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# A CRITICAL ANALYSIS OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN HIGHER EDUCATION DURING AND POST COVID-19

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**Abstract**

This research paper analyzes Sustainable Supply Chain Management during and Post Covid-19. A novel Covid-19 has developed a great danger to the health of the people in the entire World and also severely affected 210 countries and its areas. A profound problem disturbed social activities, global trade, industries and educational institutions by confinements and social distance. An outbreak of Covid-19 has intensified human sorrows by economic loss. The impacts are considerable on society, economy, health, environment and education. Especially education was affected more compared to others. Each and every country was trying to protect the disease transmission. And government introduced many remedies like isolating, testing, treating patients, banning public groupings and lockdown for some months. This paper focuses on higher education sustainability during and Post Covid-19. It also presents the important objective to examine the effect of Covid-19 pandemic on the educational sector. The paper highlights the experience of Yanbu University Colleges in Saudi Arabia. It purposes to give exploration idea for examining sustainability supply chain management in a higher education especially during and Post Covid-19 situation.

**Keywords:** higher education, supply chain management, Covid-19, SSCM, transmission, online classes, sustainability.

**Aim** – Using Supply Chain Management (SCM) as a lens, this study aimed to examine the higher education system, with the goal of accelerating progress and reaping the rewards that come with effective implementation.

**Design/methodology/approach** - The study focuses on a specific Saudi Arabian university as a case study (Yanbu University Colleges). Findings from the Study: Epidemic responses and occurrences are unprecedented in the modern supply chain. Researchers are attempting to demonstrate the significance of online education, particularly in the midst of a pandemic. Scholarly notions regarding the long-term viability of higher education are being dissected by researchers. There are implication of sustainability. In the short run, sustainability advantages in higher education are evident, but the long-term impacts are unclear and require further study. Sustainability and Resilience go hand in hand and should be studied as a unit.

**Limitations and implications of the research**: Concerns about the COVID-19 outbreak were arising. In the short term, it remained unclear whether the responses and adjustments will lead to a new "normal." It's possible that a change to existing theories or a fresh advancement in theory is required. As a result of these implications, everyone can assist minimize the spread of Covid-

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19. As said earlier, this article on the pathway only begins to address conservation issues. As a result, there are many more questions to investigate, and no single study can address all of them.

**Practical implementations** –During this pandemic situation, many administrations face severe issues. Supply chain sustainability practices can assist governments in managing their problems intellectually, particularly in education, which is a vital societal service.

**Social implications** – SSCM, SCM, social, economic and operational implications are added but the focus was on higher education and sustainability. The sustainability of the supply chain, as well as the growth of institutional students, is discovered.

**Values chosen** – Covid-19 pandemic concerns of socio-economic and educational sustainability are approached from an operations & supply chain institutional sustainability viewpoint by the writers, with a particular focus on educational sustainability. There are still a lot of unanswered questions. This study must reassess the long-term viability of higher education during and after the Covid-19 era.

## Introduction

The worst influenza pandemic situation that was reported in the history. Was 100 years ago. At that time, many countries faced economic and many social issues. Many people around the World lost their friends, family, and economical issues. A human civilization has come across from the many pandemic situation such as Ebola in 2019, SARS in 2003-2004, H1N2 Asian flu in 1957-1958, Ebola in 2014-2016, H1N1 in 2009-2010, Zika virus 20152016 and HIV/AIDS in 1981. In recent years, the World has met another pandemic situation i.e. Covid-19 which originated in Wuhan, China. Soon it spread worldwide which prompt World Health Organization to announce it as pandemic situation on Mar 11, 2020. It was the worst scenario when a rampant spread from country's borders. This rampant situation spread globally and imposed a number of health problems, lost billions of dollars and mortalities. These pandemic situations increase anxieties regarding health and initiate disastrous socio-economic problems because of this disease.

About 50 to 60 million of people fell into the extreme poor because of the rising unemployment rate due to its Covid-19 situation. Only few people were secured by the social insurance companies (Hofmann, Hannes, et al. 2014). A large portion of world population was not covered by social assistance and social insurance. Many people were trapped in the defenseless category, inclined to fall in poverty because of the socio-economic loss. Also 70% of women who are quarantining suffered from domestic violence which misleads their social status. These problems also affected the education sector severely (1.2 billion of students are out of school) (Al-Turki U. M, et. Al, 2008). It was also in jeopardy since 1.9 billion people lost 70% of their income, food shortages and malnutrition were widespread issues in many low-income nations, leading to physical and mental damage, as well as global tourism plummeted as the number of people travelling declined sharply.

In Saudi Arabia, the 1st corona patient was identified in February 2020. The government closed schools and colleges in March 2020. Education was carried on through distance online

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classes to control the Covid-19 situation. Saudi Arabia faced similar problems at the wartime. But this time the problem was health problems in the entire world.
This paper analyzes the experience of Yanbu University College in Saudi Arabia at the time of corona virus. It also explains how the students, institutions and professors reacted to this pandemic situation. As a result of this, they had to evaluate the move from a traditional classroom to a virtual one. In addition, it looks at professors' input to see how they recognized this teaching - learning process while teaching courses on Applied Linguistics and Interior Design and Computer Science. This article's goal was to provide perspectives on higher education's sustainable supply chain management.

## Literature Survey

Supply Chain Management:
Rajeev, A, et.al, (2017) proposed a demand of product increasing and its enhancement has put tension on the company outcomes and supply chain process. SSCM and SCM of higher education reduces the problems regarding online classes especially this pandemic time. Many researchers and industry plans to work on the issues of sustainable consumption and production inside the context of SSCM.
Active approaches for sustainable supply chain management are developed by Giannakis, Mihalis, as well as Papadopoulos (2016) by looking at sustainable supply chain management as a risk. This establishes a link between supply chain sustainability and risk, distinguishes it from major supply chain hazards, and examines the supply chain management method. For the purposes of analysis and data collection, a hybrid technique was used.
By examining the major types of SSCM and associated activities that are required to meet sustainability requirements, Schaltegger, Stefan, et al. (2014) found a subsidy to sustainability procedure. In supply chain management & SCM, specialists will discover a variety of strategies for putting them into action. Higher education's sustainable process will succeed on execution, according to the theory of sustainable supply chain management, which has gained popularity in the supply chain management field recently.
Planning and controlling end-to-end goods and services are part of what's known as supply chain management. Foster and Christopher, both in 2008 (2016). Adapting sustainable practices is crucial in managing supply networks due to the complicated of today’s modern supply chain and sustainable awareness in terms of environment, society, and economy. It has been found that managerial changes in current organizational strategy are being observed by Akbari et al. (2017; Amui et al., 2018) (2017).
As per Seuring and Muller (2008), a sustainable supply chain is defined as the control of the planning and management of the end-to-end products or services and the synchronization of supply chain players in light of the three sustainability dimensions. Higher levels of SCM practice, according to Li et al. (2006), can boost competitive advantage and organizational performance. SCM methods that have a significant impact on performance were found to be beneficial by Tan (2002) and by Flynn and colleagues (2010).
Chamnong, Jungthirapanich (2008) believes supply chain to be an important part of a unified university instructional distribution network. Habib, Md Mamun During the financial crisis, online education has become increasingly important. To generate new graduates with research findings and quality for society, he differentiates between supply chains that are single-level, bidirectional, and multitier. This labour provides the society with two crucial benefits, namely

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research and the development of human resources.
In higher education, supply chain management is becoming important.
Many researchers researched SCM with in manufacturing industry based on conclusions from a literature review. In addition to Heskett (1964, 1973), Ballou (1978, 2007), Oliver (1992), Oliver and Lummus (1999), Stevenson (2002), Stevenson and Tan (2002), and Cigolini (2002), there are several other authors worth mentioning (2004). However, just a few focused on the challenges of service industry supply chain management. Habib and Jungthirapanich (2007); Fernie (1995); Sampson (2000); Kathawala (2003); Lau (2003); (2009). Due to education's intangible nature as a product of the service sector, it differs from the manufacturing business. Jungthirapanich and Habib (2009). Customers themselves are a major source of process inputs in educational institutions, since they contribute their bodies, minds, and knowledge as part of the service processes. Sampson is the author of (2000)
An in-depth case study technique was used by Lau (2000) to establish the City University of Hong Kong's educational supply chain management. A "student" and a "research" supply chain, both of which strive to meet the university's aims of producing high graduates and research successes, are strategic supply chain management that could have an impact on university goals, he and others have suggested According to Lau (in 2007); Habib and Jungthirapanich (in 2008), (2009). In the modern higher education industry, Lau Antonio K.W, (2007) implements the supply chain idea. In the higher education field, he also proposes innovative management concepts.
Students are both raw material and end product in the "student" supply chain. The basic material is transformed into a high-quality final product thanks to both active and passive student services. Services provided directly to students include: student recruitment and selection, academic and non-academic courses for students, practical courses for students, and test results for students. However, indirect student services include campus construction and maintenance, IT infrastructure, bookstores, security and cafeterias and sports facilities, amongst others. Indirect services A. Lau is the author (2007). This student supply chain's mission is to create the highest-quality graduates (product) who will fit in with the society in which they live (2009). Since each student is unique, bespoke supply chain methods for each student are recommended to ensure that every student is taken into account and developed critically. This is why each student is paired with a professor who oversees their growth throughout the whole supply chain. A. Lau is the author (2007).
Research ideas are raw materials for supply chains in the "research" industry, while their realization is the end product. According to Lau (in 2007); Habib and Jungthirapanich (in 2008), (2009). Both overt and covert services contribute to the final product's development, whether it's a new machine or the discovery of basic information and the use of that knowledge for solving problems that meet society's requirements. Indirect services include campus development and maintenance, IT infrastructure, libraries, clearances, bookstores, security, and eateries, among other things. Direct services include research procedures including idea generation, gadget development, data collection, and analysis. A. Lau is the author (2007).
The pandemic situation has made higher education sustainability an important topic for universities, according to Z. N. Ansari and M.N. Qureshi (2015). The online teaching method is putting pressure on universities right now. Sustainability in Supply Chain Management is increasingly being implemented by educational institutions in order to improve the learning process and raise student capacity. To evaluate Supply Chain Management comprehensively in the context of sustainability, Ashby et al (2012) conduct an analysis. Tolerable SSCM

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symbolizes a developing field where everyone interacts with each other, and these two key notions are aligned. He also discusses the significance of a college degree, particularly in the event of a pandemic.

The COVID-19 virus astounds scientists

COVID-19 has caused significant economic, political, and social unrest, as J. Sarkis writes (2020). Covid-19 was first discovered in Wuhan, China, in December of 2019, however the World Health Organization (WHO) did not designate it a global pandemic until 11 March of the following year. For the global virus, inhibition reactions range from shutting schools and businesses to isolating people from one another and ordering them to take shelter Sarkis, J. (2020). Both public health and education benefited greatly from it, with medical and educational research growing at a rapid pace.

Around 1.6 billion youngsters have dropped out of school because of the problem, and traditional classrooms have been replaced with online learning environments, causing major disruptions in people's everyday lives and the way education and research are conducted. According to UNESCO (2020). Covid-19 (COVID) problem has sent ripples through supply chains Guan and co-authors (2020). However, the COVID-19 dilemma offers lessons and prospects for a sustainable supply chain because of social distance, remote learning, and reduced business travel. Theodore J. Sarkis (2020). Education has been redefined as a remote, computer activity under COVID-19, leaving most students with just on-line teacher assistance. As a result of such crisis reactions, supply networks have the potential to be transformed by reducing risk and building resilience. J. Sarkis is an author (2020).

Unexpectedly, a supernova was discovered. Just as a star's lifespan comes to an end, so does the educational trip that students have been on for decades. At this moment in time, the COVID-19 supernova represents the end of an outdated educational system. Fullan and Gallagher will be built on equity, excellence, and the well-being of students as a result of the boom that has taken place; nonetheless (2020).

Since the outbreak of COVID-19, the way we thought about education has shifted dramatically. Most countries have been caught off guard by this unforeseen development, and their educational institutions have had little choice but to accept the technological victories imposed, ranging from government-adopted telecommuting measures to online classroom instruction (2020).

Fullan (2020, p. 10) writes in his enlightening piece, "The struggle of the century: Disaster vs evolutionary nirvana," that "evolution could have beautiful things to offer for us - but only if we influence it." As a result of the current scenario, active kinds of learning like deep learning have become even more critical in these difficult times (2018).

This paper explores the issues associated with online teaching by looking at Seuring Stefan et.al, 2008. There are many pupils who are unable to listen and concentrate because of online learning. He also discusses societal issues that transcend the boundaries of a particular company. Supply Chain Management was also identified as the entities responsible for coordinating information and material movements.

**Proposed Methodology**

Examining a sustainable supply chain: A real-world case study the University of Yanbu. According to the findings, this research relies on a questionnaire sent to all academics, an examination of student opinions expressed on social media, and interviews with representatives from all major departments.

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1. This research includes information about the college's enrollment in each programme, as well as in all divisions and programs throughout the institution.
2. It outlines the tasks that students must complete before the crisis occurs, including the percentage of marks earned and the curriculum that must be completed.
3. Examine how the university handled education throughout the pandemic.
4. Also, the future online teaching road map may need to be altered.

Evidences:

This case study was taken in the Yanbu University College, Saudi Arabia. This Colleges have more than 2800 female and male students. It has 2 department for Male students and 4 departments for female students. The number of students both female and male is shown in the figure 1 as bar chart. Human Resource Program has many students corresponded by supply chain management, information systems, computer science, computer engineering and applied linguistics Kuandee, Watianarat, Nilsook, & Wannapiroon, (2019). The Programs add a new level of difficulty to the transition from traditional classroom to online classroom. It was difficult for the Engineering Department to move to online classes since they require frequent training (both practical and theoretical). Menachof. David A. and colleagues (2009). Even while statistics, computer science, and math are easier to learn than hardware-based training, there are still certain challenges, such as answering questions, creating charts, and formulating equations. FIGURE 2: College section, teaching hour and course numbers this makes it easier to understand how much work is involved in making the switch from a traditional classroom to an online one. This graph also depicts the Department's rank. Computer Science & Engineering and the Department of Management Science both offer five programmes each. Because of the increased number of courses offered, both Management Science and Computer Science & Engineering courses have high tuition costs to match. Departments are given two campuses, one for women and one for men, hence the numbers displayed are the total of the two campuses. To select the study's participants, a random sample of 130 professors provided contact information for their students.

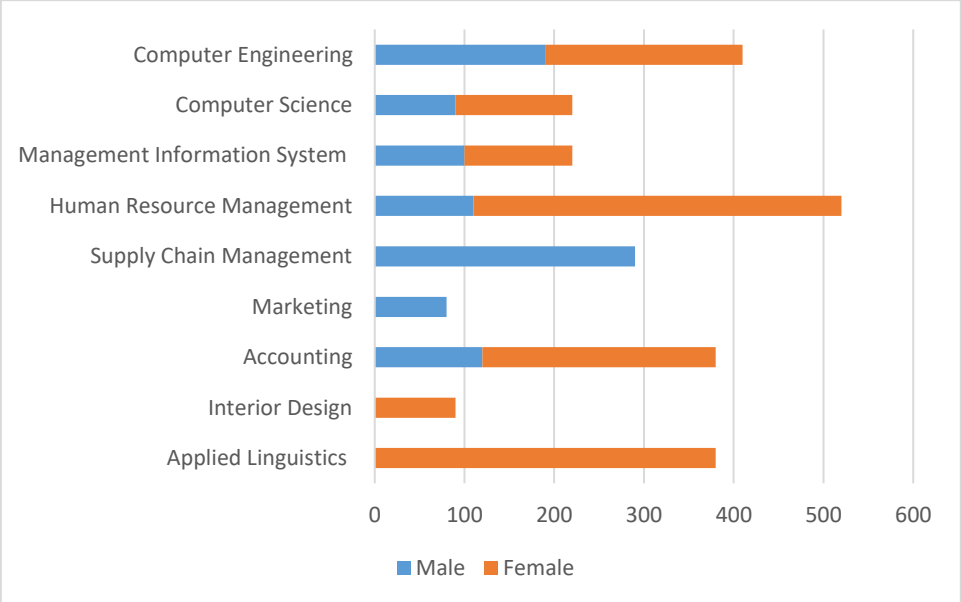


Figure 1: Number of Students and Programs in the College

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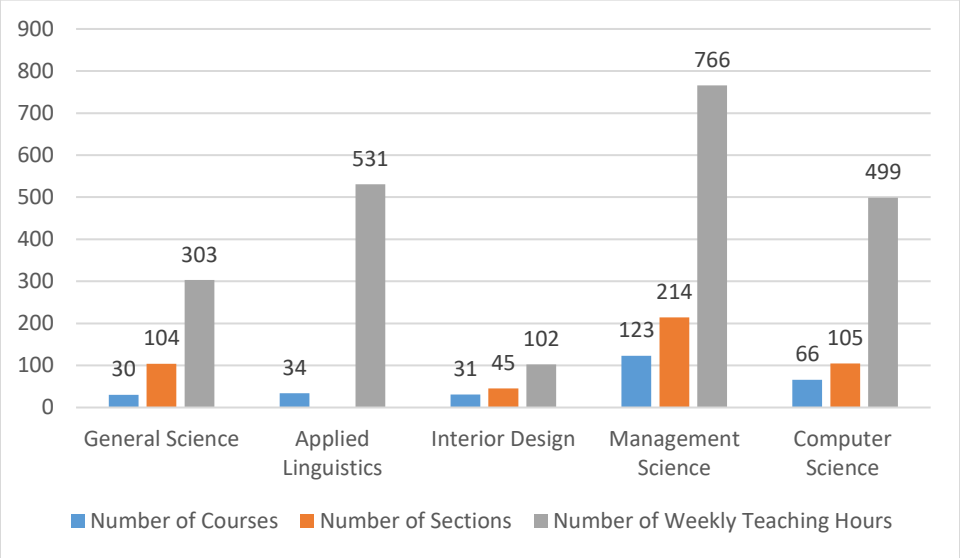


Figure 2: Number of Teaching Hours, Courses and Sections

Before Crisis: [SCM]

A survey was undertaken at the start of the crisis to see where we stood in terms of curriculum delivery and assessments for each individual class. We look at how much of each course's curriculum was given and how much of the curriculum was assessed prior to the crisis (including course level results). Steve LeMay, et al (2017). Once this was done, we looked at how much of the left syllabus had been effectively given and assessed, and what was still left to be accomplished. In addition, we emphasize strategies to communicate with students, presenting curriculum, and evaluation methods for the remaining portion of the syllabus. We use. There are methods used by teachers to coordinate course content (e.g. courses taught by numerous teachers), methods used by upper-level management to coordinate with department heads, and ways that department heads communicate with programme coordinators. These are all highlighted.

The survey was designed with a specific outcome in mind and sent out to 130 Professors who agreed to participate (46.9 percent male and 53.90 percent female). More over half of the faculty at the university are represented among the applicants. Professors of Interior Design (3.5%), Marketing (3.5%), Accounting (9.9%), Management Information Systems (15.8%), Applied Linguistics Department (20.9%), Supply Chain Management (3.5%), Computer Engineering (19.3%), Computer Science Program (17.4%), and Human Resource Management (3.5%) are among those who responded (7.4 percent). Figure 3 shows this very clearly.

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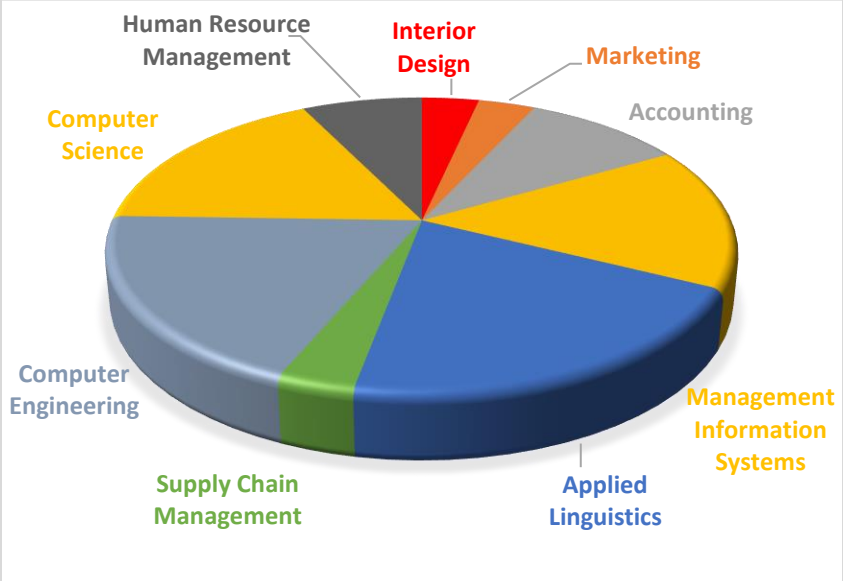


Figure 3: Respondents from different Programs

Here, the survey team was primarily concerned with discovering how much of the curriculum had already been evaluated and how many grades had been derived from the assessments. The postponement occurred in the middle of the exam. The team anticipated that all of the courses would be learned to a 60 percent level by the middle of the semester before the suspension took place. The final exam's weight meant that an assessment collected with less than 60% of the total score would be considered inadequate (Jauhar, Kumar, Pant, & Dutt, 2018). It accounted for half of the final grade in each class. Between the mid-term and final tests, students must also complete other exams. These are things like homework, tests, and projects. During the suspension, this assessment will provide an estimate of 50 percent of the scored marks.

During the Crisis [Supply Chain Management]

This section examines how professors and students enforce the stay-at-home (online) policy. The college has a risk management strategy in place, and part of that strategy included making estimates about the scenario (Gammelgaard, Britta Larson, 2018). The subject of how problems will be solved is also raised.

On March 8, 2020, the Saudi Arabian government announced that it would delay pupils' ability to attend college. Later, the Government declared that this decision does not apply to any government employees, including professors, military personnel, police officers, instructors, information technology (IT) specialists, or those working in hospitals. Students and professors are both doing their work from their own homes these days. As a result, there is a pressing need for more online meetings that cover a wide range of issues.

During this time, each employee is expected to keep tabs on the overall development accomplished in each division. It came in the middle of the semester, which was unfortunate. All departments are expected to cover the coursework and evaluations in half their time (Frazella, Edward, 2002). It was discovered through this survey that the group inquired how much of the syllabus had been completed and what percentage of the outcomes had been recorded.. Many courses have a 60% midterm exam, assignments and projects, and a 40% final exam, with the latter being more common.

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Figure 4 depicts the percentage of the syllabus that was covered in class and how well students did on the test. According to the research, anything from 50% to 80% of teachers complete the course material. Professors covered between 61% and 70% of the course material, according to the data. This means that 35 to 40 percent of the syllabus will be completed through an online process. The assignment was cancelled due to a low assessment rate. This will give a breakdown of the remaining assessment in the range of 55 to 65 percent, with the final exam making up the remaining 40 percent. On the right, you can see a breakdown of the total number of points earned.

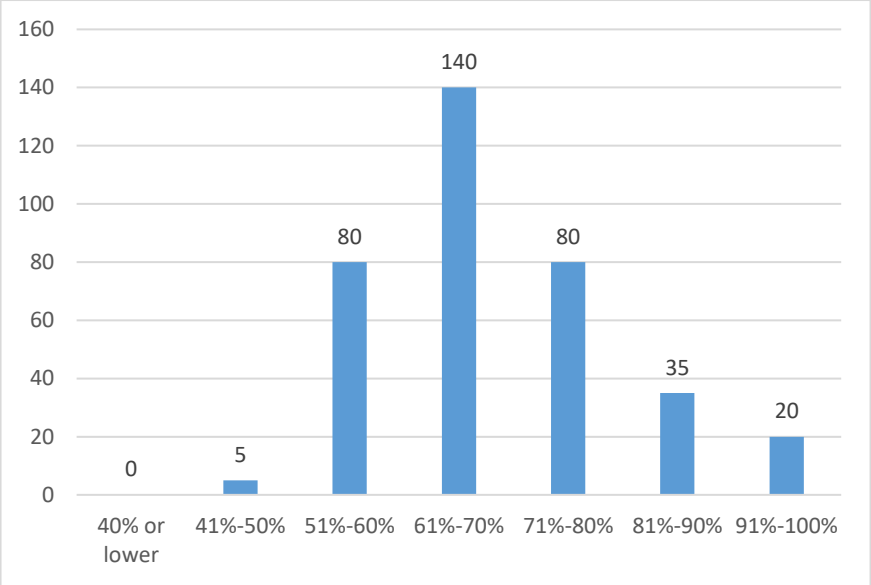


Figure 4: The Curriculum Coverage Percentage

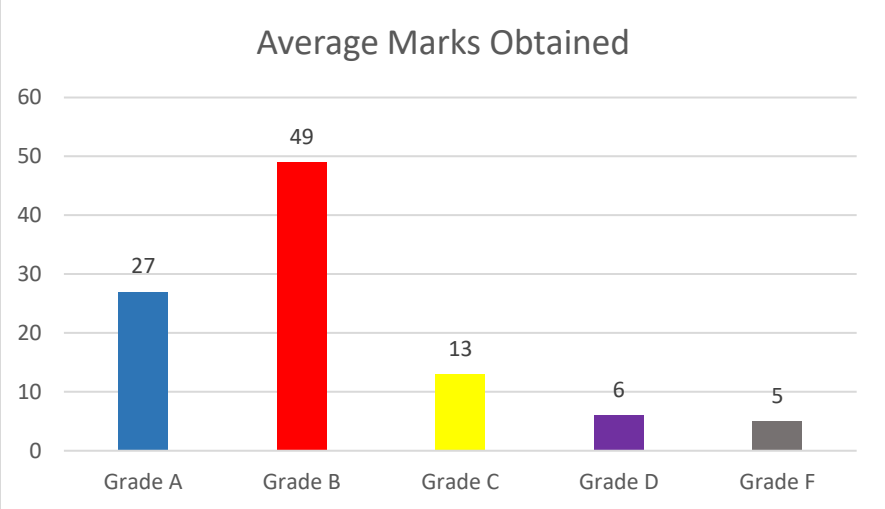


Figure 5: The Marks obtained by Students

Respondents were initially quizzed on their thoughts on the previous website they had used to communicate with and meet with pupils. Figure 6 depicts this. It turns out that 70% of educators and students are utilizing an open source learning management system (LMS). This

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was a way for professors and students to communicate over the internet. In the past, this was utilised as a teaching aid by many professors to provide course materials, homework, assessments, quizzes, and notifications to their students. Other tools used by professors include LMS, Google Meet, Zoom, Microsoft Teams, and so on. In this study, 50% of the participants used LMS, whereas 27% chose Microsoft Teams and 9% preferred Zoom. Figure 7 shows the effectiveness of these tool which are helping in teaching through online platforms.

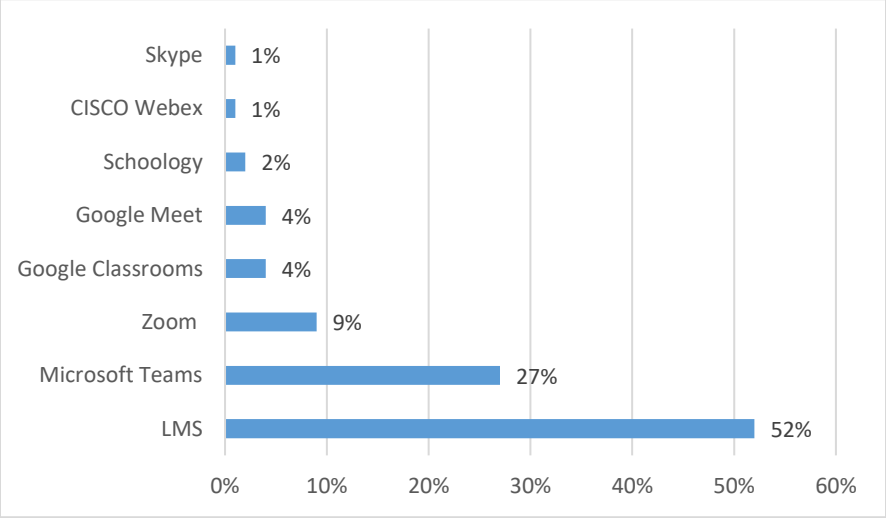


Figure 6: The methods employed in this case to communicate with the students

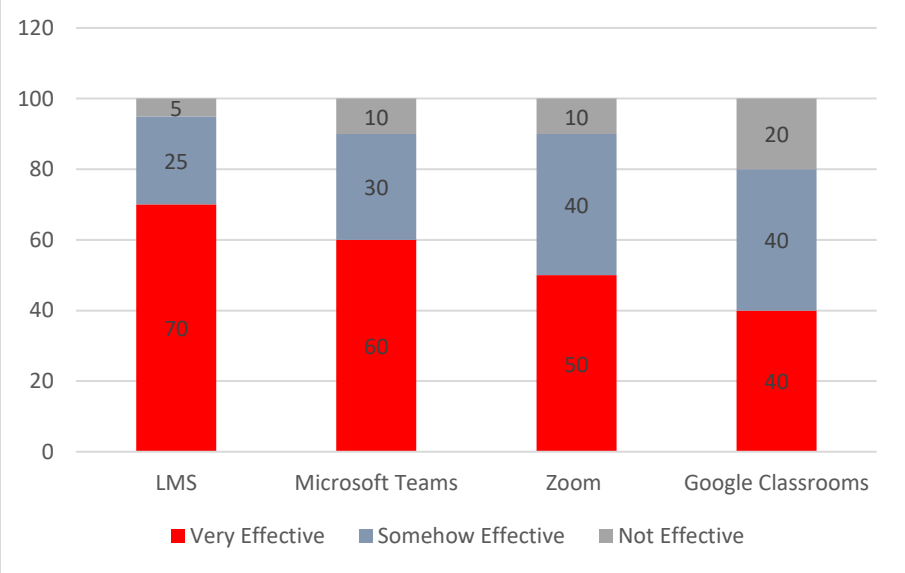


Figure 7: The tool used to distribute the syllabus.

The college team modelled the LMS successor. Roughly 26% of professors said they utilised a Microsoft Teams programme, and about 9% of professors said Zoom was extremely useful. 40% of teachers use Google Classroom, and 50% of them think Google Blackboard (LMS) is

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effective. Jungthirapanich, Mamun, and Habib (2009). A large number of professors favor zoom due to the obvious video conferencing option. The issues now appear to extend into the coming summer and possibly into the next fall. As a result, it is likely that kids will have to wait until the end of the summer before they can return to school.

The education ministry advised universities to use any other exam technique, such as an online one, for their final exam. They have consistently delivered their weekly reports, assignments, and presentations to Yanbu University Colleges. In the event of a pandemic, Yanbu University College and other Saudi University Colleges will closely adhere to these procedures.

**Findings and Discussion**

This incident taught us that online learning was lacking in quality. Making people practice the online method was an efficient way to promote its use. As a result, people are more observant and conscientious about the necessity of receiving an education online. This may be the ideal opportunity to examine the advancements in technology that have made online education more accessible. Everybody has learned from this situation and how important it is to operate online, thus this fight of people will be recorded in history (Johnson, Eric, Pyke, 2000). It is critical to strengthen the server connection and expand the availability of information technology services. It is expected that colleges and universities will conduct an assessment of the current status of LMS systems that facilitate the delivery of synchronous and asynchronous formats of instruction to students located in remote locations. A variety of teaching strategies can be used by professors to help students succeed in the classroom and build stronger relationships. Online teaching approaches, group meetings, and organising multiple exams all require teachers to be more effective. Next, pupils must be extremely engaged in their online education. When students participate in class, it enhances online teaching's advantages even further. As a result, students are expected to take responsibility for asking questions, working to find solutions, and paying attention during class. Professors are unable to include learners in this study due to a lack of time. Figure 8 displays the number of students present.

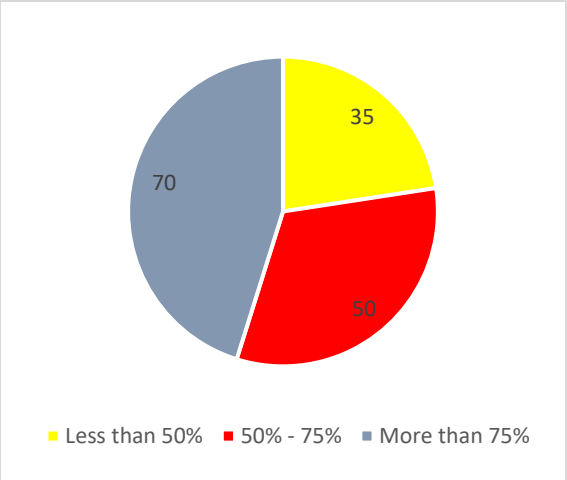


Figure 8: Attendance of students on online lectures by 3 different Colleges

Figure 8 demonstrates that 70% of students, 35% of students, and 50% of students were taking the online course. Figure 8. Three different departments all took pictures of it. Many teachers are dissatisfied with the level of participation their students are showing in their online courses.

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This demonstrates that students may do college assignments from home. Video conferencing tools such as Zoom meeting or Google Meet are used to host other types of workshops and seminars. A meeting link generated automatically by Google calendar was created using the Google Meet programme. Finally, performance includes the work of teachers, as well as their progress in covering the curriculum's objectives. This type of inquiry may be useful in figuring out how evolution has changed the nature of learning ( Frazzon Enzo Morosini, 2019).

**Conclusion**

This study examines how higher education institutions managed their supply chains during and after Covid-19. Unpredictable social disruptions, global trade, industry, and educational institutions have been caused by the novel Covid-19's development of a serious problem. A wide range of ramifications are felt across various sectors of society including health, the economy, and education. An examination of how Yanbu University College in Saudi Arabia managed its online teaching during the pandemic condition is presented in this research study. It focuses on the Yanbu University College's higher education & sustainability in particular.. It's important to note that not all Saudi Arabian universities will benefit from the findings of this research.

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