Adopting COBIT 2019 for Information Technology Risks in University Online Learning during COVID-19

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Adopting COBIT 2019 for Information Technology Risks in University Online Learning during COVID-19

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Abstract

With the COVID-19 pandemic in Indonesia in early 2020, the university's priority response is to ensure that all academic staff are safe and healthy. Furthermore, it is also crucial to ensure the organization's business processes activity working and achieving the business goals even in disaster emergencies. To achieve its goal, the university conducted strategic planning, with the goal of ensuring the university's sustainability in achieving its vision and mission even in the face of a disaster emergency. During the COVID-19 pandemic, the university's business sustainability strategy prioritises information technology (IT) as a strategic goal for maintaining business continuity. First, IT strategic goals are stakeholders who are always up-to-date, for instance, scheduling time to communicate and determine the topic of communication. The second option is work from home (WFH), in which the stakeholder has the ability to work from home, has access to tools and materials, and can work remotely. Using information technology to create an online learning environment during COVID-19 is one solution to the remote learning problem. However, it should be noted that there are risks associated with using IT to support online learning. By using the case study in Universitas Diponegoro, this study is adopting COBIT 2019 risk profile for identifying the IT risks in University Online Learning Environment During COVID-19. After constructing the COBIT 2019 risk profile, the result shows four risk factors that fit: end user, technological, infrastructure, and financial. The End User risk factor is represented in COBIT 2019 by ref.4 (IT expertise, skills & behavior). In COBIT 2019, financial risk factor is represented by ref. 1 (IT investment decision making, portfolio definition & maintenance) and ref. 3 (IT portfolio definition & maintenance) (IT cost & oversight). The infrastructure aspect in COBIT 2019 is shown in ref. 7 (IT operational infrastructure incidents). The technological aspect in COBIT 2019 is represented by ref. 8 (software adoption/usage issues), ref. 9 (hardware incidents), and ref. 10. (Software failures). The four risk factors must be identified towards the university in order to achieve the university strategy for dealing with the pandemic.

Keywords: IT; Risk; Online learning System, university, pandemic

1. Introduction

During the COVID-19 pandemic in early 2020, the learning process and academic situations in university dramatically changed to digital environment. The physical environment is neglected and silent. The virtual and digital

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traffic in the academic environment is congested. These circumstances drastically altered the university. Technology has changed the possibilities within teaching and learning. Classes, which were previously limited to lectures, talks, and physical objects, are no longer required to be designed in this manner. Teachers and students can use conference technology for replacing the interaction learning process.

The conferencing application significantly increases in term of use during the COVID-19 pandemic. According to the data, leading mobile conferencing platforms Zoom, Microsoft Teams, and Google Meet reported 200 million downloads from users worldwide in August 2021. However, this represents a drop of more than 58 percent from 2020, when Zoom, Microsoft Teams, and Google Meet had 479 million installed [1]. As for the devices to access internet, the majority of the Indonesians were mobile internet users. This may be due to the affordability and user-friendliness of the mobile devices that are available in the Indonesian market [2]. In terms of user penetration, YouTube and WhatsApp were the leading social networks in Indonesia as of the third quarter of 2020 [2].

According to a survey from September 2020, 25 percent Indonesian started using remote learning services for their children since the COVID-19 situation started. Furthermore, since COVID-19, 21% of Indonesian respondents have begun using videoconferencing for professional purposes, and 17% have begun using remote learning for themselves [3].

With the COVID-19 pandemic in Indonesia in early 2020, the university's priority response is to make sure that all the university academic staff and student is safe from the COVID-19 pandemic. Furthermore, the university must ensure that the university's business processes are operational and that the business goals are met even in disaster situations.

Remote learning is the first option to make sure all the university academic staff and student is safe from the COVID-19 pandemic. For remote learning, universities must plan what capabilities and facilities will be required to deal with COVID-19 pandemic situations. Furthermore, what plans does the university have to please the stakeholder? Remote learning technology includes information technology (IT) for lecturers and students to learn from home, as well as communication to coordinate. Given the growing importance of remote learning services technology in COVID-19 situations, technology remote learning services is critical for Indonesian universities to ensure university business continuity. It is essential to make sure that the university has a capability for continuing the university vision and mission when experiencing COVID-19 pandemic situations.

Despite the recent proliferation of technologies for remote learning, there are numerous issues that arise that are related to the risk associated with the technology used for learning. This is also a consideration because the quality of teaching and learning suffers as a result of the technology used for remote learning. Furthermore, COBIT 2019 includes a risk profile for identifying IT-related risks that may occur in an organization. However, COBIT 2019 focuses on the enterprise level [4]. Therefore, the goal of this paper is to use the COBIT 2019 risk profile to identify IT risks in the University Online Learning Environment during COVID-19. In this study, we utilize the risk factor and identify Online Learning Systems (Universitas Diponegoro, Semarang, Indonesia).

2. University strategy map during the COVID-19 pandemic

It is essential to make sure that the university has a strategy map for managing the business process when experiencing COVID-19 pandemic situations. The strategy map assists the university in identifying strategic mapping that will be carried out by the university in order to meet anticipated targets during the pandemic. During the COVID-19 pandemic, university business sustainability strategy makes IT strategic goals in maintaining business continuity during the COVID-19 pandemic. First, IT strategic goals are stakeholders who are always up to date, such as scheduling communication time and determining the topic of communication. The second option is work from home (WFH), in which the stakeholder has the ability to work from home, has access to tools and materials, and can work remotely.

The four perspective Balance Score card (fig. 1) divides the score into four perspectives. The first is in finance. From a financial standpoint, the university must continue to make the business profitable. Second is from the standpoint of the stakeholders. To ensure the continuation of the business, the university must satisfy the stakeholders (students, lecturers, and academic staff). Third, there is the internal University process. What plans does the university have to appease the stakeholder? The final component is learning and infrastructure. What capabilities and facilities do

universities require to manage the business process during COVID-19 pandemic situations?

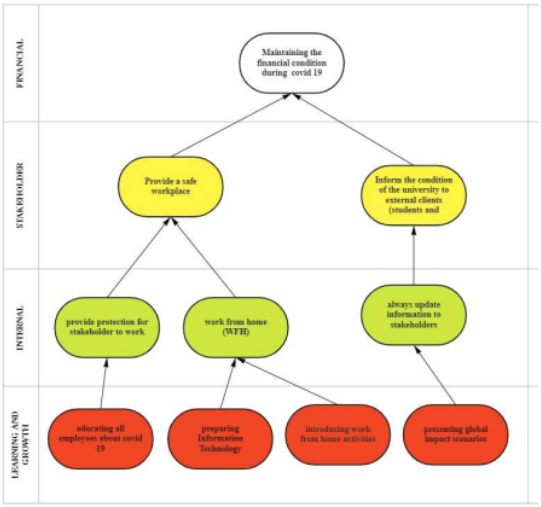

Fig. 1. University Strategy Map for handling COVID-19

From ***learning and growth*** point of view, the university has four strategies:

- educating all employees about COVID-19,
- presenting global impact scenarios,
- preparing IT
- and introducing work from home activities.

The first strategy is to educate employees about Covid through direct practice and care programs. The second strategy is the delivery of global impact scenarios, carried out by identifying operational impacts and updating plans for the future. The third strategy is the readiness of IT facilities, where IT should facilitate university activities and services to the stakeholder. Furthermore, it is essential to provide information about the university's latest condition to all stakeholders. The fourth strategy is to enhance and provide IT capabilities and facilities. The strategy means that the university's information technology advancement and provision should support all university business processes. Which all the office work activity for supporting the university business process can be accessed from the stakeholder's homes. Furthermore, there is the readiness of IT infrastructure and IT networks that all stakeholders can access from their homes.

From the **internal** business point of view, there are three goals to be achieved. The first is to provide protection for stakeholder to work. It is accomplished by providing workplace protection through social distancing programs and travel restrictions. Second, keep stakeholders informed of any changes. The process of updating information is on schedule. The third strategy work from home (WFH). This WFH activity is coordinated through remote communication. It is critical to ensure the availability of IT from all stakeholders in order to conduct remote communication.

From the **stakeholder** point of view, there are two strategic objectives to be achieved. The first is to provide a safe workplace to anticipate any health impacts on stakeholders, anticipate the impact on required stakeholder education, and anticipate the daily needs of stakeholders. The second objective is to provide information to customers and stakeholders for the current state of the university.

From the **financial** perspective, there is only one goal: maintain the university business process, which has an impact on the university's existence, for as long as possible during the COVID-19 pandemic. All objectives in the financial perspective can be met by achieving goals in the stakeholder, internal, and learning and growth perspectives.

3. The component of Information Technology in Online learning

Because of the impact of the 2019 covid pandemic, lecturers and students should be able to use technology to support university learning activities. The university learning activities can be accomplished through the advancement of technology and innovations that facilitate lecturer and student learning activities. The primary reason for incorporating technology into education is to allow students to learn comfortably and according to their needs [5]. Furthermore, because classes and universities are closed due to COVID-19, students and lecturers are forced to rely solely on technology to aid in the learning process. Prior to the pandemic, e-learning had been implemented as an accessibility tool via mobile phones and computers, providing students with flexibility. Because of the drastic reduction in the costs of implementing these technologies, the use of web-based technologies for educational purposes has increased rapidly [6].

Table 1. Application of on-line learning system on Internet

Learning area	Descriptions	Remote learning Strategies and Technologies
Student presentation	Presentations	Video on the WWW
Security	Security for enter Application for remote learning	Single Sign On (SSO)
Sharing the learning material	Sharing the material from lecturer to students	Cloud storage, Learning management system
Assignment	Quiz and Assignment	www on form application
Class activity	Online classes	Conference meet application
Collaborative projects	Group project	Collaboration tools on the WWW
Student Tours on project	Virtual tours	www integrated with the conference meet application
Student laboratory	Virtual laboratory	WWW integrated with, , WWW integrated with subject of laboratory
Simulation	Using Simulation	www for training and education, multimedia application
Communication	Internet Chat room	www, internet chat or messenger room, e-mail
Attendance in Class	Presence System	QR Code based on WWW
Digital Library	Sharing resources based on e-journal	E-journal

Table 1 depicts the various technologies used by universities to facilitate teaching activities. When universities promote the use of ICT, they must first understand their lecturers' and students' attitudes toward it [6]. The learning environment's reliance on IT is generally intended to increase access to education, improve educational quality,

improve communication and interaction among students, and increase interaction between students and teachers during the pandemic. Furthermore, during a pandemic, IT can reduce physical interactions.

4. Risks of Information Technology in the Online learning

Risk is the effect of uncertainty on the achievement of specific goals [6]. Identification of risk can be help to overcome the problem before it is occurring. Along with the growth of e-learning technologies, however, there exist problems; for instances Faculty members acceptance of e-learning systems Identifying risks can assist in preventing problems from occurring. However, as e-learning technology advances, problems may arise, such as faculty members' acceptance of the e-learning system [7]. With the importance of e-learning systems during a pandemic situation, there are several problems at the university, such as faculty members' lack of IT skills; lack of acceptance of teacher technology; and a lack of hardware, software, facilities, and network capabilities in the university environment, which could be part of the risk effect. The challenge is to ensure that the university's sustainability process is supported by the e-learning system. This can be overcome through learning in the e-learning system. In summary, the risk factors for e-learning in a university environment can be divided into four categories as shown in Table 2 [8].

Table 2. Risk Category of on-line learning System.

Risk category remote learning technology	Risk factor
End User	• Self-efficacy of technology strategies and adoption • Adoption of technological teaching in practical
Infrastructure	• Lack of proper supporting IT infrastructure • Lack of bandwidth • Intermittent communications
Technological	• Lack of proper devices for accessing the technology • Adaptability of technology with the courses content
Financial	• Financial Constraint

5. Method

This study employs a case study approach in which six processes are described: 1) plan, 2) design, 3) prepare, 4) collect, 5) analyze, and 6) share. The planning stages focus on justification for conducting a case study based on its strength and limitations [9]. The study aims to identify the risk of using IT in the learning environment among students and teachers, and proposes a Risk Management Model for the long-term sustainability of learning in a real university setting using the case study method. The case study method is appropriate for this study because our research does not seek to generalize to other universities because each university's use of technology for learning is unique in practice. In this study, we used risk factors and identify the use of Online Learning System at Universitas Diponegoro in Semarang, Indonesia.

The following design steps were used with the aim of describing the unit of analysis, identifying the problem underlying the projected research, and implementing a process to maintain the quality of the case study [9]. Universitas Diponegoro was chosen as a case study because it is one of Indonesia's state universities and a model for many pilot projects. Universitas Diponegoro is a public university in Indonesia with 11 faculties located in Semarang, Central Java. This study created a university strategy map for dealing with the COVID-19 pandemic. Financial, stakeholder (customer focus and employee satisfaction), internal, learning and growth indicators are included in the strategy map.

The following stage is preparation, which focuses on the investigator, developing a case study protocol, conducting a pilot case, and obtaining any necessary approvals [9]. Our team consists of qualified researchers who are familiar with case study methodology, and a case study protocol was developed to ensure the study's integrity. We were able to get the study approved without any problems because our team of researchers works as lecturers at Universitas Diponegoro and the study focuses solely on technology without involving any critical data.

The collection stage follows, and it entails following the case study methodology, gathering evidence from various

sources, creating a case study database, and maintaining a chain of evidence [9]. We conducted a series of observations on technology used by the University for our case study to gain an overview of the university's activities as well as the current state of its online learning activity implementation. To assess a risk in IT governance, a systematic approach is required.

The analysis stage follows, and it is based on theoretical propositions and other sources. The following analytical steps investigate the purpose of clarity and interpretation of findings using theoretical concepts and other tools [9]. The COBIT 2019 strategy map and framework with online learning system risk management techniques have been used to improve the theoretical propositions in this study. As a result, explanation building analysis is used because it can analyze case study data by generating an explanation about the case [9] and explaining how and why things happened in the university setting regarding the risk of the online learning system.

6. IT for online learning in Universitas Diponegoro during COVID-19

The sections below describe the online learning system that is employed by Universitas Diponegoro.

6.1. Single Sign On (SSO)

Single Sign On (SSO) is a mechanism that requires users to remember only one username and password in order to access a service at the same time. The SSO system is a technology that allows users to access existing network resources with a single login [9]. The SSO system authenticates the user across all applications to which they have been granted access. As a result, when users switch applications, authentication requests are no longer required [10].

Using an SSO system can avoid multiple logins by displaying authentication information and identifying the subject strictly on a trusted system. The application of the SSO system makes it easy for users, because users only need to do the authentication process once to get permission to access all services on a network [11] and the SSO system provides efficiency and security for users in managing and accessing various application services. [12].

Applications and services that can be accessed by students and lecturers of Universitas Diponegoro via SSO are the Academic, Academic System Application, and E-journal.

6.2. QRC for Students' attendance system

The students' attendance system is an educational management tool at Universitas Diponegoro that is used for attendance activities. This system uses QRC (Quick Response Code) for students' attendance system effectively for online learning system using technology because it is fast, effective, and efficient, the student captures the QRC which is activated by the lecturer. The student captures the QRC using smartphone for triggering the attendance system. Figure 2 shows the QRC for student's attendance system at Universitas Diponegoro.

Fig. 2. QRC Student attendance System

The data collection for understanding the student's usage of attendance system was carried out on December 16, 2019 – January 14, 2020. The total number of respondents was 516 students from Universitas Diponegoro's 2019 batch. The questionnaire was distributed on various social media platforms such as Instagram, Line, and WhatsApp to collect data.

Table 3. Student using attendance system during COVID-19

	Frequent	Percentage
Year of Entry		
2019	506	100%
Faculty		
Faculty of Law	13	2.57%
Faculty of Economics	15	2.96%
Faculty of Engineering	36	7.11%
Faculty of Medicine	33	6.52%
Faculty of Animal and Agricultural Sciences	19	3.75%
Faculty of Humanities	61	12.06%
Faculty of Political and Social	14	2.77%
Faculty of Public Health	62	12.25%
Faculty of Sains and Mathematics	162	32.02%
Faculty of Fisheries and Marine	65	12.85%
Faculty of Psychology	1	0.20%
Faculty of Vocational	25	4.94%
Gender		
Female	323	63.83%
Male	183	36.17%
Smartphone used		
Android	447	88.34%
IOS	59	11.66%

Table 3 shows the distribution of students who used the Universitas Diponegoro attendance system in each faculty. The data shows 2.57% were students from the Faculty of Law, 2.96% were students at the Faculty of Economics, 7.11% were students at the Faculty of Economics. students of the Faculty of Engineering, 6.52% are students of the Faculty of Medicine, 3.75% are students of the Faculty of Animal Husbandry and Agriculture, 12.06% are students of the Faculty of Humanities, 2.77% are students of the Faculty of Social and Political Sciences, 12.25% are students of the Faculty of Public Health, 32.02% are students of the Faculty of Science and Mathematics, 12.85% are students of the Faculty of Fisheries and Marine Sciences, 0.20% are students of the Faculty of Psychology, and 4.94% are students of the Vocational Faculty. With 447 respondents, Android was the most popular smartphone, followed by IOS with 59. In summary, during the pandemic COVID-19, students have easy access to the attendance system.

6.3. Online Learning System

This study conducted in Universitas Diponegoro; therefore, this section describes the remote learning technology that employed in Universitas Diponegoro. KULON (Kuliah Online), the online learning system used at Universitas Diponegoro, provides a variety of services that allow students to conduct long-distance lectures, such as students being able to download materials, take quizzes, take exams, and participate in forums.

During the COVID-19 pandemic, KULON users increased dramatically from 2,000 users to around 58,180 users [21]. This is because all lecture activities are done online. With the existence of KULON UNDIP, it is hoped that one of UNDIP's missions, education, can still be effectively carried out. KULON is an online lecture service provided to facilitate long-distance lectures for all Universitas Diponegoro students. KULON UNDIP is integrated and can be accessed by Single Sign On (SSO) UNDIP via www.sso.undip.ac.id

The data for understanding the UNDIP students who used UNDIP KULON for online lecture activities was collected from May 18, 2020 to June 24, 2020. Data was collected by distributing questionnaire links created in the

form of a Google Form. The questionnaire link is distributed through various platforms such as Line, WhatsApp, Instagram, and Twitter. Table 4 displays the data.

Table 4. Students using KULON during COVID-19

Respondent Profile	Frequent	Percentage
Year		
2014	1	0.33%
2015	2	0.66%
2016	84	27.81%
2017	88	29.14%
2018	65	21.52%
2019	62	20.53%
Faculty		
Faculty of Economics and Business	6	1.99%
Faculty of Law	7	2.32%
Faculty of Cultural Studies	1	0.33%
Faculty of Social and Political Science	13	4.30%
Faculty of Medicine	13	4.30%
Faculty of Public Health	4	1.32%
Faculty of Fisheries and Marine Sciences	19	6.29%
Faculty of Animal and Agricultural Sciences	5	1.66%
Faculty of Psychology	1	0.33%
Faculty of Science and Mathematics	183	60.60%
Faculty of Engineering	44	14.57%
Vocational School	6	1.99%
Gender		
Male	137	45.36%
Female	165	54.64%
Platform for Accessing KULON		
Smartphone	23	7.62%
Laptop	98	32.45%
Smartphone and Laptop	181	59.93%

Table 4 shows that KULON has been used evenly across all faculties and schools at Universitas Diponegoro. In addition, the respondents in this study also came from different faculties, with details of around 1.99% coming from the economics and business faculties, about 2.32% coming from the law faculty, about 0.33% coming from the cultural sciences faculty, about 4.30% came from the faculty of social and political science, about 4.30% came from the faculty of medicine, 1.32% came from the faculty of public health, about 6.29% came from the faculty of fisheries and marine science, about 1.66% came from the faculty of animal husbandry and agriculture, about 0.33% came from the psychology faculty, about 60.60% came from the science and mathematics faculty, 14.57% came from engineering faculties, and around 1.99% came from vocational schools.

To access KULON UNDIP, around 7.62% use a smartphone, 32.45% use laptops, and around 59.93% use both smartphones and laptops. In summary, students have no difficulty accessing KULON during the COVID-19 pandemic.

6.4. Virtual Laboratory

In Indonesia, the learning-by-doing method is used in education. Learning by doing is a method of teaching in which the teacher attempts to engage students in more practical and creative learning methods [15]. This concept can be implemented in higher education through practical activities that aim to prepare students for the world of work. As a result, the presence of a laboratory is critical for putting classroom theories into practice. A laboratory is defined as a specific location or room that is outfitted with equipment for conducting experiments (investigations and so on). The equipment provided in the laboratory can be real or digital.

A laboratory that uses equipment in digital form is called a virtual laboratory. A virtual laboratory is defined as an interactive environment for the creation and implementation of laboratory installation simulation experiments [16]. A virtual laboratory uses a software as a visualization of a real laboratory. All equipment and processes are carried out on the software which can be accessed via a PC/laptop. Generally, the use of virtual laboratories is used for certain reasons, such as the unavailability of practicum equipment, expensive practicum tools, and it is impossible to do practical work directly (for instances such as pandemic situations).

Some of the advantages obtained when using a virtual laboratory are reducing maintenance costs, as remote access to the laboratory, motivating students to conduct experiments according to their interests, and learning basic and advanced concepts of experiments through remote access [17]. Virtual laboratories can be used as an alternative to overcome limited learning resources [18] and save money on relatively more expensive practicum tools and materials, as well as maintenance and repair of practicum tools when they are damaged. In addition, the use of virtual laboratories can also increase security and safety, because there is no interaction with practical tools and materials. The flexibility possessed by the virtual laboratory allows students to learn basic concepts and conduct experiments without limitations on time and place so as to make students have a better understanding.

DSCH as a logic simulator, Cisco Packet Tracer as a computer network simulator, Proteus as a microcontroller programming simulator, and other technologies are used in the implementation of virtual laboratories for Universitas Diponegoro students. The use of virtual laboratories can make it easier for students to conduct experiments and understand learning concepts safely and flexibly during COVID-19. In addition, it is one of the strategic techniques to achieve the university strategy map for handling COVID-19. Table 5 lists the software applications used by Universitas Diponegoro students to conduct virtual laboratories. The data was collected between February and July of 2021.

Table 5. Software used for virtual laboratory.

Software's Name	Frequent	Percentage
Matlab	114	22.22%
DSCH	151	29.44%
Cisco Packet Tracer	172	33.53%
Porteus	35	6.82%
Programmable Logic Control (PLC)	14	2.73%
Auto-land	2	0.39%
Others	25	4.87%
Frequency of virtual laboratory software use		
Once a week	185	67.03%
Per fortnightly	22	7.97%
Once a month	69	25.00%

According to the survey results, 114 students (22.22%) use Matlab, DSCH 151 students (29.44%), Cisco Packet Tracer 172 students (33.53%), Proteus 35 students (6.82%), Programmable Logic Control (PLC) 14 (2.73%), Autoland 2 (0.39%), and other software 25 students (4.87%).

From the results of all respondents, a total of 185 respondents with a percentage of 67.03% used a software once a week, a number of 22 respondents with a percentage of 7.97% used a software every two weeks, and a total of 69 respondents with a percentage of 25% used a software for one month.

6.5. Video Conferencing

Video conferencing is a face-to-face application that can be used for online learning. Video conference is an internet-based communication tool in the form of voice and image to take people to different places but at the same time at a meeting [16]. This platform has a significant influence on learning activities in both schools and universities because, in addition to online communication, it can transfer voice, video, and interactive data between two or more groups or people.

Video conferencing is divided into 3 categories [26]. First is known as Personal video conferencing, using the term private because this call is usually only used between two people. Video calls at least assist communication between two or more people who have audio and motion video images using a computer, dedicated video phone, or both. Then, business video conferencing provides the same solution as personal video conferencing, but with the addition of several features, such as the ability to include multiple people in video calls, collaboration features, document sharing capabilities, increased presentation capabilities, whiteboard capabilities, additional bandwidth requirements, and additional cost. Business video conferencing is specifically designed to meet the needs of business meetings and group collaboration, not our personal needs to collaborate with family and friends. Following that is Web video conferencing, which is specifically designed to transmit video calls in a web page or classroom setting.

Table 6. Students' Video Conference Use for accessing Virtual Class

Faculty	**Frequent**	**Percentage**
Faculty of Economics and Business	58	12.3%
Faculty of Law	32	6.8%
Faculty of Cultural Studies	21	4.5%
Faculty of Social and Political Science	51	10.8%
Faculty of Medicine	29	6.2%
Faculty of Public Health	6	1.3%
Faculty of Fisheries and Marine Sciences	42	8.9%
Faculty of Animal and Agricultural Sciences	33	7.0%
Faculty of Psychology	15	3.2%
Faculty of Science and Mathematics	102	21.7%
Faculty of Engineering	47	10.0%
PSDKU	2	0.4%
Vocational School	33	7.0%
Devices commonly used for accessing Virtual class		
Laptop	358	76.0%
Mobile Phone (Smartphone)	105	22.3%
PC (Computer)	6	1.3%
Tablet (Tab)	2	0.4%
Applications commonly used for accessing class		
Microsoft Teams	463	98.3%
Zoom	8	1.7%

The data collection process was carried out by researchers between May 31 and July 31, 2021. In terms of student characteristics based on the most frequently used video conferencing platforms as media for lectures in virtual class, table 6 shows that 463 respondents use Microsoft Teams and 8 students use Zoom. The significant difference occurred because Universitas Diponegoro offers premium services on the Microsoft Teams video conference platform. It can be summarized that the use of video conferencing for replacing activity poses no barriers to teaching activity at Universitas Diponegoro.

Table 7 summarizes the component of technology for online learning system based on an overview of teaching activity at Universitas Diponegoro.

Table 7. Identification of IT risks for online learning at Universitas Diponegoro

Learning area	Descriptions	Remote learning Strategies and Technologies	Risk identification
Share the learning material	Sharing the material from lecturer to students	Using WWW for accessing KULON System (*Kuliah online*)	• Students can access easily • There are no financial constraints • There is no obstacle for the infrastructure • The technology can support
Assignment	Quiz and Assignment	Using WWW for accessing KULON System (*Kuliah online*)	
Class activity	Online classes	Conference meet application	
Attendance system	Presence System	QR Code based in WWW	
Student laboratory	Virtual laboratory	WWW integrated with, , WWW integrated with subject of laboratory	
Communication	Internet Chat room	www, internet chat or messenger room, e-mail	

The identification of information technology risks in online learning at Universitas Diponegoro is that students can easily access the material, there are no financial constraints because Universitas Diponegoro provides the best services on the Microsoft Teams video conference platform, Learning management system, Software tools for virtual laboratory, and attendance system services. Furthermore, there are no impediments to the infrastructure, and the technological support is adequate.

7. COBIT 2019 Risk Profile

The primary drivers for COBIT 2019 are confirming IT governance, remaining relevant in a changing environment, and addressing the limitations of COBIT 5. As previously stated, the goal of COBIT is to assist in the creation of value. One of the things mentioned in COBIT 2019 is addressing the business risk associated with the use, ownership, operation, involvement, influence, and adoption of IT within an enterprise. The design factors in the 2019 COBIT Framework propose several factors that influence Enterprise Governance of Information and Technology (EGIT). Each design factor is tailored to the organization's specific context. In practice, when evaluating organizations, it is critical to develop evaluation solutions [6]. The introduction of the Design Factor (DF) in COBIT 2019 is expected to make it easier for practitioners to identify the state of the organizations. In COBIT 2019, the risk profile is introduced as the 3rd design factor. The risk profile consists of 19th risk profiles:

1. IT Investment decision making, portfolio definition maintenance
2. Program and projects Lifecyle management
3. IT cost and oversight
4. IT expertise, skills & behavior
5. Enterprise/IT architecture
6. Unauthorized actions
7. IT operational infrastructure incidents
8. Software adoption/usage problems
9. Hardware incidents
10. Software failures
11. Logical attacks (hacking, malware, etc.)
12. Third-party/supplier incidents
13. Noncompliance

14. Geopolitical Issues
15. Industrial action
16. Acts of nature
17. Technology Based Innovation
18. Environmental
19. Data & information management

These design factors can have an impact on the company's priorities, governance, and management objectives. As a result, these factors influence the EGIT component's instantiation.

8. Formulation of online learning systems in universities in a pandemic situation

The university is compelled to use an online learning system to ensure that the business strategy map is followed during pandemic situations. The risks of online learning system have been identified in table 2. This study attempts to sort risk for using an online system and to synergies with the university's strategic map during pandemic situations by adopting the design factor for risk profile in COBIT 2019. The risk profile is the focus of the COBIT 2019 risk profile design factors. The risk profiles define the different types of IT-related risks that can occur in an organization. The risk profile can show which risk areas the company may encounter. COBIT 2019 includes nineteen risk profile categories (see fig. 3) [6].

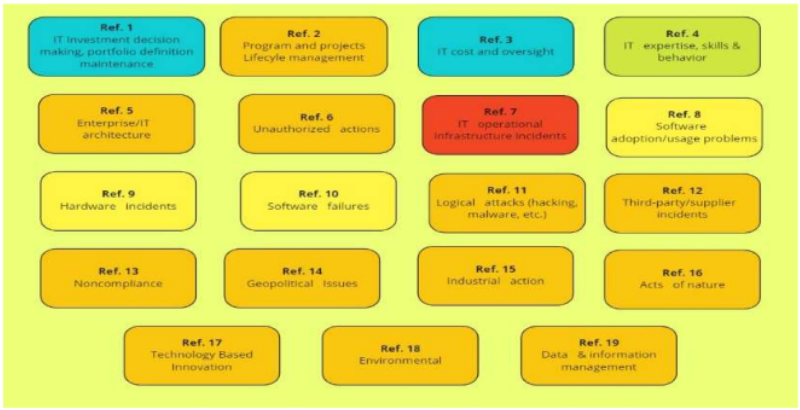

Fig. 3. COBIT 2019 Risk Profile (Design Factor 3) [27]

However, COBIT 2019 focuses on the enterprise level. As a result, for the university online learning system, we identify only four factors that have a significant influence in the university.

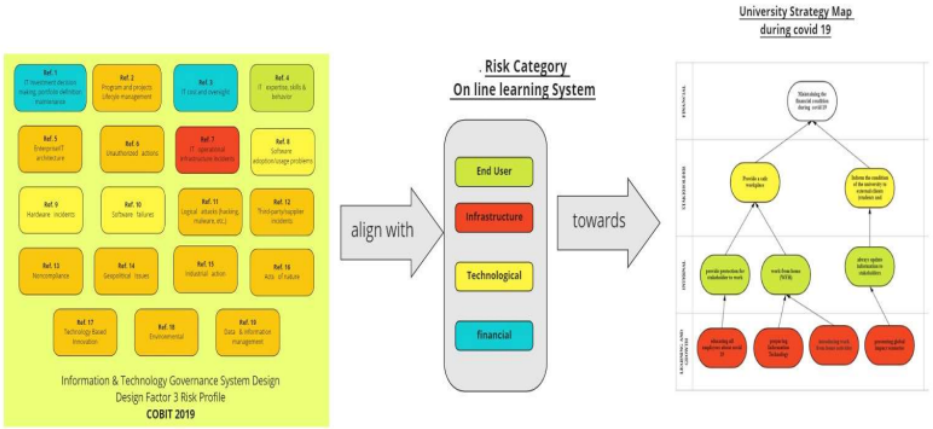

Fig. 4. Online learning system's IT risk categories

Figure 4 shows the correlation between the 2019 COBIT risk profile, the IT risk of the university's online learning system, and the university's strategy map during the pandemic. Tables 2 and 7 show that the identified risk factors for IT risk in the university's online learning system are end users, technology, infrastructure, and finance. In the COBIT 2019, the End user is represented by ref. 4 (IT expertise, skills & behavior). As for finance in COBIT 2019, it is represented by ref.1 (IT investment decision making, portfolio definition, and maintenance) and ref. 3 (IT cost & oversight). Next is infrastructure aspect in COBIT 2019, which is shows in ref. 7 (IT operational infrastructure incidents). As for technological aspect in COBIT 2019, it is represented by ref. 8 (Software adoption/usage problems), ref.9 (Hardware incidents), and ref. 10 (Software failures). All of the risk factors identified are aimed at understanding the impediment when the university needs to achieve the university strategy map during a pandemic. The university can prepare risk recovery management by identifying the risk factor.

9. Conclusion

In pandemic situations, the objective of an online learning system is to ensure that stakeholders are always up to date, for example, by scheduling time to communicate and determining the topic of communication. The second option is to work from home (WFH). Furthermore, even in pandemic situations, the university business must be maintained. It is possible to secure the implementation and business processes by understanding the risk factor in online learning systems. The COBIT 2019 risk profile establishes best practices for enterprise-level risk management. As a result, this study discovered that only four risk factors corresponded to the university's strategy map for dealing with pandemic situations. The risk factors are End user, Technological, Infrastructure, and Financial. In the COBIT 2019, the End user is represented by ref. 4 (IT expertise, skills & behavior). As for financial risk factor in COBIT 2019, it is represented by ref.1 (IT investment decision making, portfolio definition, and maintenance) and ref. 3 (IT cost & oversight). Next is infrastructure aspect in COBIT 2019, which is shown in ref. 7 (IT operational infrastructure incidents). As for technological aspect in COBIT 2019, it is represented by ref. 8 (Software adoption/usage problems), ref. 9 (Hardware incidents), and ref. 10 (Software failures)

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