothes, masks and face shields to support the needs of university and other major hospitals and District Health Centre (Puskesmas) around Malang. Innovative products such



as making disinfectant boxes, body transporter equipment, provision of special N95 mask for vulnerable person in doing job, UV boxes, ventilator are among the products made in collaboration between student and lecturer in the university laboratory (4).

In addition to the Logistics Division, the tracking division has gathered opinion from general respondents by assessing the application distributed by Brawijaya University academic community with filling Google form. It has already launched 2 sessions of opinion gathering. The participation and responses from respondents are very helpful and appreciated in the success of collection of data for useful for the prevention of the spread of COVID-19, especially in Brawijaya University and for the local residents because the University also collaborate with related government agencies. In addition, the operational division plays also important roles, the division is divided into health service and psychological support section. Health service subdivision is responsible for health promotion by intensified promotion and education on a massive scale through several means namely making flyers, social and electronic media related to Covid–19. While in terms of psychological aspect, psychiatry has played a role to maintain psychological health of people. These activities have been carried out including ongoing short-term activities.

The long-term program was planned in addition of a task force job, namely intensify the massive spread of COVID-19 prevention program. The program was conducted after the activities inside the campus considered sufficient and under control. These activities were implemented by distributing basic food (sembako) to people living in nearby campus, collaboration with local government to form toughness village (kampong tangguh), in addition to the previously mention activities such as distributing hand sanitizer, mask, and special clothes for health officer. An advocacy team affiliated with the Brawijaya University task force has been formed and played a function to approach regional leaders to understand the view of academics to help reduce the spread of COVID-19, especially for citizens in Malang.

This long-term program was aimed at building community empowerment in preventing COVID-19 transmission and increasing psychosocial socialization and education to the community so as to eliminate the stigma of fellow citizens who are positive COVID-19 would uncontrollably contaminate people. The recovered patient of COVID-19 who returned from hospital could live normal. The activities include making food storage installation, simulation of suspected corpse scavenging of COVID-19 positive patient and simulation of the implementation of village responsibility in the several villages within Malang area is an idea of forming kampong tangguh. The success of kampong tangguh activities were largely depended on the synergy of all academics, bureaucrats (village and regional government), technocrats, security and order holders (Indonesian National Police) and the community.

#### 3.5.3. Waste Management in Brawijaya University Campus

As a sustainable campus Brawijaya University aware about the important of waste solution program including solid and liquid wastes. For liquid waste, some treatment methods have been implemented starting from locally centralized liquid waste treatment, the use of septic tank and cooperation with third parties to manage particularly of chemical liquid waste. The chemical and sometime hazardous waste is usually a waste product from laboratory, Polyclinic Health Centre, Campus Hospital. The solid waste management in Brawijaya University campus comes from office and mostly from several canteen inside university campus. Office waste is



usually in the forms of paper, plastic, and others. While from university canteen produces both organic waste like vegetable, fruit, disposed/rejected food and inorganic waste like plastic, stereo form, can and others. University staffs in charge of clean and green campus collects the wastes and are transported to the Composting Technical Implementation Unit (UPT Kompos) (6).

In addition to all explained waste management, water treatment from toilet and mosque have already been re-used for watering plants. The organic waste material from leaves and twigs from green area of campus is easily process as compost. The UPT Kompos is essential for sustainable campus useful for converting waste into more beneficial products and for student practical works related competency of waste management. Regarding compost production, the production processes, including:

- 1. Chopping the waste; waste is chopped into size 5 10 cm.
- 2. Piling up; the chopped waste is piled up as the raw material of compost.
- 3. Composting; starting by pouring decomposer on top of piled waste and mixing well. Then, it spreading up onto floor, forming several layers.
- 4. Filtering; the ready-made compost is filtered using screen to get fine particles.
- 5. Packaging; the compost is packaged with plastic bag and ready for selling.

According to the collected data, under normal condition average of daily solid waste collected was approximately 6 meter cubic ( $\pm$  3 pickups) so that collection has to be done every day. From the collected solid waste, around 70% of waste was organic waste and the remaining 30% was inorganic waste. Almost all wastes were treated in the PUT Kompos as the valuable material and compost. The remaining waste that could not be processed, call as residue, was transported to the landfill site that managed by Malang Municipality. In the operation of this facility, constrain that faced was to manage the organic material in bulk amount and insufficient area and time to separate the waste.

During the pandemic COVID-19, the UPT Kompos is still running the activity to separate the waste and make compost, but amount of organic and inorganic wastes was largely decreased by 70%. This is because of only minor and important administrative activities was carried out in campus due to Large Scale Social Restriction (PSBB : Pembatasan Sosial Berskala Besar). The organic material coming from the park and green area in the campus was not significantly change, but all university canteen closed.

## 3.5.4. Out Campus Waste Management: case study TPST 3R Dadaprejo Mandiri Recycling facility

## a. The Purpose of Organization

TPST 3R Dadaprejo Mandiri recycling facility is an organization that conducted the waste separation activities for minimizing the discharged waste needs to be transported to landfill. This TPST is located at Dadaprejo Village, Junrejo District, Batu Municipality. This recycle facility was formed in collaboration between Batu Municipality, Dadaprejo Village, Dadaprejo Mandiri Independent Community Group and Brawijaya University. This recycle facility substituted the task of municipality agencies to handle the solid waste management in this village with mechanism as shown at Fig 1 below.





Figure 1. Method of Collecting the Waste

The recycle facility collects wastes from the household in some designated areas at Dadaprejo village. Instead of direct disposal of household waste into landfill, with the role of recycle facility the wastes are shorted into valuable material and residue, of which the residue is transported and discharged to the landfill site. In the past system wastes were collected twice a week, but in this recent system the wastes were collected every day. The results of shorting were namely organic material for compost raw material, except especially collected kitchen waste for the livestock feed, and inorganic material could be sold and all wastes are sources of generating income for recycle facility. From the wastes collected, around 62% are processed and in the forms of valuable material (because it could be easily sold), compost and livestock food, and 37% of residue (Dadaprejo Mandiri, 2018) (7).

## b. Performance of the Organization

TPST 3R Dadaprejo Mandiri recycling facility is serving the entire household in the Dadaprejo Village. There are 4 sub-districts namely Areng-areng, Karangmloko, Dadaptulis Dalam and Dadaptulis Utara. Total number of households that was recorded in 2018 was around 1.243 households (BPS, 2018) (6).

The recycle facility was supported by three small vehicle and one pick-up car. During the operation, the amount of the wastes collected from the household was increasing by the time. Recently the recycle facility collected the wastes from the household around 9 to 12 m<sup>3</sup> per day depending on waste produced. The recycle facility management is considering serving the entire village by operating vehicles owned. The capacity is still under control, so that no increase level of service needed. Further focus of this recycle facility is by increasing the capacity of plant and minimizing the residual waste transported to the landfill site with improving management and capability of the workers to sort wastes and producing more recycle and valuable materials.

## c. The Other Activities of Recycle Facility

Beside collecting and sorting the waste, the recycle facility has other activities in connection with solid waste management. These activities were for the purpose of empowering and educating the villager to actively play more roles in solid waste management. In relation to establish waste bank, a financial organization, the empowerment of villager needs to be done by encouraging them, especially the housewife, to separate and collect valuable materials from plastic bottle, paper and others. Based on the agreed price of valuable materials, then the household could hand the stuffs over to the officer in charge and recorded as his or her deposit.



At the mean times, education of household to save the money through the waste bank for many purposes is important. After being accumulated for 1 year, she/he could withdraw the money. The benefits of this activity is less wastes are transported to the recycle facility.

The other purpose is to transform the additional function the recycle facility to a study source of kindergarten and elementary school students about processing of household waste. A lot of visit to the facility has been regularly schedule for free of charge. With this activity, the recycling facility has already participate to introduce early age student to concern about a little part of sustainable environment which is about processing wastes to save environment. This is also the way to build awareness of young generation to care about the waste problem and change his/her behavior to throw rubbish at a proper rubbish bin in order to protect environment.

## d. The Waste during Pandemic

It is interesting to note that wastes transported to the facility during pandemic COVID-19 fluctuated depending on some factors. The pandemic issue was considered an important issue starting from the beginning of March 2020. The relation between time and the waste volume could be explained as follow:

- In the beginning of March 2020 In this period, the waste volume was recognized as normal, because the people do not aware yet about the danger of COVID-19 and all daily activities including shopping or just buying food and vegetables for cooking were normal.
- Period Middle of March 2020

In this time the social distancing policy was implemented to prevent the spreading of Covid– 19 by the Batu Municipality major. As a result, the volume of waste started to decrease almost half of the normal waste volume. The people started to reduce outdoor activities including restriction of going to the mall and supermarket.

- Beginning of April 2020
  Though the waste volume further reduced due to was not only impact of COVID-19 but also purchasing power of people decreased because of not being able to run business for sometimes. The pandemic COVID-19 started to badly influent economic condition of particularly low-income people.
- The End of April 2020

The Ramadhan month has begun from the third week of April. Under normal condition, the waste volume increases up to 125% as compared with the other months. During pandemic COVID-19, the waste volume increased to 85% of the normal condition. The condition showed that people need to prepare and spend more money especially to buy many type of foods during the Ramadhan month.

In short, the pandemic COVID-19 has influenced the behavior of people in relation to the waste volume. But the Ramadhan month disturbed a little bit the influence of pandemic COVID-19 due to it is regarded as holy month for celebration of people performing fasting so that the requirement of food increase beside to maintain the body healthy to support 30 days fasting. However, as the pandemic COVID-19 is still continuing, the waste volume of waste might also change due to Eid Al-Fitr celebration and further decrease in buying power.

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#### 3.5.5. Summary/ Concluding Remarks

The pandemic COVID-19 has badly affected the economic condition of people in Indonesia and the entire world. It has influenced the daily life of people, including the campus life. Therefore, thinking of sustainable campus is important, maintaining activities related to sustainable campus still needs to be done including waste management. Changes of people behavior relating to health concern during the pandemic COVID-19 is a must. Waste volume during the pandemic inside campus decreased significantly, but the waste volume outside of campus seemed to be fluctuated. As concluding remarks some actions have been done by Brawijaya University campus to cope with the pandemic COVID-19 and waste management as follow:

- 1. Brawijaya University Covid–19 task force was established, and several activities were carried out to reduce or eliminate the effect the pandemic COVID-19 both in campus and has also participated in several activities to help the Malang municipality office and people from infection.
- 2. The pandemic COVID-19 has affected people's behavior toward waste management, especially solid waste management by household, particularly outside campus.

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## **Chapter 3.6: Solid Waste Management in the ITS Campus during the COVID-19 pandemic**

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The COVID-19 pandemic has significantly influenced the amount of solid waste generation in Surabaya, the second largest city in Indonesia. As recorded in May 2020, the amount of municipal solid waste received in the Benowo landfill site dropped by 13% from the same month of the previous year. The trend was also observed in both temporary storage and sorting facilities around the ITS campus: TPS ITS and TPS Gebang Keputih. Each TPS received between 5.40-5.98 tons of wastes per month throughout April-May in 2020. Since the university is temporarily closed and the academic community mostly works at home, the amount of waste recorded in both TPS was lower from the earlier month. However, the number was rather constant during the implementation of large-scale social restrictions (PSBB) policy. Nevertheless, efforts for improving solid waste management during the COVID-19 pandemic have been conducted by the ITS management through the elimination of potential contamination of the solid waste during collection, transfer, transport, and disposal activities. In addition, an online platform, dedicated as the information center of COVID-19 pandemic that affect to the whole campus activities, has currently gained more attention since the academic community is preparing for the "new normal" policy after the PSBB implementation.

#### 3.6.1. Introduction

Solid waste management during the COVID-19 pandemic requires not only a better hygiene standard for the waste workers but also self-awareness for the potential contamination from the non-hygiene environment. The International Solid Waste Association (ISWA) advises

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three top priorities for waste management during this pandemic period, (i) ensuring that waste management in cities will not be disrupted and create no extra concerns of public health due to the improper waste management, (ii) adjusting recycle activities to avoid risks of infections and contaminations, and (iii) safely treating and disposing the increased amount of medical waste generation [1]. The World Health Organization (WHO) particularly recommends appropriate handling of household waste generation particularly the waste generated at home while caring for an unhealthy family member. Materials used after coughing or sneezing should be directly thrown in the bin and hand hygiene should be performed afterward [2].

The large-scale social restrictions (PSBB) was first implemented by the Government of Indonesia (GoI) in Jakarta as the first epicenter of COVID-19 crisis in Indonesia. It was then followed by other cities across Indonesia including Surabaya Metropolitan Area (i.e., Surabaya, Sidoarjo Regency, and Gresik Regency) which was started on April 28 and has been prolonged to its third phase until June 8. During the PSBB period, schools, universities, and some office buildings are closed. Restrictions also affect activities in public places as well as religious and cultural activities. As a result, the solid waste generation in some areas is significantly decreased as more people are working and studying from home and having fewer activities outside. In the area where housing complexes are located, the solid waste generation is generally increased during the PSBB period.

Surabaya is the second-largest city in Indonesia with total inhabitants of about 3.15 million in 2019. The city is located on the northern coast of East Java province with a total area of about 326 km<sup>2</sup>. The municipal solid waste is normally collected in the temporary storage and sorting facilities (TPS) before being transported to the landfill. The TPS facilities have improved the solid waste management as the uncollected waste and illegal was disposal activities around the residential areas can be decreased. It is reported that Surabaya has a waste collection service coverage of approximately 80-85% [3]. The monthly average of solid waste transported to landfill was recorded at 51,368 tons in 2019. This waste was transported to Benowo landfill located in the north-west of Surabaya. The solid waste recorded in April, the month where the PSBB implementation began, was about 12% lower than the previous month. The Benowo landfill received 56,677 and 49,787 tons of solid waste in March and April, respectively.

ITS campus has a total area of about 187.4 hectares, a quite comfortable place for 20,000 students, and 2,000 lecturers and staffs. The main campus is located in the eastern part of Surabaya. The main campus comprises of university and office buildings, sport facilities, parks as well as student dormitories. Solid waste management in the ITS campus covers waste separation, containment, collection, transfer and transport, treatment, and disposal. The treatment of solid waste at the moment covers only composting of food wastes and yard wastes. The treatment activities will not be discussed in this paper. According to the solid waste generation limit enacted through the Surabaya City Regulation No. 10 Year 2017, ITS campus is responsible for transporting all generated waste to the Benowo landfill as the solid waste generation exceeds one cubic meter per day.

#### 3.6.2. Materials and Methods

This study focuses on solid waste management in the area of ITS campus during the COVID-19 pandemic. Data collection of this study was carried out from the period between March to May 2020, particularly during the implementation of the PSBB period in Surabaya. The



main source of the data used in this study is from Municipal Environmental Agency (DLH) of Surabaya as well as data from the unit of solid waste management in the ITS campus. Literature review on solid waste management during the COVID-19 pandemic was also conducted using the Internet search engines using keywords, such as solid waste management in Indonesia and solid waste management during the COVID-19 pandemic.

#### **3.6.3.** Results and Discussion

The implementation of solid waste management in the ITS campus is based on the Government Regulation (PP) No. 81 Year 2012 on the Municipal Solid Waste (Household and household-like solid waste) Management as well as the Surabaya City Regulation No. 5 Year 2014 on the Waste Management. According to the City Regulation, an educational facility must have an organization or working-unit specifically designed for solid waste management at a campus-scale. Moreover, the government also bans open dumping outside the designated TPS or landfill, burning waste without following the guideline, and handling hazardous waste which could lead to the environmental contamination. As a smart-eco campus, ITS has pledged to reduce the amount of solid waste generation by implementing reduce-reuse-recycle (3R) program at the source. One of the examples is the establishment of an internal waste bank in some departments and faculties. Lectures and campus administration activities have gradually implemented paperless productivity. The regulation enforcement towards 3R is supported by strong socialization and environmental awareness campaign initiated by various parties.

#### A. Components of solid waste management

*Collection.* The solid waste collection covers a process of solid waste loading as well as a process where the collection vehicles are picking up the waste containers or bins and then unloading it in the designated places. A collection point at source refers to a place where all the generated domestic waste is gathered in a container or bin located in the classroom or student dorm room. All the generated solid waste produced at the source shall be collected in a larger container. In this case, the university provides two types of containers: permanent and non-permanent containers. Each type of container is placed in 18 different locations. These containers are placed in certain areas with convenient access for the collection vehicles.

**Transfer and transport.** All waste in containers is transferred from the collection points to the TPS in the area (TPS ITS) before transporting it to the Benowo landfill. The campus is equipped with four trucks with containers capacity of 2-3  $m^3$  each. Another facility located close to the campus area, namely TPS Gebang Keputih, is also served as temporary storage and sorting facilities for the settlements where most houses are rented by ITS students. The collection rate of the truck serving both TPS is 1-3 times per day. Fig 1 depicts the waste management process at the ITS campus from source to disposal.

**Disposal.** The increasing quantity of solid waste generation is one of the city's development challenges faced by the Surabaya government. The Benowo landfill is the sole disposal site in Surabaya. It receives municipal wastes transported from all TPS, residual materials from materials recovery facilities, and residue from composting houses. Foliage, branches, and wood wastes that are unable to be composted are gathered and piled up in an open space.





Figure 1. Waste management process flow diagram at the ITS campus

#### B. Solid waste generation and characteristics

Based on the data in 2019, the main campus of ITS produced a total of 3.84 tons of waste per day. The daily solid waste generation was composed of 72% of domestic waste originating from all building units, including student dormitories and 28% of foliage and small branches. A complete proportion of solid waste compositions in the ITS campus is shown in Fig. 2.



Figure 2. Solid waste compositions in the ITS campus

All domestic wastes are transported to the Benowo landfill. About 37% of foliage and branches are transported and treated in the ITS composting house. The rest is piled up on the open space designated specifically for handling this type of waste. Large branches and wood wastes are collected on certain days. The average generation for these types of waste is 20 m<sup>3</sup> per day. The composition of domestic waste is mainly food wastes (30%) and recyclable materials such as paper (25%) and plastics (29%). Based on the type of solid waste, paper, plastics, and tetra pack food and drink cartons have a 3R potential of about 55.21%. The potential sales value of the plastics waste generation is about 71.8% including HDPE, PET, PVC, and LDPE. PET and



HDPE plastics are worth IDR 3,500 per kg according to a price list set by one of the waste banks in Surabaya. Papers are worth between IDR 1,000-2,500 per kg. The operational of material recovery facilities and waste banks in Surabaya is interrupted amid the PSBB period.

#### C. Solid Waste Management and Practice during the COVID-19 pandemic

The amount of municipal solid waste landfilled in Surabaya was decreasing by 12% from 56.7 tons of waste in March to 49.8 tons of waste in April. The city's solid waste generation in May was also lower than in April. The amount dropped by 13% compared to the amount recorded in 2019. The amount of solid waste generation in the ITS campus is in general lower than before the implementation PSBB period. The first COVID-19 cases in Indonesia were reported at the beginning of March. One month later the first patient tested positive for COVID-19 was discovered in Surabaya according to *Kompas.com* [4]. We argue that as Surabaya citizens seemed aware of the ongoing situations, more people stayed indoors ever since. Activities in the campus area were limited since the beginning of March as the academic community was on a semester break and in preparation for the commencement of the PSBB period. The summer semester was postponed for two weeks before finally turning all lectures into online platforms. Fig. 3 shows solid waste generation from January to May in 2019 and the same months in 2020 at transport depo TPS ITS and TPS Gebang Keputih.



Figure 3. Solid waste generation at TPS (transfer depo) ITS (a) and TPS Gebang Keputih (b)

This transfer depo (TPS) receives solid waste from the ITS campus and boarding house, where most of ITS student stayed. The amount of solid waste generation in both TPS throughout April-May in 2020 is rather constant. TPS ITS received 5.40 and 5.67 tons of wastes in April and May, respectively. TPS Gebang Keputih received 5.98 and 5.92 tons of wastes in April and May, respectively. However, the amount is about a ton lower than the amount recorded in March in both TPS. The week in which the PSBB period began is also the week in which Muslims' Holy Month of Ramadan began. Two possible reasons are due to the implementation of the PSBB and the celebration of Ramadan as fasting comes with food consumption reduction. Typically, household consumption will be increased as people are preparing for the Eid Fitr celebration [5]. However, the GoI warned its citizens to refrain from large gatherings and maintain physical distancing during the 2020 Eid Fitr amid COVID-19 pandemic.



A study from the Indonesian Institute of Sciences (LIPI) reports that the increasing amount of online shopping has contributed to the increasing amount of plastic wastes during the PSBB period in Greater Jakarta [6]. The use of single-use plastics is essential during the COVID-19 pandemic including in medical and packaging. The plastic demand in the medical sector includes the gown (LDPE), vinyl gloves (PVC), and face-shield (PP) [7]. The composition of municipal solid waste during the COVID-19 pandemic is yet to be addressed. The composition of solid waste in the area of ITS campus during the COVID-19 pandemic was mostly foliage and small branches as well as household-like waste originating from office buildings that were still opened. Four vehicles are used daily to collect these wastes with the capacity of 8 m<sup>3</sup> per day and transfer it to TPS ITS. The collection routes remain the same as explain in 2.2.

ITS has established an online platform dedicated as the main source of information, protocols, and recommendations regarding COVID-19 and activities during the PSBB period around campus. The information pool can be accessed freely on The university's https://www.its.ac.id/information-COVID-19/. academic community is encouraged to check the page regularly to know the newest status of ITS measures and responses amid COVID-19 pandemic. Some responses taken were the production of protective hazmat suits and face-shields for hospitals in Surabaya as well as the distribution of hand hygiene supplies for those in need the most. It is important to ensure that waste workers are equipped with correct personal protective equipment (PPE), such as gloves, boots, and masks. ITS has published a guideline through this platform for waste workers as well as those who currently on selfquarantine at home on how to avoid contamination and spreading the disease by promoting an independent waste separation.

#### 3.6.4. Future Challenges

Fears of the contaminated waste are foreseen and risks to be minimalized by maintaining the protocols for waste separation, handling, collection, transfer and transport, treatment, and disposal, especially among waste workers. Their health will be in a greater risk when PPE is not available in a sufficient amount for a long period. Reducing the number of waste workers working in the same location might necessary to maintain physical distancing [8]. Waste separation at household levels is even more encouraged during the COVID-19 crisis. An association of waste pickers in South Africa has urged the local community to wrap the used materials and contaminated waste to avoid physical contact with trash [9]. Special waste collection containers for used masks and gloves are also recommended to be placed in buildings or public places to ensure the safe handling of masks [10]. The government's regulations on waste management during the coronavirus crisis is yet to be existed [11]. The COVID-19 pandemic has taught us the importance of good communication and digitalization. The socialization of new regulations has gone digital gradually. As solid waste management in Indonesia also involves informal sectors, it is important to ensure that waste workers including waste pickers are well-protected and that information is well-circulated among those protecting communities from the unmanaged waste.

#### 3.6.5. Conclusions

The research shows some interesting findings on the decreasing amount of solid waste generated during the implementation of PSBB in Surabaya amid COVID-19 pandemic, especially



at both temporary storage and sorting facilities serving the ITS campus and settlements nearby. It is because more people are staying at home and thus produce less waste. ITS campus has implemented measures for better solid waste management and conducted activities to protecting waste workers from the contaminated waste in particular. The result of this research could be beneficial to be used as a reference for the implementation of solid waste management in other university campuses. As the academic community is preparing for the "new normal" policy after the PSBB implementation. Furthermore, it is important to ensure that any changes in regulations on the campus are well-communicated and promptly delivered.

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## Chapter 3.7: Financial Analysis of GE (Garbage Enzyme) Application at Universitas Sumatera Utara Campus

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Savings in campus operational costs is an absolute thing to do during the covid pandemic 19. GE (Garbage Enzyme) is the result of fruit skins fermentation or rejected fruits and vegetables that can be used for hygiene purposes on campus. Cleaning floors, cleaning toilets and cleaning tables, windows and glass doors are among the activities that require cleaning solution that previously used commercial cleaning solutions but can be replaced with GE. The purpose of this study is to determine the savings obtained by the Universitas Sumatera Utara when replacing the needs of commercial cleaning materials with GE. Research parameters were production costs, income, revenue, Benefit Cost Ratio, Revenue Cost Ratio, Return On Investment, Break Even Point. The conclusion from this study is that GE is feasible if using as a floor cleaner on campus instead of commercial floor cleaners. The results of the financial analysis were as follows: production cost IDR 900,000, -; Revenue IDR 19,500,000 .; income IDR 18,335,000; B / C (%) 15.96, R / C (%) 16.96; ROI (year) 0.065; BEP Price IDR 884. If the University of North Sumatra uses GE as a floor cleaner to clean ground floor instead of commercial floor cleaners, then a yearly savings of IDR 561,530,328 will be obtained.

#### 3.7.1. Introduction

GE (Garbage enzyme) contains enzymes produced from the fermentation process of natural ingredients, such as fruits and vegetables [1]. The purpose of making GE is to manage environmentally friendly waste. The process of making GE is similar to the process of making compost but in making GE, there is an addition of water as a microbial growth medium. The final product obtained in the form of liquid which is preferred because it is easier to use. According to [2] environmentally friendly waste management is very effective for managing waste such as becoming GE. This management is also able to control pests in the environment. In addition, the GE manufacturing process will release Ozone ( $O_3$ ) gas which can reduce carbon dioxide ( $CO_2$ ) in the atmosphere while reducing the greenhouse effect and global warning [3].

GE can be used as a cleaning solution that can be used as a multipurpose cleaner, for example for mopping, washing dishes, cleaning bathrooms, windows and so forth. This is due to the alcohol and organic acids found in the liquid have disinfecting properties [4]. Anaerobic metabolism / fermentation of fruits naturally causes the operation of bacteria and fungi [5] which produce alcohol and organic acids.

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The disinfecting properties of GE are able to control pathogenic bacteria and fungi [6] so that they can be used to replace commercial disinfecting products. Therefore the continued use of GE causes financial savings.

Universitas Sumatera Utara consists of 3 sites where the main site located in Medan City has an area of 202,126 m2 for ground floors [7]. Every day the campus must be cleaned and the main cleaning activities in the building include mopping, cleaning glass doors, windows, glass tables and cleaning toilets. The purpose of this study was to determine how much savings could be made by Universitas Sumatera Utara if the use of commercial cleaning products was replaced by GE.

#### **3.7.2.** Materials and Methods

This research was carried out in Agricultural Faculty, Universitas Sumatera Utara. GE was made in a 160 liter plstic container/drum. The rejected fruit were used such as bananas, papayas, pineapples, squeezed oranges, watermelons, melons, mangoes and cucumbers. At the time of the study, the campus had begun to be closed so that fruit waste could not be collected from the canteen. As a source of simple carbohydrates / sugar was wet molasses. The water used was deep well water which is available in the Faculty of Agriculture.

Fruits were washed with well water. Furthermore, fruits were weighed with a GE manufacturing formula with a ratio between molasses, fruits and well water is 1: 3: 10.

#### A. Method of Data Collecting

The data used were primary data which were the results of research conducted through GE manufacturing

#### **B.** Implementation of Research

- Prepare everything needed during research such as materials for processing GE.
- GE processing while maturation GE need 100 days

In making GE by 160 liters the formula of ingrediends were 10 kg molasses, 30 kg of rejected fruit and 100 liters of well water. In the making of GE, the materials were not saturated to the drum capacity, but there was a little room left to anticipate the formation of CO2 gas so that the drum cap does not come loose due to gas pressure.

Next the fruits were washed, cut into sizes 2 to 3 cm. Special for pineapple, crown and rootstock were not used. Special for papaya, seeds were not used. Fruits were not peeled, because some enzymes also come from the skin of the fruit.

After 100 days, GE was harvested by filtering to separate the liquid from the solid. The liquid part was stored in a tightly closed drum while the solid part was mixed with livestock manure, soil and rice husk to become media for planting.

GE liquid will smells like fresh fruits accompanied by a mild aroma of alcohol / ethanol.

#### C. Parameters

The parameters measured in this research were Production Costs, Revenues, Incomes (Profit and Loss Analysis), Revenue Cost Ratio (R / C Ratio), Benefit Cost Ratio (B / C Ratio), Return On Investment (ROI), Break Even Point (BEP) Price.



#### **D.** Analysis Method

The analytical methods used were:

Quantitative analysis is used to calculate financial analysis including

- Production costs (TC=FC+VC),
- Revenue (TR=PxQ)
- Income ( $\Pi$ =TR-TC)
- R/C Ratio = Total Revenue (R) : Total Production Costs (TC)
- B/C Ratio = Total Income (B) : Total Production Costs (TC)
- ROI (Return On Investment) = Income/capital x100%
- BEP Price = Total Production Cost (TC): Total Production (Q)

#### 3.7.3. Result and Discussion

GE was harvested after processing for 100 days. GE obtained after filtering was around 130 liters. For applications, GE is diluted 10 times so that the aroma of fruits is still smelled especially the aroma of oranges while the effectiveness as a disinfectant remains good.

#### A. Production Cost

Production cost in this research was IDR 900,000,- The financial analysis carried out for a period of 100 days/three months. Usually fruits and vegetables to make GE were unpaid because they were available from the campus canteen, for examples fruits skin from juice making and vegetable waste from canteen cooking. But GE in this study was made at the time the campus was going to lockdown, i.e early March so that some of the canteens were closed. Therefore, the material in this study uses were rejected fruits purchased at IDR 5,000 per kg.

Table1. Financial Analysis Results of GE Production					
NO	DESCRIPTION	TOTAL	UNIT	PRICE	The amount of
				(IDR)	costs (IDR)
1.	Expenses				
А	Investment Costs				
	1 Drum with the capacity of	1	Unit	250.000	250.000
	160 liter	1	Unit	230.000	230.000
	Total Investment Costs				250.000
	Variable Costs				
Ð	1 basin with the capacity of 10	10	unit	10.000	100.000
В	kg				
	2 Rejected Fruits	10	kg	5.000	50.000
	3 Strainer	2	Unit	100.000	200.000
	4 Knife	2	Unit	100.000	200.000
	5 Cutting Board	2	Unit	50.000	100.000
	6 Molases	10	Kg	10.000	100.000
			-		
	Total Variable Costs				750.000



NO	DESCRIPTION	TOTAL	UNIT	PRICE (IDR)	The amount of costs (IDR)
С	Fix Costs 1 Labour	1	Person	150.000	150.000
	Total Production Costs				1,150,000
D	Revenue GE prize as biodesinfektan Total Revenue	1300	Litre	15.000	19.500.000 19.500.000

#### B. Income

The income from GE was IDR 18,350,000,- Income comes from revenue after deducting costs. GE sales prices was assumed to be the same as commercial floor cleaner prices because GE is assumed to have the same functions as commercial floor cleaners and is even better because GE contains friendly microbials which, when entered into water bodies, do not cause damage to aquatic biota and instead improve water quality conditions [8] [9].

Table 2. Results of Financial Analysis by using GE as biodesinfectan (floor cleaner)

Parameters	GE
Total Cost (IDR)	1,150,000
Income (IDR)	18,350,000
Revenue (IDR)	19,500,000
R/C(%)	16.96
ROI (year)	0.065
B/C (%)	15.96
BEP Price (IDR)	884

#### C. Revenue

Revenue obtained from GE as floor cleaner. In this study, for one cycle of making GE for three months by using a 160 liter drum capacity, produced GE 130 liters and diluted 10 times so that the resulting GE was worthy of 1300 liters of application. The price of GE was assumed to be the same as the price of a commercial floor cleaner which is IDR 15,000,-/l so that a revenue of IDR 19,500,000,-was obtained.

In this study, it was assumed that GE was used at the Universitas Sumatera Utara to clean ground floor only. Actually, in addition to cleaning floors, GE is also very well used for cleaning glass window, doors, and cleaning toilets.

#### **D. R**/**C** (%)

R/C describes whether an business is efficient because it is a comparison between total revenue and total production costs. The business is profitable as R/C was 16,96 %. This is related to the low total cost. This cost will be even cheaper when using GE material from campus canteen waste, which is juice skin from juice maker and vegetable waste from culinary sellers. Cheaper cost because it uses water that is not purchased. The water to make GE comes from well water on campus. Water can also use water harvesting, especially for washing fruits and to dilute GE at the time of application.



#### E. Benefit Cost Ratio (%)

B/C in this research was 15.96%. B/C is a measure of the comparison between income and total production costs. Benefits cost ratio in this research indicated that GE is feasible and feasible to implement [10].

#### F. ROI (year)

ROI is an analysis to determine the level of business profits related to the capital used. The size of the ROI is determined by the level of capital turnover and the net profit obtained. ROI is income divided by capital and multiplied by 100% [11]. In this study the ROI was 0.065%, which meant that GE investment back after 23 days.

#### G. Break Even Point (BEP) Price

BEP price is the price per unit of a product produced by a producer in a non-profit position and no loss which also reflects the minimum price per unit of goods specified by the manufacturer. In this study, Rp. 884, - Meanwhile, the general price of commercial floor cleaner is IDR 15,000,-

The area of the gound floor of the University of North Sumatra is 202,126 m2 which requires a floor cleaner of 3174 liters each month. If the University of North Sumatra utilizes GE as a floor cleaner for ground floor at a BEP price, the costs incurred are 3174 liters times IDR 884 which is IDR 2,805,816,- Meanwhile, when using a commercial floor cleaner with a price of one liter of IDR 15,000, the University of North Sumatra incurs a cost of IDR 49,600,000 per month and if calculated for one year then it costs IDR 595,209,000,-.

#### 3.7.4. Conclusion

The conclusion from this study is that GE is feasible if use as floor cleaner in campus instead of commercial floor cleaner. The results of the financial analysis were as follows : production cost IDR 900,000,- ; Revenue IDR 19,500,000,- ; income IDR 18,335,000,- ; B/C (%) 15.96, R/C (%) 16.96; ROI (year) 0.065; BEP Price IDR 884,-. If the University of North Sumatra uses GE as a floor cleaner to clean ground floors instead of commercial floor cleaners, then a yearly savings of IDR 561,530,328 will be obtained.

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**Part IV:** 

# Energy and Climate Change in Sustainable University during COVID-19 Pandemic







### Chapter 4.1: Energy Management at Halu Oleo University

#### Muhammad Zamrun Firihu<sup>66</sup>, La Ode Santiaji Bande<sup>67</sup> and Hasmina Tari Mokui<sup>68</sup>

Over the years, Halu Oleo University has continuously strived to establish sustainable and green campus. One of the efforts is by participating in the UI GreenMetric World University Rankings that has several criteria including energy and climate change. The main objective of this paper is to describe energy management efforts at Halu Oleo University in establishing green and sustainable environment. Regarding energy management, Halu Oleo University has applied energy conservation as well as renewable energy policy. Energy conservation is carried out by implementing the use of energy-efficient equipment and maximizing ventilation for air and light exchanges. While the Renewable Energy Policy is implemented by utilizing solar energy for photovoltaic streetlighting as well as rooftop photovoltaic power plant. As a result, there is significant reduction at the total energy consumption at Halu Oleo University. Regardless of its current achievement, Halu University will keep continuing its green and sustainable action plan. Besides continuing current practices, the future energy management plan at Halu Oleo University will also be focused on developing solar and biomass power plants, implementing regular energy audits and energy consumption surveys in each working unit, providing automated indoor and outdoor lighting as well as increasing research on environmentally friendly alternative energy sources.

#### 4.1.1. Introduction

Halu Oleo University (UHO) has been assigned as the 42<sup>nd</sup> state university in Indonesia since 14 August 1981, based on Presidential Decree of the Republic of Indonesia Number 37 of 1981 concerning the Establishment of Halu Oleo University. The inauguration ceremony was conducted by the Director General of Higher Education, namely Prof. Dr. D.A. Tisna Amidjaja on Wednesday, 19 August 1981. This inauguration date was accordingly set as the anniversary date of Halu Oleo University. In addition, Drs. Eddy Agussalim Mokodompit, M.A was appointed as the first Chancellor of Halu Oleo University.

Initially, the main campus of Halu Oleo University was located in Kemaraya covering an area of 7 ha. The development of the new main campus began in 1983 by purchasing 250 hectares of land located in Anduonohu, approximately about 10 km from the initial one. In 1987,

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the Anduonohu Campus has been opened and become the main campus of Halu Oleo University ever since. Currently, Halu Oleo University has 15 (fifteen) Faculties, 1 (one) Postgraduate Program and 1 (one) Vocational Education Program. Kemaraya campus is currently used for Postgraduate Program and Faculty of Forestry and Natural Science. While the rest of the Faculties and Vocational Programs are located in the Anduonohu Campus. By June 2020, the total number of academic staff, administrative staff and active students are 1.419; 957; and 39.604 people respectively. Based on this resource profile, it is clear that Halu Oleo University needs to apply proper management standard to ensure its position as the world class university.

Since its initial establishment, Halu Oleo University leaders have committed to strive introducing sustainability in every aspect of university life. This commitment is portrayed into Halu Oleo University motto, i.e. Green Campus, Hope, Trust and National Pride. Halu Oleo University involvement within UI Greenmetric World University Rankings is part of the effort in maintaining sustainability by comparing its achievement with other universities nationally and worldwide. UI Greenmetric World University Rankings have several criteria in determining sustainable campus, including green energy. The main objective of this paper is to describe energy management as the effort to achieve sustainable campus at Halu Oleo University. Therefore, this paper will be started by describing sustainable and green action at Halu Oleo university. Then, current practices of energy management at Halu Oleo University will also be discussed. Finally, possible future energy management plan will also be reviewed in order to achieve sustainable and green missions at Halu Oleo University.

#### 4.1.2. Implementation of Green Campus at Halu Oleo University

Halu Oleo University has committed to bring sustainability within its campuses and actively contribute to environmentally friendly programs that are beneficial to support balanced ecosystem. The following part of this section will discuss in detail several programs that have been launched in Halu Oleo University to support sustainability missions within the university.

Halu Oleo University has been tagged as the green campus since its establishment and this motto is still relevant to the changing era. Therefore, the Green Campus Motto has been launched to promote the vision that green campus establishment is not only the responsibility of the university leaders but also all campus residents including its staff, students and surrounded neighbors. Various collaborations and partnerships have been built with environmental organization such as WWF-Indonesia as well as the local government such as Southeast Sulawesi Provincial Government. The Government of Kendari City has also designated some part of Halu Oleo University Campuses as Green Open Space areas since 2010. In addition, UHO has pledged to support free smoke area in 2016 as an effort to reduce air emissions, both indoors and outdoors.

Starting from 2016, Halu Oleo University has built its very own botanical garden located in the Anduonohu Campus. The UHO Botanical Garden has an area of 22.8 ha which is expected to be an edu-ecotourism place as well as contributor for high quality Oxygen ( $O_2$ ) and absorber for Carbon Monoxide ( $CO_2$ ) for the area. The main vision of the UHO botanical garden is to become the world's leading university botanical garden in the fields of conservation, education and research on endemic plants in Sulawesi.

Halu Oleo University realizes that global development nowadays has significantly reduced the quality of environment as well as brought unpredictable global pandemic such as



COVID-19. Halu Oleo University responses to the global transformation while establishing the green campus has been explained in the Development Master Plan (DMP) of Halu Oleo University for the Period of 2012-2045. This masterplan was stipulated in the Rector of Halu Oleo University Regulation, Number 2610/UN29/R /2012, dated on 26 December 2012. One section of that regulation specifically stated that Halu Oleo University develops comfortable, safe and environmentally friendly campus to support the achievement of world class universities (RIP UHO, 2012). Likewise, a more operational guidelines has been set in the Rector of Halu Oleo University Regulation, Number 1630b/UN29/SK/KP/2016 concerning the Implementation of Green Campus at Halu Oleo University.

In line with the Green Campus Program at Halu Oleo University, the University of Indonesia has launched the UI Greenmetric World University Rankings. This program shows the role of the University of Indonesia in increasing environmental sustainability efforts in the global environment more specifically on energy management. UI GreenMetric Ranking has been a driving force for Halu Oleo University to perform self-investigation in establishing a sustainable and environmentally friendly campus. Joining in 2017, the criteria and indicators existing in the UI GreenMetric rankings continue to be met and implemented well at Halu Oleo University. In 2019, Halu Oleo University holds the UI GreenMetric Rankings nationally and globally at the 27<sup>th</sup> and the 444<sup>th</sup> places, respectively [1].

#### 4.1.3. Energy Management at Halu Oleo University

#### A. Current Condition

Energy management at Halu Oleo University refers to one of UI Greenmetric Criteria, i.e. energy and climate change. The energy and climate change criteria basically covers 21% of the total score in the UI Greenmetric World University Rankings with the indicators as follows [2]: (1) Energy efficient appliances usage; (2) Smart building implementation; (3) Number of renewable energy (RE) sources; (4) Electricity usage per campus population; (5) The ratio of RE towards energy usage; (6) Green building policy; (7) Greenhouse gas (GGH) emission reductions program; as well as (8) The ratio of total carbon footprint per campus population. Having these indicators as the guidance, the universities are expected to improve its energy efficiency efforts in managing the facilities and taking more advantage from nature and renewable energy resources.

Table 1 shows Halu Oleo University achievement in the UI Greenetric World University Rankings since its first ranked in the 2017 up to now. It is clearly shown in Table 1 that Halu Oleo University managed to improve its ranking both nationally and globally over the year. As for Energy and Climate Change Criteria, the score remains constant at around 700 points in 2019.

Tuble 1. Huld blob binversity Hellevenents in the bit breenmetre world binversity Runkings					
Veer	Number of Participated	R	T-4-1 C		
rear	Universities	National	Worldwide	- Total Score	
2017	619	42	552	2823	
2018	719	33	537	3875	
2019	780	27	444	4675	

Table 1. Halu Oleo University Achievements in the UI Greenmetric World University Rankings

In the last couple years, Halu Oleo University has implemented the UI GreenMetric indicators as a standard for energy management at the university with some adjustment to the



existing university condition. Generally, energy management at Halu Oleo University can be characterized into energy conservation as well as renewable energy policy.

Energy conservation is carried out by implementing the use of energy-efficient equipment and maximizing ventilation for air and light exchanges (Figure 1). Energy saving procurements at Halu Oleo University have been obtained by applying regulations such as arranging the lamps efficiently, turning off the lights during the day or when the sun is able to illuminate the environment, opening curtains that can block natural light, turning off the lights in the room at night, utilizing the LED lighting, turning on the air conditioner only during hot weather, closing doors and windows when the air conditioner is on as well as turning off the computer when not in use. Implementation of energy conservation program has slowly reduced the level of electricity consumption in Halu Oleo University as shown in Figure 2.



Figure 1. Example of Building with Natural Ventilation at Halu Oleo University



Figure 2. Electricity Consumption of Halu Oleo University in kWh during 2017-2018

Halu Oleo University has been also applied Renewable Energy Policy by utilizing solar energy for electricity. Solar energy are used for photovoltaic (PV) streetlights and small-scaled rooftop PV power plants at Halu Oleo University. According to [3], the use of PV streetlights has a large impact to reduce electricity consumption and it is proven that Halu Oleo University has saved its electricity bills by implementing such technology.

In addition, a small scaled PV power plant has been installed at the rooftop of Faculty of Engineering in 2016, with total capacity of 5 kWp. This PV system is not only to provide



additional energy to the faculty but also as a research object for lecturers and students. Figure 3 shows the PV system data provided in [4]. In Figure 3, it is shown that the total power generated as per accessed time is about 6.241 kWh while the total power generated starting from its commissioning time is about 23.741 MWh. Detail about the total power produced annually by this rooftop PV system is clearly displayed at the underneath of Figure 3. As for the impact to the GHG emission, there has been a total of 20 tons of  $CO_2$  avoided since this PV system is commissioned (Figure 3).



\* The expected average yield results from a manual specification. Depending on the orientation and the irradiation fluctuations between the individual years, there might be considerably larger deviations in contrast to the expected average yield.

Figure 3. Rooftop PV system data at Faculty of Engineering for the period of 2016 - 2020 [4]

#### **B.** Future Energy Management Planning

In order to improve sustainability and green campus program, it is necessary for Halu Oleo University to combine its planning and development with the new emerging concept, called smart campus. According to [5], smart campus is aligned with the smart city concepts consisting of the following components, i.e. smart microgrid, smart utility, resource management, improved services, people management, as well as educational services. Based on the concept of smart and green campus, the future energy management plan at UHO will be focused on developing solar and biomass power plants, performing regular energy audits and energy consumption surveys in each working unit, implementing automated indoor and outdoor lighting as well as supporting more research on renewable and alternative energy.

Regarding the new RE facilities, Halu Oleo University has prepared a 14.4 ha land at the Anduonohu campus to build grid connected PV Power Plants with total capacity of 1 MW. This RE plan has reached the signing of the cooperation contract. In addition to that, some researchers at Halu Oleo University is currently focusing their works on Biomass as alternative renewable energy sources. In the future, Halu Oleo University will boost more research on this domain as well as its implementation for supporting university RE program.



Furthermore, it necessary to perform energy conservation principles in order to conduct energy management effectively [6]. Therefore, Halu Oleo University will continue its energy conservation program implementing regular energy audit as well energy consumption surveys in each working unit according to ISO 50001. Performing audit and consumption survey is very crucial to investigate the impact of electrical appliances usage to the total energy consumption. It is shown in [7] that public tertiary institutions can significantly reduce the electricity use by applying energy efficiency retrofitting for the air-conditioners, lighting systems and ventilation fans within university buildings. In the near future, Halu Oleo University will set the masterplan on Energy Management System so that the university energy policies and planning are clear and specific.

#### 4.1.4. Summary/Concluding Remarks

In conclusion, the proposed sustainable and green campus program is the personification of Halu Oleo University motto therefore the university will continuously strive to support the establishment of the aforementioned program. Halu Oleo University has also been successfully improved its position within the UI Greenmetric World University Rankings in the last 3 (three) years. However, it is important for Halu Oleo University to keep improving its energy management efforts through energy conservation, more utilization of renewable energy and implementation of smart campus concept. A more detail energy masterplan followed by proper execution will ensure the achievement of the green campus motto and accordingly positioning Halu Oleo University as world class university leading in sustainability.

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## Chapter 4.2: Energy Management at the Sepuluh Nopember Institute of Technology (ITS) During the COVID-19 Pandemic Period

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The COVID-19 pandemic has led to widespread changes in many aspects of human life, including within university campuses. During the epidemic, the Sepuluh Nopember Institute of Technology (ITS) has taken a number of steps aimed at dealing with the COVID-19 crisis, such as its Smart Ecocampus initiative, energy saving and management, and support for environmental health. In an effort to improve energy management, ITS conducted an energy audit at the Rector's Building, Research Center (RC), the Physics Engineering Building, and the Mathematics Building, with recommendations made for improving the management of utilities in the three buildings. Savings have been made by installing solar cells on a grid in the RC building to provide electricity cost savings of up to 62.3%. The "new normal" implemented in ITS complies with health protocols such as having four hand-washing points at each building access point, the distribution and use of masks and face shields for every lecturer and student, as well as spraying disinfectants in all buildings. Another activity carried out in research by ITS lecturers is to put in place a transformation program directed at handling COVID-19.

#### 4.2.1. Introduction

ITS Ecocampus was established in 2011 by prioritizing operational and maintenance procedures related to sustainable development and environmentally friendly approaches, such as energy saving, water saving, and recycling of solid waste. ITS has also developed the involvement of academicians who care about the environment in all its academic activities. As a tertiary-level institution, ITS conducts research and scientific and technological development that supports its Smart Ecocampus. The active participation of the academic community is achieved through empowerment at both faculty and community level to encourage alignment with the Smart Ecocampus idea and empowerment of people living on the ITS campus. In addition to its

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own Ecocampus program, these activities have also contributed to global programs relating to environmental sustainability and the UN's Sustainable Development Goals (SDGs).

The implementation of the Smart Ecocampus program began with the reduction in air pollution and the provision of green open spaces. Efforts to reduce air pollution are recorded in the Carbon Report Book, which allows the calculation of carbon emissions from motor vehicles in the ITS campus environment. Calculation of the adequacy of green open space (RTH) in ITS is related to motor vehicle carbon emissions and review of RTH adequacy is based on the ITS master plan, with predictions of total carbon emissions resulting from campus activities (transportation and energy). From the results of these calculations it is known that in the ITS environment 39% of air pollution comes from motorcycles.

#### A. Carbon emissions and carbon absorption at the ITS campus

Carbon emissions generated by the productive activities of the ITS campus are divided into three sectors: the transportation sector that contributes 54%, the energy production sector at 45%, and the waste-processing sector at 1%. For the carbon emissions generated by the campus's productive activities, CO2 absorption capacity in the campus area is still in surplus, as only 44,513.52 kg/month of total CO2 absorption capacity of 1,061,784.625 kg/month is taken up. This absorption capacity is generated by green spaces, in the form of forested areas, green areas, roadside areas, parks, and stadiums, which constitute around 40% of the total area of the ITS campus of 185 ha. This green space is divided into nine zones, each having different characteristics. Zone locations from Zone 1 to Zone 9 can be observed on the map as shown in Figure 1



Figure 1. ITS Campus map, divided into nine zones

#### **B.** Energy Saving

One of the energy saving steps taken is to improve energy management, including the carrying out of energy audits. In the last three years ITS has carried out energy audits in three buildings: the Rector's Building, the Physical Engineering Buildings, and the Mathematics Buildings. The energy audit results show that... and the recommendations made are to use LED lighting and environmentally friendly renewable-energy sources such as solar cells (these have been installed by the Research Center and Electro T buildings). There is the use of equipment and utilities: Efficiency & management of equipment.



#### 4.2.2. ITS in the COVID-19 pandemic period

Activities carried out during the COVID-19 pandemic included room sterilization and energy saving. Space sterilization is carried out in buildings throughout ITS, including administrative workspaces, lecture rooms, laboratories, workshops, rooms in the student dormitory building, spaces in the robotics building, rooms in the Rector's building and Graha building, and rooms in the Medical Center building. Room sterilization uses ethanol at 70–80% concentration and is carried out once for all buildings not used regularly and once a week for rooms that are in use.

Electricity generation in the Research Center (RC) was enhanced by installation of solar cells linked to a grid on RC buildings between January and May 2020. Savings in electricity usage costs due to the use of the solar cells in the RC buildings during the COVID-19 crisis were 22.8% in April and 62.3% in May. (Note: April data for March usage and May data for April usage.)

## 4.2.3. ITS in the "new normal" period: addressing new ways of life in the post-19 pandemic period through the concept of green healthy buildings

#### A. An idea for preparation for the new normal period on campus

The concept of the "new normal" is of a permanent change to a previous normal situation. In the case of the COVID-19 new normal, the community must coexist with the virus because as yet no vaccine is available. In life in this new normal situation, we have to adjust to new rules and standards, such as social distancing, wearing of masks, frequent hand washing and sterilization of hands before entering a building. Another new standard is the air quality in buildings in which air is a vehicle for the spread of bacteria and viruses.

#### B. Air-conditioned rooms with no air circulation healthy buildings

During the pandemic, closed air-conditioned rooms can increase virus concentration and so innovation is required to ensure they remain air conditioned and at the same time healthy. This needs to be done in accordance with information from the WHO indicating that transmission of COVID-19 can be by droplets and aerosols.

The WHO states droplets (> 10 microns) will fall to floors, tables, chairs, and door handles and can remain viable for 72 hours. In contrast, aerosols (< or = 10 microns) released when sneezing, coughing, and breathing normally (0.6 to 10 microns) can remain in the air for up to three hours, transmitting to people even though there is no direct contact between them.

The American Society of Heating, Refrigerating, and Airconditioning Engineers (ASHRAE) states that air-conditioned buildings should have open windows to allow the entry of outside air, so that the concentration of the virus decreases. Outside air needs to be filtered continuously if possible, with portable air cleaners equipped with a HEPA filter installed as needed.

Meeting the criteria recommended by ASHRAE will reduce the concentration of the virus in rooms because air is constantly moving and providing good circulation, thus reducing virus transmission in crowded areas.



#### C. Indoor air quality

According to US EPA, the level of pollutants in a room can be between 2 and 100 times higher than outdoors. Source of indoor pollution include animal hair and dander, dust mites, soot, chemicals, pesticides, fumes from chemicals, mildew, tobacco smoke (containing 3,000 chemicals), carpets and upholstery, and molds and bacteria. Symptoms of health problems caused by air pollution include eye or throat irritation, headache, dizziness, lassitude, fatigue, difficulty in breathing, difficulty in concentration, nausea, and dry or itchy skin. Buildings in Indonesia are generally designed for beauty and energy efficiency rather than the health of occupants. By paying less attention to issues of indoor air quality (air flow, distribution, oxygen requirements, the indoor environmental quality of buildings) the amount of air ventilation that can enter rooms is limited.

- a) Anticipating and preventing COVID-19 transmission in air-conditioned rooms in the new normal
- Looking at the shape of the building and the building envelope, the following issues are considered:
  - 1. Are there any windows that allow opening?
  - 2. Is there any possibility of outside air or fresh water entering rooms to reduce the virus concentration brought indoors by sufferers and carriers?
- System Rules mounted air: kinds and types its
- We checked the air conditioning systems installed to ascertain whether they were central systems with chilled water using air handling units; VRF systems with ducting or free blow (wall, cassette, ceiling sustained); DX duct split systems; or residential units (split wall, cassette, floor standing etc.).

#### b) Standard air-conditioned rooms in new normal

- Is the system installed with ventilation air channels (fresh air/outside air)? If so, how much and what type of air is entering (cubic feet per minute/person, ventilated air, air changes per hour)?
- Air changes per hour (ACH): this is number of air changes that occur within one hour at a room. Substitution of air is needed to obtain thermal comfort, because warmer and humid indoor air will be replaced by cooler, drier outside air. The purpose of air changes in addition to thermal comfort is indoor air quality (IAQ) which supports health.
- Minimum air change requirements (ACH) requirements for ventilation systems, for example Lecture Rooms: 5-7; Lab Room: 6-15

#### Office adequacy of fresh air supply to the room

**Building:** Can windows be opened and outside air freely enter the room? Is natural ventilation sufficient or is mechanical assistance needed fans help. For natural and mechanical ventilation, the minimum air flow is > 20 air changes per hour for adaptive thermal comfort.

**AC system**: Is the outside air (fresh air/ ventilation air) entering the room sufficient? To reduce virus concentration inside a room, minimum outside air should be incorporated into room



To reduce the spread of COVID-19, before and after use rooms need to be in sterilized by irradiation with UVC or ozone and then arranged for circulation in line with the concept of adaptive thermal comfort.

#### Adaptive thermal comfort

Heating, ventilation, and air conditioning systems play important roles in the spread of the COVID-19 virus when compared to social/physical distancing.

It is therefore appropriate to think about the idea of the "healthy building" based on the concept of adaptive thermal comfort related to:

- natural ventilation
- forced/mechanical ventilation
- dedicated outdoor air system (DOAS) air conditioning.

Ways to create a healthy building include:

- **Removing/sucking out air around people** by installing exhaust fans near to people's heads. Exhaust fans should be installed with HEPA filters so exhaust product does not contaminate the environment.
- **Reducing the concentration of virus in the room** by allowing in already-conditioned fresh/outside air (filtered, temperature controlled, and moisture content lowered) using DOAS.
- **Filtering the air inside the room** by using personal-wear air purifiers fitted with HEPA filters.

#### Rules for air in lecture spaces and offices High efficiency particulate air (HEPA) filters

True high efficiency particulate air (HEPA) filters are at least 99.97% efficient at filtering 0.3  $\mu$ m mass median diameter (MMD) particles in standard tests. Some penetrating particles may be smaller than 0.3  $\mu$ m, so filtration efficiency for such particles can be slightly lower



Figure 2. Air conditioning in lecture rooms and office

#### Room disinfection mechanisms with UVC or ozone

Before and after use, rooms need to be sterilized using UVC for several minutes (using a timer to evenly treat the room), as well as ozone being used for empty spaces for several minutes



before and after activities. **Note:** During sterilization using UVC or ozone, rooms must be unoccupied.



#### c) Ultraviolet type C (UVC) light for virus destruction

Figure 3. UVC for destruction of the virus

UVC is ultraviolet light with a spectrum that consists of shorter and more energetic wavelengths of light. UVC is believed to destroy virus particles in humans and so experts use UVC to kill microorganisms.

#### UV (ultraviolet) type C used as a disinfectant

UVC is used to maintain air quality standards despite the dynamics of cooling load and the dynamics of biological pollutants in the room. There are also innovations in room sterilization using UVC rays (Figure 4) for biological pollutants attached to the surfaces such as benches, floors, and walls. Irradiating of rooms is carried out automatically every time the room is about to be used or after an activity and can be automated via condition sensors attached to PC-operated web cams.

The irradiation process is carried out at certain time intervals when the room unoccupied. During the process the door is closed and information is displayed to users outside. UVC wavelengths can be remotely regulated so they can be used for multi-organic sterilization of pollutants (biological pollutants) (Figure 5).



Figure 4. Smart room sterilization system using UVC rays





Figure 5. UVC wavelengths able to sterilize biological pollutants

#### 4.2.4. Concluding Remark

The Indonesian population is potentially at risk from COVID-19 in closed rooms. To mitigate this risk, conditions must be changed in the "new normal" by maintaining a "healthy room" protocol for the health and safety of users. We have created a "Smart Indoor Health and Comfort System" to sterilize rooms and maintain air quality through the integration of air control systems and sterility control systems based on artificial intelligence. Such systems consist of a combination of air control systems that ensure air meets ASHRAE 62.1 standard (residential) and sterilization control systems using UVC light regulation. The sterilization process is carried out periodically and automatically every time a room is used, by irradiating the room with portable UVC for a certain time period, after which the room can be used again.

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**Part V:** 

# Well-being in Sustainable University during COVID-19 Pandemic







## Chapter 5.1: Managing Prosperous Sustainable Higher Education in the Midst of COVID-19 Outbreak

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The objective of this paper is to describe programs conducted by Universitas Teuku Umar (UTU) in response to the COVID-19 outbreak. Higher education institution is greatly affected by the rapid spread of the virus throughout Indonesian and the world. As part of the societal system, UTU plays a significant role to the emergency risk management, particularly within its commitment to be a prosperous sustainable university. Some contributions that have been made in response to the crisis are: (1) forming COVID-19 Task Force Team, (2) producing hand sanitizer, (3) producing cloth mask with students and alumni, (4) producing touchless hand washer, (5) spraying disinfectant on campus, (6) providing internet access for faculty members and students, (7) providing logistics for affected students, (8) providing volunteering access for students and alumni, (9) conducting online learning, (10) organizing thematic community service, and (11) developing herbal park. UTU views the pandemic as a challenge that needs to be solved by collective actions. With that in mind, UTU examines the potential of sustainability within its organization, in its cultural environment and its understanding of science to solve the challenge.

#### 5.1.1. Introduction

Crisis caused by the COVID-19 pandemic has affected various sectors. While many parties continue to strive to meet other critical needs, such as health, water, sanitation, and basic needs, the education sector must not be forgotten because it will have an equally detrimental impact if less attention is given. To control the spread of the virus, the government of Indonesia has ordered all educational institutions become online and advised all citizens to carry out independent isolation at home [1,2]. The effect of the pandemic on education can have long-term implications.

As confirmed global cases are still increasing, universities face serious challenge in sustaining its goal including enrolment, administrative infrastructure, tuition fees, student-to-faculty ratios and costs [3,4]. Universities need to take action to manage the risk caused by the COVID-19 outbreak. For instance, Wang, Cheng, Yue, and McAleer [5] argue that universities in

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China have contributed positively in preventing and controlling the pandemic situation, such as alumni resource collection, medical rescue and emergency management, mental health maintenance, control of staff mobility, and innovation in online education models. Such actions signify one of the pivotal functions of universities, which is social service.

Universitas Teuku Umar (UTU), which is situated in the tip of northern Sumatera island of Indonesia, strives to become a prosperous sustainable university. This goal is mentioned in its vision statement, that is to become a source of inspiration and reference in the development of science, technology and business in the agro-and-marine industry at the regional level in 2025, national level in 2040, and international level in 2060 through innovative, creative and highly competitive research. As such, UTU provides supports for the COVID-19 outbreak control that is in line with the three functions of university: education, research, and social services. In this paper, we describe the response taken by UTU in resolving the crisis.

#### 5.1.2. Facts about Universitas Teuku Umar as a Sustainable Campus

Universitas Teuku Umar (UTU) is relatively new public higher education institution established in 2014 by the government of Indonesia. Its currently has six faculties: (1) faculty of agriculture, (2) faculty of marine and fishery sciences, (3) faculty of public health, (4) faculty of economics, (5) faculty of engineering, and (5) faculty of social and political sciences. Overall, these faculties offer 20 study programs. These study programs have been accredited by the National Board of Accreditation for Higher Education, Ministry of Education and Culture of the Republic of Indonesia.

With its core product in agro-and-marine industry, UTU has developed UTU Farm with a total area of 3.4 acre which serves as a place for developing agriculture and a place for processing organic waste into compost or compost houses. UTU Farm cultivates approximately 1000 kinds of banana, durian, fig, date palm, and other trees. It also has a rice field with the concept of combined farming. A total forest vegetation of UTU is approximately about 380,500 m2 and a perimeter / edge line of 3,790.46 m. This forest vegetation is designated as a campus forest which is useful to reduce the effects of global warming. The forest vegetation helps the absorption of CO2 by plants and maintaining the balance of the ecosystem. In preserving the environment, UTU has been committed to be a Green Campus. This effort is made possible through relevant policies related to the good governance including infrastructure development, waste management, waste, water and transportation must be based on environment-friendly concepts. Figure 1 and 2 below are the views of UTU campuses.





Figure 1. Campus Setting of Universitas Teuku Umar



Figure 2. Integrated Building with Green Concept

In 2019, UI Green Metric has ranked UTU in 22<sup>nd</sup> place nationally and 422<sup>nd</sup> worldwide. In 2016, UTU was ranked 24<sup>th</sup> nationally and 366<sup>th</sup> worldwide. In 2017, UTU was in the 23<sup>rd</sup> greenest campus of 58 universities in Indonesia and ranked 468 out of 619 universities worldwide. In 2018, UTU ranked 21<sup>st</sup> greenest campuses from 66 universities in Indonesia and ranked 432<sup>nd</sup> out of 719<sup>th</sup> universities worldwide. UTU continues to carry out several green campus programs including programs that support the reduction in the use of paper and plastics, namely Bring Your Own Bottle, Plastic Diet Program, and Bike on Campus.

#### 5.1.3. Quick Response from UTU on the COVID-19 Outbreak

#### A. COVID-19 Task Force Team

Universitas Teuku Umar (UTU) continues to take strategic steps to prevent the spread of Corona Virus Disease 19 (COVID-19). One step is to form a special Task Force Team who is in charge in controlling the spread of COVID-19 on campus. This task force team is consisted of the Vice Rector for Student Affairs and Alumni as the team leader and assisted by several faculty members and staffs. The task force team is expected to be the front guard of UTU in facing the impacts caused by COVID-19. Additionally, the task force team also acts as the center for promoting, educating, and disseminating information related to the prevention of COVID-19 cases. This team manages all campus programs related to the prevention of COVID-19 on campus and the community.



#### B. Producing Hand Sanitizer

UTU has produced as many as 400 bottles of hand sanitizer to be distributed to the campus community for free. The production still continues to be distributed to the general public as a form of prevention of the spread of the corona virus. The production is made in an integrated laboratory under the supervision of the head of the UTU Laboratory. The production is carried out by a team consisting of faculty members and laboratory staffs who are competence in the field of chemistry. The quality of UTU's hand sanitizer production in accordance with the standards of the World Health Organization (WHO). Figure 3 below is the member of integrated laboratory team and task force team producing hand sanitizer.



Figure 3. Producing Hand Sanitizer at UTU's Integrated Laboratory

#### C. Producing Cloth Mask with Students and Alumni

The Task Force Team of COVID-19 gathers students and alumni to produce cloth masks. The products then are distributed by the Incubator of Business and Technology of UTU. These cloth masks were distributed to faculty members, staffs, and students as well as several government offices who ordered the masks. Some faculties in UTU also distribute masks for free to the public. Cloth mask production has been carried out to fulfill orders from external parties including PT.PLN of the Aceh province, Bank Aceh Syariah, and internal working units within the scope of UTU.

#### D. Producing Touchless Hand Washer

The Task Force Team of COVID-19 also produces Touchless Hand Washer (THW) by the faculty members and students of the Department of Mechanical Engineering, Faculty of Engineering. The production has reached 25 units. These products were made in collaboration with PT. PLN Branch Meulaboh to be given and placed at several public places in Aceh Barat. Figure 4 below is the task force team handed over the touchless hand washer to PT. PLN Branch Meulaboh.


The Sustainable University Effort during COVID-19 Pandemic



Figure 4. Producing Touchless Hand Washer

#### E. Spraying Disinfectant on Campus

As an effort to prevent the spread of COVID-19, UTU has taken a number of actions including spraying disinfectant on campus. It was conducted in all buildings, rooms and corners of the campus. The activity was in collaboration with the Aceh Barat District Health Office. In addition, a number of COVID-19 prevention protocols were also carried out, including scanning the body temperature of each employee and guest who come to campus and placing a hand washer at several strategic points. Figure 5 below is the task force team when spraying disinfectant on campus.



Figure 5. Spraying Disinfectant on Campus

#### F. Providing Internet Access for Faculty Members and Students

UTU provides free internet quota for faculty members and students for two months from March and April to expedite the process of teaching and learning online. This program is crucial to support the Study from Home program in which the students and faculty members are engaged



in an online teaching and learning. Internet access has been a great burden for most students and faculty members since it is expensive.

#### G. Providing Logistics for Students

Since the work/study from home ordered has been issued, not all students are in fact went home. Some of them remains near campus area due to multiple factors, especially those who are originally from other districts or provinces. This logistical assistance was provided to ease the economic burden of students from outside the region, especially outside Aceh who did not return home. There are 120 students who received the food logistics. The basic food items distributed to students were rice, instant noodles, cooking oil, eggs, canned fish and milk. Figure 6 below shows the distribution of logistics for affected students.



Figure 6. Distributing Logistics for Students Affected by the COVID-19

#### H. Providing Volunteering Access for Students and Alumni

A number of students and alumni gathered as COVID-19 Prevention Volunteers (RPC-19) in Aceh Barat. This program is as an effort to help prevent and control the spread of COVID-19. This volunteers team opens several COVID-19 health information centers in Aceh Brat. Additionally, a number of activities have been carried out by the independent volunteer community, including the distribution of masks to residents, spraying disinfectants in a number of public facilities and residents' homes, taking part in collecting data on migrants and residents suspected of having symptoms of COVID-19, checking the body temperature of the residents and distributing groceries to some residents affected by COVID-19. Figure 7 below shows students and alumni volunteering activity.



Figure 7. Students and Alumni's Volunteering Activity



#### **5.1.4.** Conducting Online Learning

Since the spread of COVID-19 has affected Indonesia, UTU has shifted the traditional learning into online learning. This online learning is carried out through various learning management system, such as Edmodo, Zoom, Google Classroom, or Google meet. In addition to lectures, a number of seminars and conferences are also conducted online, including all meetings related to office works. This change is a challenge for universities, especially faculty members and students. Teaching and learning processes carried out at home online caused various problems, such as the lack of ability to use technology, limited internet facilities, the lecturer competence. However, with the various problems that have arisen in conducting online lectures during COVID-19, the knowledge transfer process must continue. Figure 8 below is the example of online lecture at UTU.



Figure 8. Online Learning Through Zoom

#### I. Organizing Thematic Community Service for Students

UTU has decided to continue implementing the community cervice program in this period under the theme "Prevention and Countermeasure of COVID-19". This program is in line with the government policy of learning practices during the COVID-19 pandemic emergency. This program contains technical guidelines for students who are conducting community services in their village independently. Students can still implement community services according to the health protocol and help solve various problems in the COVID-19 pandemic in their respective village areas.

#### J. Developing Herbal Park

UTU through the Incubator of Business and Technology (IBT) Center developed research on herbal plants through the use of land for herbal gardens. One of the biodiversity that will be developed is the red ginger plant. The development of the Herbal park, which is located next to the UTU Rectorate building, is a research collaboration involving the IBT Center, the University Farm Center and the Teuku Umar University Health and Counseling Center. The 20x60 square meter Herbal Park is intended to support learning activities for students and research as well as being a public space for the public to get to know various types of herbal plants. In this herbal garden, there will be with various types of herbs that can be used for health. The development of



traditional medicinal plants can be used as an entrepreneurial laboratory among students and faculty members to produce herbal products and herbal medicines and can be used as research for the prevention of diseases such as COVID-19 and other diseases (arthritis, muscle pain, digestive pain, and gout). Figure 9 below is the location for herbal park.



Figure 9. Developing Herbal Park

#### 5.1.5. Concluding Remarks

Universities around the world are now facing alarming situation due to the COVID-19 pandemic. Universitas Teuku Umar, in particular, continues to overcome the difficulties caused by the pandemic. This effort involved the collaboration among many parties, including university leaders, faculty members, staffs, students, and stakeholders. The pandemic has challenged UTU on its commitment as a sustainable university. As mentioned by Nicolaides [6], a sustainable university is a positive movement towards social and environmental responsibility that is managed with accountability for the welfare of the society. One indicator of sustainable university introduced by Barth, et al [7] is adaptable to a future higher education system. UTU views the COVID-19 pandemic as a challenge for future education system. To solve the challenge, thus UTU needs to be adaptive with all resources that it has. UTU examines the potential of sustainability within its organization, in its cultural environment and its understanding of science to solve the challenge.

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### Chapter 5.2: Prosperous Sustainable Campus during COVID-19 Pandemic in Universitas Pancasila

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COVID-19 has negative impacts on health, which also affects the economy and social welfare. The number of people living in poverty is increasing due to the preventive effects of COVID-19 virus transmission. COVID-19 has also changed the way of life and the education process. Universitas Pancasila must be able to overcome all problems and situations caused by the COVID-19 pandemic. Some of the efforts that have been made include actively contributing to scientific discussions, producing hand sanitizers, implementing COVID-19 health protocols regulated by the government, and WHO. To reduce the economic impact and large-scale social restrictions in Indonesia or known as *Pembatasan Sosial Berskala Besar (PSBB)*, Universitas Pancasila provides support and policy for affected students. The support is in the form of internet data, reduction of laboratory costs, and additional living cost for students who comes from outside Jakarta, Bogor, and Tanggerang Area. They cannot go home due to large-scale social restrictions. The students receive the support as a reduction of tuition for next semester. Universitas Pancasila also provides certainty of payroll for lecturers and staff. Community services such as donation promote how to prevent and bring out community awareness to deal with COVID-19.

#### 5.2.1. Introduction

Universitas Pancasila focuses more on the negative impact of the COVID-19 pandemic because it is in Jakarta, the epicenter of the pandemic itself. There is some sector that is negatively impacted by the COVID-19 pandemic. Firstly, the health sector [1][2]. The virus quickly spread, and recent studies show that there is a possibility that this virus mutated, making it resistant to some of the reagent that is implemented in other places. From the health sector comes the social sector [3], people are ordered to keep distance and limit social interaction with one another. This situation makes stressed and feels isolated [4] because it is human nature as

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social beings to interact with each other. Companies are obligated to set their workers to works from home. However, some people might have lost their daily income because of factories closing and mass lay off. The negative impact on the economy sector also leads to the general and overall financial situation [1][3][5] [6]. Thus, this paper shares some of the Universitas Pancasila measures that tackle the negative impacts, how to survive, and strive to move forward.

#### 5.2.2. Overview of Universitas Pancasila

Universitas Pancasila was established on October 28, 1966. Universitas Pancasila is a merger of two universities, the old Universitas Pancasila (founded in 1963) and Universitas Bung Karno. The Vission of Universitas Pancasila is becoming an Excellent and Leading University based on Pancasila Values. The mission is (1) organizing a quality education process based on Pancasila noble values; (2) research in a systematic, measurable and integrated manner in developing science and technology and technological innovation (3) providing services to the community, government, and industry to improve the competitiveness and welfare of the community.

Universitas Pancasila that has received an "A" accreditation ranking has 13,380 active students, 407 lecturers, and 377 staff. Universitas Pancasila has two campuses. The main campus is on Jalan Srengseng Sawah, South of Jakarta, with approximately 12 hectares. Meanwhile, the second campus is on Jalan Borobudur, Central of Jakarta. Universitas Pancasila consists of 7 faculties, which are Faculty of Economics and Business, Faculty of Law, Faculty of Engineering, Faculty of Communication, Faculty of Pharmacy, Faculty of Tourism and Faculty of Psychology, with a total of 27 study programs diploma levels, bachelor, master, and doctoral degrees.

Universitas Pancasila makes Pancasila's noble values as a character of civitas academics and makes integrity, competence, loyalty, enthusiasm, solidity, and harmony as campus culture.

Universitas Pancasila is a member of UI GreenMetric since 2010. By planning and implementing sustainable development as a green campus, Universitas Pancasila has successfully increased the UIGM rank from 32<sup>nd</sup> in 2018 to 29<sup>ths</sup> in 2019 at the national level. Figure 1 illustrates the rectorate building on the main campus that surrounds with trees and green plantation.



Figure 1. Rectorate Building in Main Campus



#### **5.2.3.** Efforts to Overcome the COVID-19 Pandemic

#### A. Prevention of Transmission

Since March 19, 2020, the campus has been close for all academic activities that include in-class teaching and learning, laboratory practices, face to face counseling, etc which involved a crowd of students and lecturers. The policy to close the campus was taken to under the decision from the government. The learning process continues online via <a href="http://lms.univpancasila.ac.id/">http://lms.univpancasila.ac.id/</a> and e-learning website in each faculty. Meanwhile, the other activities, such as meeting, counseling, thesis defense, etc held by using online communication such as messenger, phone, and video conference. Figure 2 shows senate meetings and management meetings held online using video a conference application.



Figure 2. Video conference (a) Senate Meeting, (b) Management Meeting

Although the campus is closed, some staff and lecturers with a managerial position must come to campus alternately with a predetermined schedule by keeping social distancing. The Rector regulates the health protocols of COVID-19 in Universitas Pancasila following WHO[7] and government regulations[8]. Everyone must wear masks in the campus. Then, their body temperature is checked in the main gate and each entrance of the buildings. Disinfectant chambers provide on the campus main gate and several faculty buildings, as shown in Figure 3. Meanwhile, Figure 4 shows handwashing facilities placed near every entrance of buildings. Hand sanitizer containers place in every corner of the buildings, where handwashing facilities are impossible to install.



Figure 3. Disinfectant chamber on the campus main gate (a), and the entrance of the Engineering and Faculty Building (b).





Figure 4. Example of Hand Washing Facilities in *Rektorat* (a), and Pharmacy Faculty building (b).

To prevent COVID-19 transmission among academic members and staff, some facilities are modified. Signs for physical distancing are assigned in the elevators, waiting room, meeting room, mosque, etc. The elevator switches are modified as non-touch switches using sensors.



Figure 5. Elevator switch modification (a), and physical distancing signs (b)

#### B. Academic Research and Discussion

One of Universitas Pancasila's contributions to COVID-19 prevention is producing hand sanitizers, as shown in Figure 6. It is distributed to academic members and the community around the campus for free. This product is also used in a campus area, and places in a particular area where many people pass by, and the hand-washer is not possible to install.



Figure 6. Hand sanitizer made in Universitas Pancasila (a),(b), and Hand sanitizer container (c)



#### 5.2.4. Prosperity for the Academic Members and Staffs

#### A. Employment certainty

COVID-19 affects the economy globally, and the unemployment rate is increasing. To provide the tranquility in working for the lecturers and staff, Universitas Pancasila ensured no laid-off of the employees during the pandemic. Even though Universitas Pancasila implemented the order of "work from home" (WFH), all employees are given full salary and benefit, especially those who still have to go to campus. This policy also applies to contract staff who support academic activities.

#### **B.** Financial support for students

The situation forced some students to expand more resources to attend classes and learn, such as internet data. Universitas Pancasila decided to give financial support to those who need it. Each student received Rp.150.000 per month for three months, from March to June 2020. They will not receive this money in cash but as a reduction of tuition fees for next semester.

For students who come from outside of Jakarta, Bogor, Depok, Tanggerang, and Bekasi (Jabodetabek), that are not able to go back to their respective hometown or city due to largescale social restriction, the university has taken the initiative by giving them food and living cost with the average value of Rp.125.000 per student, three times every two weeks, for a total of 81 students. Figure 7 shows the representation of students who received financial support.



Figure 7. Symbolic delivery of financial support for student

Furthermore, specific faculty such as Engineering Faculty and Pharmacy Faculty, that have a curriculum of exercises or practicing in the laboratory, that cannot be performed because of the large- scale social restriction policy will be done online. This led to the reduction of their financial obligation of Rp.100.000. However, for certain laboratory practices that cannot be performed online, will be carried out in July by following the health protocol for COVID-19.

The academic incentive will also be given to students who do not have the necessary facilities, such as phone data, WIFI, laptops, or computers, that can support online classes. This incentive comes in the form of lowering the minimum passing grade to a C+. Students who actively participate in class, midterm, and final exam will be given a minimum score of B.



#### C. Donation for Society

The canteens at Universitas Pancasila are managed by the surrounding community and monitored by the university. Because the campus is closed, they could not get income as usual. Therefore, the university waives rental fees as long as the campus is closed. During Ramadan, between May and June, the University orders breaking fast food from the canteens to be distributed to orphanages. Thus, the canteen can still generate income even though it might not be as much as usual.

The donation was given to the community around campus by *Program Pancasil Berbagi* (Pancasila Sharing Program). Rice, sugar, cooking oil, hand sanitizer, etc were packed and distributed to the one who needed it. Figure 8 shows the activities of the Program Pancasila Berbagi.



Figure 8. Donation for the community from alumni (a), Doctoral Programs (b), University (c,d)

#### 5.2.5. Summary/ Concluding Remarks

COVID-19 pandemic affected the people, including the economy and prosperity. It changed the way of life and the education process. Online learning becomes a necessity in the implementation of teaching and learning activities. Lecturers and staff must work from home, only those who have to come to campus is allowed. Although they work from home, everyone has a full salary and benefits from the university.

Universitas Pancasila is actively involved in researches and academic discussion in overcoming COVID-19. Health protocol recommended by WHO and government is implemented. To ease students' economic burden, Universitas Pancasila provides financial and academic support for students affected by COVID-19, such as students from outside Jabodetabek



area, those who have limitations for online learning facilities. Universitas Pancasila also donated to the community.

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### **Program of Event** The Sustainable University Effort during **COVID-19** Pandemic

UI GreenMetric International Webinar Series 1: "Sustainable University and Food Sufficiency during COVID-19 Pandemic"

Date	: Tuesday, 19 May 2020
Time	: 6.30 – 8.30 PM (Jakarta Time, GMT+7)
Application	: Zoom and YouTube (https://youtu.be/vvA7ZAblJCc)
Chair	: Prof. Dr. Ir. Ambariyanto, M.Sc., National Coordinator of UI GreenMetric for
	Indonesia Universities and Vice-Rector, Universitas Diponegoro
Speakers	•

- Prof. Santiago García Granda, National Coordinator of UI GreenMetric for Universities in Spain and Rector, University of Oviedo, Spain
- Mr. Yesbol Omirzhanov, National Coordinator of UI GreenMetric for Universities in Kazakhstan and Representative of Rector, Kazakh National Agrarian University, Kazakhstan
- Prof. Dodik Ridho Nurrochmat, Vice-Rector, IPB University, Indonesia
- Dr. Herlin Chien, National Coordinator of UI GreenMetric World University Rankings Network for Universities in Chinese Taipei and Representative of President, National Pingtung University of Science and Technology, Chinese Taipei
- Prof. Ouajdi Korbaa, National Coordinator of UI GreenMetric for Universities in Tunisia and Professor, the University of Sousse, Tunisia
- Dr. Esmail Karamidehkordi, National Coordinator of UI GreenMetric for Universities in Iran and Director of International Scientific Cooperation Office, University of Zanjan, Iran
- Dr. Jaime Alberto Romero Infante, National Coordinator of UI GreenMetric for Universities in Colombia and Director of Environmental business management Master, El Bosque University, Colombia

#### UI GreenMetric International Webinar Series 2: "Teaching, Learning and Working in Sustainable University during COVID-19 Pandemic"

Date	: Tuesday, 9 June 2020
Time	: 6.30 – 8.30 PM (Jakarta Time, GMT+7)
Application	: Zoom and YouTube ( <u>https://youtu.be/N2T9B13S-Gg</u> )
Chair	: Prof. Mirko Degli Esposti, National Coordinator of UI GreenMetric World
	University Rankings Network for Universities in Italy and Deputy Rector,
	University of Bologna, Italy

Speakers

Prof. Dr. Mustafa Çufali, National Coordinator of UI GreenMetric for Universities in Turkey and Rector, Bülent Ecevit University, Turkey



- Mgs. Silvia Donoso Acosta, National Coordinator of UI GreenMetric for Universities in Ecuador and Representative of Rector, Escuela Superior Politécnica de Chimborazo, Ecuador
- dr. Agustin Kusumayati, M.Sc., Ph.D., University Secretary, Universitas Indonesia
- Dr. Laszlo Gyarmati, National Coordinator of UI GreenMetric World University Rankings Network for Universities in Hungary and Director of Jozsef Attila Study and Information Center, University of Szeged, Hungary
- Dr. Dario Liberona, National Coordinator of UI GreenMetric World University Rankings Network for Universities in Chile and Visiting Lecturer, Seinajoki University of Applied Sciences, Finland
- Dr. Juris Iljins, National Coordinator of UI GreenMetric for Universities in Latvia and Director of Quality Management and Sustainability, Riga Technical University, Latvia
- Dr. Habib M. Fardoun, National Coordinator of UI GreenMetric for Universities in Saudi Arab and Director of KAU Center for Academic Standards & Excellence, King Abdulaziz University, Saudi Arabia
- Ms. Birte Hornemann, Chief Data Strategist, Aalborg University, Denmark

#### UI GreenMetric Indonesia Webinar Series 1: "Sustainable University during COVID-19 **Pandemic**"

Date	· Friday 24 April 2020
	. 1 Hday, 24 April 2020
Time	: 09.00-10.30 WIB
Application	: Zoom and YouTube ( <u>https://youtu.be/HqppENTIaPM</u> )
Chair	: Prof. Dr. Tommy Ilyas, Expert Member of UI GreenMetric
Keynote Speaker	: Prof. Ir. Nizam, M.Sc., DIC., Ph.D, Director General of Higher
	Education, Ministry of Education and Culture
Sneakers	

- Speakers
- Prof. Dr. Ir. Ambariyanto, M.Sc, National Coordinator of UI GreenMetric for Indonesian Universities and Vice-Rector, Universitas Diponegoro
- Prof. Dr. Arif Satria, SP, MSi., Rector, IPB University •
- Prof. Dr. Fathur Rokhman, M.Hum., Rector, Universitas Negeri Semarang
- Prof. Dr. Jamal Wiwoho, SH, MHum, Rector, Universitas Sebelas Maret •
- Prof. Dr. Moh Mukri M.Ag., Rector, UIN Raden Intan Lampung
- Prof. Ir. Panut Mulyono, M.Eng., D.Eng., Rector, Universitas Gadjah Mada •
- Prof, Dr. Ir. Bustami Syam, M.S., M.E., Vice-Rector, Universitas Sumatera Utara (USU) •
- Prof. Dr. Ir. Gandjar Kiswanto, M.Eng. Director of Operation and Maintenance of Facilities, Universitas Indonesia

#### **UI GreenMetric Indonesia Webinar Series 2: "Sustainable University and Food Sufficiency** during COVID-19 Pandemic"

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Speakers

- Susi Agustina Wilujeng S.T., M.T., Head of the Smart Eco Campus Development Unit, Institut Teknologi Sepuluh Nopember
- Dr. Eva Anggraini, S.Pi., M.Si., Director of Scientific and Strategic Information Publications, IPB University
- Dr. Jamhari, S.P., M.P., Dean of the Faculty of Agriculture, Universitas Gadjah Mada
- **Prof. Dr. Ir. Amin Retnoningsih, M.Si,** Head of Conservation Development unit, Universitas Negeri Semarang
- **Prof. Dr. Ir. Purwanto, DEA,** Head of Planning and Development Agency, Universitas Diponegoro
- Dr. Suryanto, S.E., M.Si., Head of the Center for Environmental Research, Universitas Sebelas Maret
- Diana Sari, S.E., M.Mgt., Ph.D, Director of Innovation and Corporation, Universitas Padjadjaran

## UI GreenMetric Indonesia Webinar Series 3: "Sustainable University and Waste Management during COVID-19 Pandemic"

Date	: Friday, 8 May 2020
Time	: 09.00-10.30 WIB
Application	: Zoom and YouTube ( <u>https://youtu.be/UF3Uqc4fW9Y</u> )
Chair	: Prof. Dr. Ir. Ambariyanto, M.Sc, National Coordinator of UI GreenMetric
	for Indonesian Universities and Vice-Rector, Universitas Diponegoro

Speakers

- Prof. Drs. H. Ganefri, M.Pd., Ph.D., Rector, Universitas Negeri Padang
- **Prof. Dr. Adiwijaya, S.Si., M.Si.**, Rector, Telkom University
- Ir. Temmy Wikaningrum, M.Si., Head of Environmental Engineering program, President University
- **Prof. Dr. Ir. Syafrudin, CES, MT,** Deputy Director of Research and Industrial Cooperation, Universitas Diponegoro
- Dr. Eng. Tri Budi Prayogo, ST., MT., Coordinator of Waste Management, Brawijaya University
- Warma Dewanti, S.T., M.T., Ph.D., Head of the Center for Sustainable Infrastructure and Environmental Research, Sepuluh November Institute of Technology
- Dr. Ir. Nurzainah Ginting, M.Sc, Coordinator of Waste Processing, University of North Sumatra (USU)

# UI GreenMetric Indonesia Webinar Series 4: "Teaching, Learning and Working in Sustainable University during COVID-19 Pandemic"

Date	: Friday, 15 May 2020
Time	: 09.00-10.30 WIB
Application	: Zoom and YouTube ( <u>https://youtu.be/0sTWuPbfsOMn</u> )



Chair

: **Prof. Ir. Gunawan Tjahjono, M.Arch., Ph.D,** Expert Member of UI GreenMetric

Speakers

- Prof. Dr. Dwia Aries Tina Pulubuhu, MA. Rector, Universitas Hasanuddin
- Prof. Fathul Wahid, S.T., M.Sc., Ph.D., Rector, Universitas Islam Indonesia
- Prof. Dr. Mohammad Nasih SE MT Ak CMA, Rector, Universitas Airlangga
- Prof. Dr. Dadan Ramdan, M.Eng, M.Sc., Rector, Universitas Medan Area
- Prof. Dr. Ir. Moch. Sasmito Djati, M.S., Vice-Rector, Universitas Brawijaya
- dr. Agustin Kusumayati, M.Sc., Ph.D., University Secretary, Universitas Indonesia
- Dr. rer. nat. Poerbandono, ST, MM, Head of the Quality Assurance Unit, Institut Teknologi Bandung

## UI GreenMetric Indonesia Webinar Series 5: "Energy and Climate Change in Sustainable University during COVID-19 Pandemic"

Date	: Thursday, 4 June 2020
Time	: 09.00-10.30 WIB
Application	: Zoom and YouTube ( <u>https://youtu.be/HpxEpGL-vzc</u> )
Chair	: Dr. Nyoman Suwartha, S.T, M.T, M.Agr., Vice-chair of UI GreenMetric
Speakers	:

- Dr. Ir. Gunawan Budiyanto, M.P., Rector, Universitas Muhammadiyah Yogyakarta
- Prof. Dr. Muhammad Zamrun F., S.Si., M.Si., M.Sc., Rector, Universitas Halu Oleo
- Dr. dr. Asep Sukohar, M.Kes, Vice-Rector, Universitas Lampung
- Ir. Andrey Andoko M.Sc., Vice-Rector, Universitas Multimedia Nusantara
- **Prof. Dr. Ir.Tri Widjaja M.Eng.,** Head of the Center for Sustainable Energy Research, Institut Teknologi Sepuluh Nopember (ITS)

# UI GreenMetric Indonesia Webinar Series 6: "Well-being in Sustainable University during COVID-19 Pandemic"

Date	: Thursday, 11 June 2020	
Time	: 09.00-11.00 WIB	
Application	: Zoom and YouTube ( <u>https://youtu.be/An38R5EjdU8</u> )	
Chair	: Prof. Dr. Ir. Amin Retnoningsih, M.Si, Head of Conservation	
	Development unit, Universitas Negeri Semarang	

Speakers

- Prof. Dr. Jasman J. Ma'ruf, SE. M.B.A, Rector, Universitas Teuku Umar
- Prof. Dr. Ridwan Nurazi, SE, M.Sc, Ak, CA., Rector, Universitas Bengkulu
- Prof. Ir. Ofyar Z. Tamin, M. Sc., Ph. D, Rector, Institut Teknologi Sumatera
- Prof. Dr. Wahono Sumaryono, Apt., Rector, Universitas Pancasila
- Dr. Sri Rahayu, S.H., M.H., Vice-Rector, Universitas Bangka Belitung



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### UI GreenMetric World University Rankings: Background of the Ranking

#### **Initiation of the Ranking**

The UI GreenMetric World University Ranking is an initiative of Universitas Indonesia which is being launched in 2010. Prof. Gumilar Rusliwa Soemantri Stated that it is a part of strategy of raising its international standing. The University hosted an International Conference on World University Rankings on 16 April 2009. It invited a number of experts on world university rankings such as Isidro Aguillo (Webometrics), Angela Yung-Chi Hou (HEEACT), and Alex Usher (Educational Policy Canada). It was clear from the discussions that current criteria being used to rank universities were not giving credit to those that were making efforts to reduce their carbon footprint and thus help combat global climate change.

#### Aim of the Ranking

The aim of this ranking is to provide the result of online survey regarding the current condition and policies related to Green Campus and Sustainability in the Universities all over the world. It is expected that by drawing the attention of university leaders and stake holders, more attention will be given to combating global climate change, energy and water conservation, waste recycling, and green transportation. We hope that the ranking will be useful to university leaders in their efforts to put in place eco-friendly policies and manage behavioral change among the academic community at their respective institutions.

#### **Creating the Ranking**

Universities that wish to participate are asked to provide numeric data on a number of criteria that can give a picture of their commitment to the greening of their campus and putting in place environmentally friendly policies that support sustainability. The criteria include such baseline information as the size of the university, both spatially and in terms of population, the campus location and the amount of green space; and also information on energy use, transport, water use and recycling and waste treatment. In addition, it will ask about efforts being made by the institution towards establishing green policies and management.

#### Methodology Used to Create the Rankings

#### • The philosophy behind the rankings

We based our instrument on a broad philosophy that encompasses the three Es: Environment Economics and Equity.

#### • The criteria

We selected criteria that are generally thought to be of importance by universities concerned with sustainability. These include the collection of a basic profile of the size of the university and its zoning profile, whether urban, suburban, rural. Beyond this we want to see the degree of green space. The next category of information concerns electricity consumption because of its link to our carbon footprint. Then we want to know about transport, water usage, waste management and so on. Beyond these indicators, we want to get a picture about how the university is responding to or dealing with the issue of sustainability through policies, actions, and communication. In the first version of the methodology, used in 2010, 23 indicators were used within the five categories to calculate the ranking scores. In 2011, 34 indicators were



used. Then in 2012 we leave the indicator of "smoke free and drug free campus environment" and used 33 indicators to evaluate the green campus. In 2012, we also categorize the indicators into 6 category including education criteria. One change being considered is the formation of a new category for sustainability education and research. In 2015 the theme was carbon footprint. We add two questions related this issue in the energy and climate change section. We also improved our methodology by adding a few sub-indicators that related to water and transportation in the 2015 ranking. A major change in methodology was done in 2016 by considering new trends in sustainability issues. In 2017, It is started to request some documentation for prove as an evidence. In 2018, the theme was Universities, Impacts, and Sustainable Development Goals (SDGs). We added detailed answer options to the following indicators: total area on campus covered in forest, planted vegetation, water absorption besides forest and planted vegetation, energy efficient appliances usage, smart building implementation, the ratio of renewable energy produce/production towards total energy usage per year, elements of green building implementation, the greenhouse gas emission reduction program, all of waste and water criteria, the ratio of parking area to total campus area, transportation initiatives to decrease private vehicles on campus, the transportation program designed to limit or decrease the parking area on campus, shuttle services, Zero Emission Vehicles (ZEV) and pedestrian policy on campus, and the existence of a university-run sustainability website. We also added a new question on Education Criteria, i.e. existence of published sustainability report. We changed the question of the bicycle into Zero Emission Vehicles by considering the green transportation related to universities worldwide. In 2019, the theme was Sustainable University in a Changing World: Lessons, Challenges, and Opportunities. We improved the questionnaire in the options for answers and more explanation about smart building indicators. In 2020, the theme of the questionnaire is Universities' Responsibility for Sustainable Development Goals and World's Complex Challenges. What is new in 2020 UI GreenMetric questionnaire is UI GreenMetric WUR tries to approach the impact that university can provide in an effort in planning a green campus to community.

#### • The scoring

Scoring for each item will be numeric so that our data can be processed statistically. Scores will be simple counts of things, or responses on a scale of some sort.

#### • The weighting of criteria

Each of the criteria will be categorized in a general class of information and when we process the results, the raw scores will be weighted to give a final calculation. The weighting Criteria can be found in Fig.1.

#### • Refining and improving the research instrument

While we have put every effort into the design and implementation of the questionnaire, we realize that this seventh year-round is bound to have shortcomings. Therefore, we will be reviewing the criteria and the weightings continuously to reflect input from participants and state of the art developments in the field. We welcome your comments and input.

#### • Data collection

Data will be collected through online system between May-October of the year, from the universities we have contacted and who are willing to provide information.

#### • The results announcement

The results of the metrics is annually released in December.





Figure 1. UI GreenMetric ranking criteria and weighting



Figure 2. Number of UI GreenMetric's participating universities 2010-2020



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CBIOM3S

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Center for Biomechanics, Biomaterials, Biomechantronics and Biosignal processing (CBIOM3S) works on the development of health technology products, of which several products have been made: bionic hands, mechanical hands, club foot therapy devices for babies, braces for patients with osteoarthritis of the knee joints, artificial feet, Parkinson's disease diagnostic tools, exo-glove it for stroke patients, etc. more information: https://cbiom3s.undip.ac.id/

Center for Plasma Research (CPR) focuses on conduct research activities in plasma and plasma applications include, environmental plasma, plasma for food, agriculture, textile, materials, medical and plasma for energy that focus on gasification plasma. This center has successfully commercialized "Zeta Green" which is an air purifier that able to clean the air surrounding and remove smoke, virus, bacteria, and fungi. more information: http://cpr.undip.ac.id/

The SDGs Center of Diponegoro University serves as a focal point to redefine, sharpen and continuously increase the university's effort and commitment to environmental sustainability and development. The SDGs Center of Diponegoro University has a vision to become "a center of excellence for the university that can play an active role in encouraging achievement of the SDGs in Indonesia by 2030." more information: http://sustainability.undip.ac.id/

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Covid-19 Pandemic, started in 2020, has shocked and brought unprecedented impacts to higher education institutions around the world. During this pandemic they have to adapt and mitigate the impacts in learning, research, community engagement and other services. In terms of sustainability, they have to mitigate the impacts not only for now, but also for the future.

To discuss, learn and share the experience of several universities on this issue, UI GreenMetric World University Rankings Network in collaboration with their members held virtual international and national webinar series in 2020.

This book documents invited papers which have been presented by the university leaders from member universities.



R.F. Sari is the Chairperson of UI GreenMetric and a Professor of Computer Enginering at the University of Indonesia. N. Suwartha is the Vice-Chair of UI GreenMetric and a Lecturer at the Dept. of EESP, University of Indonesia. Junaidi is the Vice-Chair of UI GreenMetric and a Lecturer at the Fac. of Humanities, University of Indonesia