Резюме. *Интернет вещей (IoT) - это перспективная технология, которая имеет широкий спектр приложений. Он позволяет физическим объектам быть организованными в специализированную структуру, чтобы повысить ее удобство с точки зрения простоты и использования времени. Он должен преобразовать мысль о преодолении разрыва между физическим миром и миром машин. В нынешней ситуации он также используется в широком спектре технологий. Одно из его приложений - отслеживать и сохранять данные с различных устройств с течением времени, что позволяет легко анализировать набор данных. Затем этот анализ может быть основой решений, принимаемых на его основе. В этом исследовании описываются концепция, архитектура и взаимосвязь Интернета вещей и больших данных. Далее изучаются несколько вариантов использования Интернета вещей и больших данных в методологии исследования. Описываются возможности и открытые вызовы, в том числе будущие направления. Кроме того, этот документ добавляет ценность, предлагая новую архитектуру для анализа больших данных в Интернете вещей. В целом обсуждаются различные типы аналитики больших данных Интернета вещей, их методы и связанные с ними технологии интеллектуального анализа большого объема данных.*

Ключевые слова: *Интернет вещей, большой объем данных, архитектура.*

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THE IMPACTS OF COVID-19 PANDEMIC ON THE GLOBAL SEMICONDUCTOR INDUSTRY

Nor Aznan Mohd Nor
Manipal International University, Malaysia
e-mail: *noraznan.namn@gmail.com*

Abstract: *The impact of COVID-19 pandemic to manufacturing companies has been horrendous that panic attack has occurred among the companies, as well as semiconductor companies. Many companies have been declared bankrupt due to this pandemic and a new normal have been born such as remote working, following by certain Standard Operating Procedures (SOPs) implemented by the government to avoid infection of this COVID-19 virus and practice social distancing at the workplace. Apart from the new normal, there are some effects to the semiconductor companies in a way that could present a negative impact to the future of the companies. There are some drastic measures being implemented to adapt with the new normal as well as keeping the production running as usual. The main motive of analyzing the current situation is to avoid complete down fall of production of semiconductor companies which may affect the global economy.*

Keywords: *COVID-19 pandemic, new normal, semiconductor companies, global economy.*

Basic provisions. Financial crisis can be considered to be the main impact. To run the business, employees are needed and the employees must be paid with commensurate salary

for them to work in a productive manner. Since the COVID-19 outbreak, it has caused much downfall in demands as well as companies being forced to reduce the employees and labours due to the health protocols fixed by the government.

By assessing the impacts faced by the semiconductor companies around the globe, it can be seen that the impacts eventually lead to financial stress in the company and further cause other consequences through financial setbacks.

Temporary manufacturing of high-demand items such as face masks, gloves, hand sanitizers, respirators and ventilators could also help in maintaining growth and profitability of the company.

Introduction. COVID-19 pandemic is a contagious disease which is harmful and can cause death in merely 14 days for a physically weak person (Coronavirus Disease 2019 (COVID-19) - Diagnosis and Treatment, 2020). When the outbreak started in Wuhan, China the medical care center was not able to perform any surgeries nor medical advises and treatment could not be made due to this disease cannot be cured with any form of treatment eventually leading to death (COVID-19: A History of Coronavirus, 2020). As time goes, this virus started to spread all around the world which caused a world COVID-19 pandemic outbreak. COVID-19 is also known to be fast spreading disease through touch whereas mainly people within 1-meter distance will be affected (Coronavirus Disease (COVID-19) - World Health Organization, 2021). According to the World Health Organization (WHO) researchers, they have come up with ways to prevent getting infected by the COVID-19. Those are social distancing which is always stand in distance at least 1 meter away from people, wearing face mask or face shield, use hand gloves and always sanitize the hands after touching some publicly accessible things, avoid crowded areas, keeping the room well ventilated, wash hands often with soaps and coughing into elbow or tissues (COVID-19 Mythbusters - World Health Organization, 2020). It has become a new normal for people all around the world to follow the compulsory SOP to prevent getting infected by the virus. COVID-19 outbreak has not only impacted the daily lifestyle of people but also impacted the Manufacturing companies. Manufacturing companies are central to sustaining the economic growth of the country. Semiconductor companies are one of the manufacturing companies, and the main operation of these companies is to convert raw materials, parts and components into a fully merchandised good through machines (Where Self Made is Made, 2021). Apart from machines, many workforces are needed to support the whole company for a smooth production of goods for the retailers (Where Self Made is Made, 2021). In addition, education system undergoes extreme changes as well (Arpentieva et al., 2021; Baisanov et al., 2022). Due to the new normal, company analysts have come up with few ways to overcome the negative impacts in order to maintain the production rate of semiconductor companies as the companies will be running normally with certain SOPs to follow that will prevent the spread of virus to people (Sulistiyani et al., 2020).

Impacts On Semiconductor Industry Due to COVID-19 Pandemic. Impacts can both be considered good and bad. Due to this COVID-19 outbreak, the semiconductor companies have only experienced bad impact to their production and also the downfall of their company. The types of impact in the semiconductor companies are on the workforce, operations and supplying demands from the retailers, production rate and financial crisis (COVID-19: What It Means for Industrial Manufacturing, 2021).

Workforce. Normally, machines are widely used in production since it will increase the production rate. However, in order to handle the production such as maintenance of the machines, assembling raw materials and finished product, inspections of the finished product, companies still rely on labours to run the machines. In producing large amount of goods, considerable amount of workforce is needed in the company. This COVID-19 outbreak has called for certain SOPs to be followed, therefore, many companies have shifted to remote working for almost 80% of their employees (COVID-19: What It Means for Industrial Manufacturing, 2021) and many companies are found terminating their employees to maintain the economical growth of the company, where it has mainly increased unemployed people all around the world (Fana et al., 2020). The SOP fixed by the government is that a social distancing is needed while working and in order to follow the SOP, remote working was implemented for most of the employees to ensure the companies still remain running as per schedule. (COVID-19: What It Means for Industrial Manufacturing, 2021). All workers are restricted from travelling without valid reasons (COVID-19: What It Means for Industrial Manufacturing, 2021). Some semiconductor companies have to cut down the salary by half or less for all the employees in order to run the company with a good economic condition (ILO Monitor: COVID-19 and The World of Work, 2021). Many employees prefer to be paid lower than not having a job with salary. Table 1 shows the percentage of declined in working hours and reduce in employment rate due to COVID-19 outbreak.

Table 1:

The percentage of declined in working hours and reduce in employment rate (ILO monitor: COVID-19 and the world of work, 2021)

	Decline in working hours (%)	**Full-time equivalent (40 hours, million)**	**Full-time equivalent (48 hours, million)**
World	6.7	230	195
Low income	5.3	14	12
Lower-middle income	6.7	80	70
Upper-middle income	7.0	100	85
High income	6.5	36	30
Africa	4.9	22	19
Americas	6.3	29	24
Arab States	8.1	6	5
Asia and the Pacific	7.2	150	125
Europe and Central Asia Europe	6.0 7.8	24 15	20 12

Apart from this, some companies have also adapted more Artificial Intelligence (AI) to run the production without depending on the regular workforce whereby they just need the labours on maintaining and running the configuration of the AI (Artificial Intelligence Market, 2018).

Operations and Supplying Demands from the Retailers

COVID-19 outbreak has not only affected the semiconductor companies, it has also affected the vendors, raw material suppliers and regular customers of this companies (Coker et al., 2016). The vendors and suppliers will also be facing some financial difficulties due to their low business rate and this causes them to reduce purchasing and selling of raw materials (Coker et al., 2016). Therefore, the production of the semiconductor companies would be reduced or becomes unstable with less raw material supplies which in turn lose its product market price and stakeholders of the company. Fig. 1 shows the fluctuated global production rate during year 2020. This factor impacts not only the electrical but also fabricating metal products, industrial machinery and equipment, printing and publishing, apparel and textile companies (Manufacturing Industry at High Risk of Severe Impact from COVID-19 Pandemic, 2020).

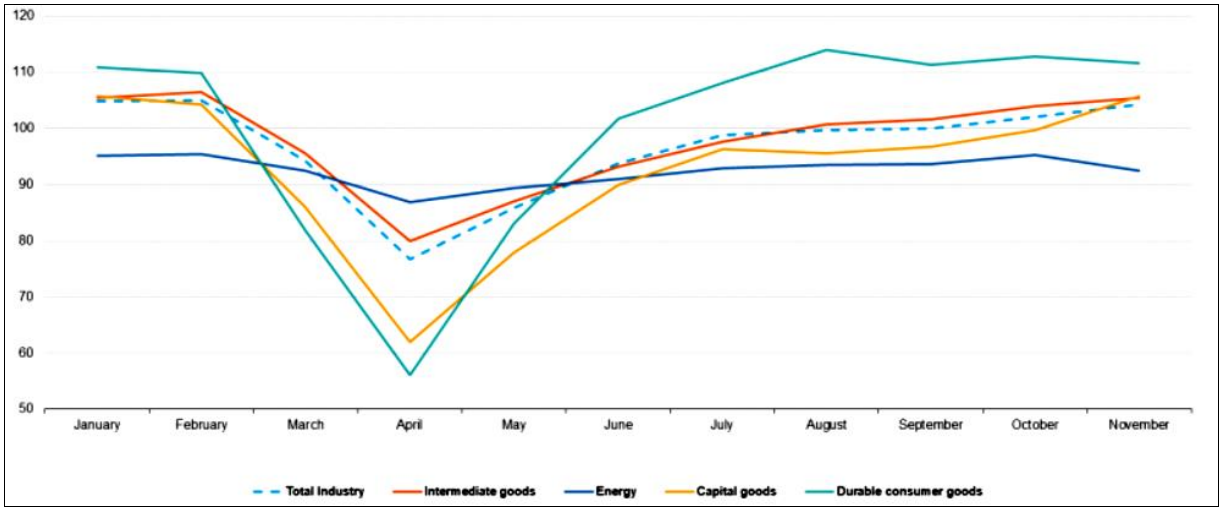

Fig. 1: *Global production rate from January 2020 to December 2020 (Impact of COVID-19 crisis on industrial production, 2021)*

During this outbreak, the demanding equipment are more to medical and in order to follow the SOP fixed by the government which is to wear certain personal protective equipments (PPE) such as face mask, hand sanitizer, face shield and hand gloves (COVID-19: Adapting Manufacturing Operations to New Normal, 2020). Many manufacturing companies have shifted their production priority on the demanding goods such as PPE, respirators, frozen foods, hand sanitizers and ventilators (30 Industries Witnessing a Rise in Demand Due to COVID-19, 2020). Therefore, semiconductor companies could adapt with this new strategy and start to move temporarily on increasing production rate on the demanding goods which helps in increasing the growth of the company. It is therefore advisable to work closely with organization planners to study deeply the customers' and markets' actual needs (COVID-19: Adapting Manufacturing Operations to New Normal, 2020).

Production Rate. There are few factors that lead to reduction in production rate among the semiconductor companies where they have drastically reduced the quantity of goods produced as demands have shifted to ventilators and respirators, face masks, hand sanitizers and more medical equipments (Kumar et al., 2020). Apart from that, to run the production site in semiconductor companies, more workers are needed. Government have fixed some SOPs such as having limitations on how many workers should be working in the company which has become an obstacle for semiconductor companies to increase or maintain their production rate. It is also to ensure that the virus is contained from spreading to one another. (Cai & Luo, 2020). More labors are needed to maintain and increase the production rate. Furthermore, the demand for electrical and electronic components has reduced over the years due to the COVID-19 outbreak (Handy, 2020). Fig. 2 illustrates the demand for semiconductor equipment from December 2019 to March 2020, while Table 2 shows companies which have shifted to manufacturing medical device and PPE during the outbreak of COVID-19.

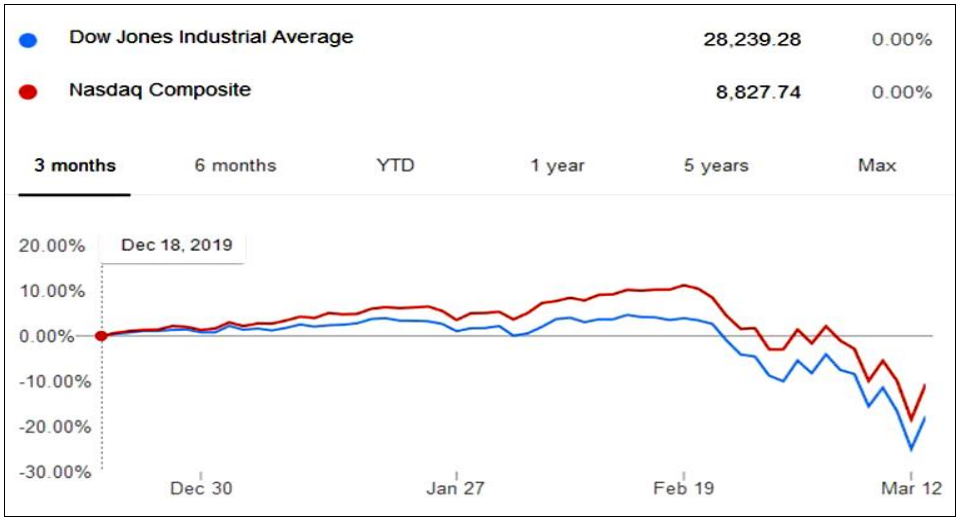

Fig. 2: *The Demands of semiconducting equipment from December 2019 to March 2020 (Handy, 2020)*

Table 2:

Companies shifting to manufacturing medical device and PPE during COVID-19 outbreak (Kumar et al., 2020)

Companies	Industry	Before COVID-19 manufacturing	During COVID-19 manufacturing
Ford	Automobile manufacturing	Vehicles	Respirator and ventilators
Tesla	Automobile manufacturing	PV Cells and vehicles	Ventilators
Airbus	Aircraft manufacturing	Aircraft	Ventilators
Zara	Fashion	Apparel	Surgical masks
Bacardi	Alcohol	Rum	Hand Sanitizers
Gucci	Apparel	Clothing	Masks
Indian Ordnance Factory	Defence	Defence equipment	Ventilators

Financial Crisis. Financial crisis can be considered to be the main impact among all that have been previously mentioned. To run the business, employees are needed and the employees must be paid with commensurate salary for them to work in a productive manner. Since the COVID-19 outbreak, it has caused much downfall in demands as well as companies being forced to reduce the employees and labours due to the health protocols fixed by the government. The reducing number of employees would be hard to present difficulty in increasing the production rate and will indirectly reduce the revenue of the company as less product is being produced (How The Semiconductor Industry Can Emerge Stronger After the COVID-19 Crisis, 2020). Therefore, the semiconductor companies can follow the guideline through five stages; resolve, resilience, return, reimagination and reform (How the Semiconductor Industry Can Emerge Stronger After the COVID-19 Crisis, 2020), as shown in Table 3. By following these five stages, the company will be able to strengthen the muscles by grabbing opportunities in the market.

Table 3.

Five stages: resolve, resilience, return, reimagination and reform (How the semiconductor industry can emerge stronger after the COVID-19 crisis, 2020)

Five Stages				
Stage 1: Resolve	**Stage 2: Resilience**	**Stage 3: Return**	**Stage 4: Reimagination**	**Stage 5: Reform**
Address the immediate challenges that COVID-19 represents to semiconductor workforce, customers, and business partners	Address near-term cash-management challenges and broader resiliency issues during virus-related shutdowns and economic pressures	Create a detailed plan to return the business back to scale quickly, with a focus on adapting your demand planning, product pricing, and sourcing strategy, as well as ensuring a smooth ramp-up of production	Reimagine the "next normal"-understand how macroeconomic developments will impact semiconductor-industry dynamics and understand how your institution should reinvent itself to adapt	Closely monitor regulatory and competitive developments

Conclusion. By assessing the impacts faced by the semiconductor companies around the globe, it can be seen that the impacts eventually lead to financial stress in the company and further cause other consequences through financial setbacks. Semiconductor companies were one of the top companies in the global industry before the COVID-19 pandemic outbreak. In order to remain at the top, the companies should work back into capturing the market by following the guideline through five stages; resolve, resilience, return, reimagination and reform. They should avoid any further spreading of the virus by strictly following the SOP imposed by the government to stabilize and/or increase the income of the company. Remote working has some advantages over traditional working environment where there will be less physical contact with anyone. Temporary manufacturing of high-demand items such as face masks, gloves, hand sanitizers, respirators and ventilators could also help in maintaining growth and profitability of the company.

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COVID-19 ПАНДЕМИЯСЫНЫҢ ЖАҺАНДЫҚ ЖАРТЫЛАЙ ӨТКІЗГІШ ӨНЕРКӘСІБІНЕ ӘСЕРІ

Nor Aznan Mohd Nor
Манипал халықаралық университеті, Манипал, Малайзия,
e-mail: *noraznan.namn@gmail.com*

Түйін: *COVID-19 пандемиясының өндірістік компанияларға әсері ауыр болды, өйткені дүрбелең шабуылы жартылай өткізгіш және жартылай өткізгіш компаниялар арасында орын алды. Көптеген компаниялар пандемияға байланысты банкротқа ұшырады және COVID-19 инфекциясын болдырмау және жұмыс орнында әлеуметтік қашықтықты сақтау үшін үкімет енгізген белгілі бір Стандартты операциялық процедураларға (SOP) сәйкес қашықтан жұмыс істеу сияқты жаңа ережелер пайда болды. Жаңа ережеден басқа, жартылай өткізгіш компаниялар үшін компаниялардың болашағына теріс әсер етуі мүмкін кейбір салдарлар бар. Жаңа қалыпты режимге бейімделу және өндірісті қалыпты күйде ұстау үшін кейбір түбегейлі шаралар қабылдануда. Ағымдағы жағдайды талдаудың негізгі мотиві - жаһандық экономикаға әсер етуі мүмкін жартылай өткізгіш компаниялар өндірісінің толық құлдырауын болдырмау.*

Түйінді сөздер: *COVID-19 пандемиясы, жаңа норма, жартылай өткізгіш компаниялар, жаһандық экономика.*

ВОЗДЕЙСТВИЕ ПАНДЕМИИ COVID-19 НА МИРОВУЮ ПОЛУПРОВОДНИКОВУЮ ПРОМЫШЛЕННОСТЬ

Nor Aznan Mohd Nor
Университет Манипал Интернешнел, Манипал, Малайзия
e-mail: *noraznan.namn@gmail.com*

Резюме. *Влияние пандемии COVID-19 на производственные компании было ужасающим, поскольку паническая атака произошла как среди компаний, так и среди компаний, производящих полупроводники. Многие компании были объявлены банкротами из-за пандемии, и возникла новая норма, такая как удаленная работа с соблюде-*

нием определенных Стандартных операционных процедур (СОП), введенных правительством, чтобы избежать заражения вирусом COVID-19 и практиковать социальное дистанцирование на рабочем месте. Помимо новой нормы, есть некоторые последствия для полупроводниковых компаний, которые могут оказать негативное влияние на будущее компаний. Принимаются некоторые радикальные меры, чтобы адаптироваться к новому нормальному режиму, а также сохранить производство в обычном режиме. Главный мотив анализа текущей ситуации - избежать полного спада производства полупроводниковых компаний, который может повлиять на мировую экономику.

Ключевые слова: *пандемия COVID-19, новая норма, полупроводниковые компании, мировая экономика.*

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STOCK MARKET RESPONSES TO COVID-19 CASES: UNLOCKING MALAYSIA'S FUTURE

Shairil Izwan T.[1*], Neilson T.[1], Edwin F.[2], Boon Yik W.[3], Gulzhaina K. Kassymova[4]

[1] Department of Social Science and Management, Faculty of Humanities, Management and Science, Universiti Putra Malaysia, Campus Bintulu, Malaysia.
[2] Cluster of Business and Management, Open University Malaysia, Malaysia
[3] Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Malaysia
[4] Institute Metallurgy and Ore Beneficiation, Satbayev University; Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
e-mail: shairil@upm.edu.my

Abstract. *The COVID-19 pandemic has posed a major health and economic crisis on a global scale. The waves of this crisis hit Malaysia since early March 2020. This unpredicted crisis is among the obstacles faced by Malaysia towards the country's mission of development in 2020. However, the country is still in the line of planning and introduced its mission and vision of shared prosperity in 2030. In contrast, during this crisis, the impact has especially been hard on vulnerable groups. The stock market of Malaysia was also affected. The government introduced a stimulus package to attempt to recover the economy. This study focuses on KLCI Index on the impact of COVID-19 cases reported on day trading and macroeconomic variables during the year 2020. We employ the Bound Test to identify the co-integration and perform the ARDL. The results show that the cases reported have a significant impact on macroeconomic variables and the stock market in both the short- and long run. In conclusion, we found that the effective management of a health crisis is one of the best solutions to reduce the negative impact on economic performance and recover from any crisis.*

Keywords*: Covid-19, Stata, Growth, Stock Market.*