



Innovation in Times of Pandemics

How businesses develop their innovation processes during COVID-19: The example of the business community in Singapore

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Presented by Luis Aguilar Alvarez
luis.aguilar-alvarez@etu.unistra.fr / luis.aguilar@jupiter.uni-freiburg.de
N. Etudiant :21816827 / Matrikelnummer: 4766529

Supervised by:
Prof. Dr. Emmanuel Mueller

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Résumé

L'innovation est un processus que les entreprises développent pour avoir des avantages sur le marché, ainsi que pour tenir leur position face aux changements dans l'environnement où elles se trouvent. Néanmoins, l'innovation est un processus qui peut prendre du temps. Alors, que se passe-t-il quand « les règles du jeu » changent du jour au lendemain ? En 2020, la pandémie COVID-19 a impacté tous les niveaux de l'ordre mondial, comme la santé, la société, la politique, et l'économie. Les gouvernements ont pris des mesures pour éviter la propagation du virus et la saturation de leurs systèmes de santé sociale, dont les plus courants ont été la fermeture des frontières et la mise en place de confinements. Les entreprises se sont vues forcées à prendre des décisions et d'innover plus rapidement que d'habitude pour pouvoir traverser la crise.

La crise causée par la COVID-19 a aussi touché les pays les plus stables ; tel est le cas de Singapour. Malgré sa taille et sa jeunesse en tant que nation, Singapour est un pays qui a réussi à se développer très rapidement. De plus, le pays a une position géopolitique stratégique, qui lui a permis de devenir un centre très important en Asie pour les entreprises et l'innovation. Avec un grand nombre d'institutions gouvernementales qui poussent l'innovation, des lois et des normes qui sont très favorables pour la création d'entreprises, et sa proximité aux autres pays de l'Asie, il-y-a beaucoup de sociétés multinationales, ainsi que des start-ups, s'installent à Singapour.

Avec le développement de la pandémie COVID-19, la fermeture des frontières et la mise en place de mesures similaires aux autres pays du monde, les sociétés à Singapour ne pouvaient plus opérer de la même façon et, à un moment donné, les personnes ne pouvaient plus sortir de leur maison ni du pays. Par conséquent, les entreprises ont dû commencer à sortir des sentiers battus et innover. Lors d'une crise, les processus d'innovation des entreprises jouent un rôle essentiel. Ces processus doivent être réalisés de manière rapide et il y a des facteurs clés qui vont déterminer leur résultat.

Abstrakt

Innovation ist ein Prozess, den Unternehmen durchführen müssen, um Vorteile auf dem Markt zu haben und um ihre Position angesichts der Veränderungen in ihrem Umfeld zu behaupten. Dennoch ist Innovation ein Prozess, der Zeitaufwand nimmt. Was passiert also, wenn sich die "Spielregeln" über Nacht ändern? Im Jahr 2020 hat sich die COVID-19-Pandemie weltweit auf allen Ebenen, der Gesundheit, der Gesellschaft, der Politik und der Wirtschaft bemerkbar gemacht. Die Regierungen haben Maßnahmen wie Grenzsicherungen und Ausgangssperren ergriffen, um die Ausbreitung des Virus und eine Überlastung ihrer sozialen Gesundheitssysteme zu vermeiden. Unternehmen waren gezwungen, Entscheidungen zu treffen und schneller als üblich innovativ zu handeln, um die Krise zu überwinden.

Die durch COVID-19 verursachte Krise hat auch die stabilsten Länder wie Singapur getroffen. Obwohl Singapur als Staat erst vor 55 Jahren gegründet wurde und mit ca. 5 Millionen Einwohnern eine verhältnismäßig kleine Nation darstellt, gehört es zu den wenigen Ländern, denen es gelungen ist, sich sehr schnell zu entwickeln. Seine voreilhaft geographische Position, ermöglichte es Singapur schnell, ein wichtiges Zentrum in Asien für Wirtschaft und Innovation zu werden. Neben der unmittelbaren Nähe zu anderen asiatischen Ländern gehören viele Innovations- und Unternehmensgründungsförderliche Regierungsinstitutionen und Gesetze, zu den Gründen, weshalb sich viele multinationale Unternehmen sowie Start-ups in Singapur niederlassen.

Durch die Schließung der Grenzen als Resultat der Entwicklung der COVID-19 Pandemie konnten Unternehmen in Singapur nicht auf die gleiche Weise operieren. Hinzu kam, dass viele Menschen sogar innerhalb des Landes ihre Wohnorte nicht mehr verlassen konnten. Daraufhin mussten Unternehmen anfangen, über den Tellerrand zu schauen und innovativ zu sein. In einer Krise spielen die Innovationsprozesse in Hinblick auf das Überleben eines Unternehmens eine entscheidende Rolle. Neben der Notwendigkeit diese Prozesse schnell durchzuführen, gibt es weitere Schlüsselfaktoren, die das Ergebnis bestimmen.

List of abbreviations

COVID-19 – Coronavirus Disease 2019

WTO – World Trade Organisation

OECD - Organisation for Economic Co-operation and Development

OEC - Observatory of Economic Complexity

SGC – Singaporean-German Chamber of Commerce and Industry

ASEAN - Association of Southeast Asian Nations

APAC – Asia Pacific

R&D - Research and Development

DIHK – German Chamber of Commerce and Industry

DOS – Department of Statistics of Singapore

PR - Permanent Resident

CB - Circuit Breaker

MOL - Ministry of Law (Singapore)

MOM - Ministry of Manpower (Singapore)

MOH – Ministry of Health (Singapore)

SGD - Singaporean Dollar

SME – Small and Medium-sized Enterprises

HR – Human Resources

EDB – Economic Development Board

1. Introduction

“As awful as this epidemic has been, the next one could be much worse. The world is simply not prepared to deal with a disease.”

Bill Gates, 2015

On the night of March 23th, 2020, Singapore closed its borders to any short-term visitor as a measure to control the spread of COVID-19 (Ramchandani, 2020). The small southeast Asian nation had not been the only one to do so: Kenya suspended flights in and out of the country; Argentina and Canada banned any foreign visitor from entering their countries; the United States restricted flights for people coming back home to only a few airports; many EU member states closed their borders to non-EU states and between themselves (Yar, Salcedo, & Cherelus, 2020).

According to OCDE, the COVID19 pandemic has been the greatest shock of the 21st century. For it has not only affected public health, but the economic, financial, and social sectors as well. It has led to short-term decline in GDP for many major economies and many economic sectors, such as tourism, have faced an output decrease as high as 70% (OECD, 2020) . It also has created a lot of uncertainty within the business community around the world. Twelve days after the first cases were registers in Wuhan, China, the world started to feel the real human and economic impact of the pandemic (The Economist , 2020).

The governments of different countries have taken measures in order to stop the spread of the virus. Phrases including “social distancing” or “stay home” have been used in the common speech in the first months of 2020. Even the G-20 has been held online, for the first time. This has had a drastic impact in many business operations. According to *The Economist*, by March 19th, China’s industrial output had gone down by 13.5% and retail sales were 20.5% lower.

Nevertheless, as awful as a pandemic can be, it also brings important changes to the global order. The Black Death, in the middle ages, killed millions of people but it led to an increase in labourers’ salaries because of the massive lack of labour force. Thus, it also

contributed to the breakdown of feudalism (The Economist , 2020). Though the COVID-19 pandemic will have a different outcome, there are different challenges and opportunities that naturally appear in times of crisis and that lead to scenarios where innovation and entrepreneurship are essential for the success of an organisation (Devece, Peris-Ortiz, & Rueda-Armengot, Entrepreneurship during economic crisis: Success factors and paths to failure., 2016).

In the context of the pandemic COVID-19, this thesis aims to answer the question: how businesses in Singapore appropriately develop their innovation processes during COVID-19? Thus, this thesis aims to demonstrate how such a crisis can stimulate innovation. In order to do so, the biggest challenges, opportunities, and what the actions and outcomes involved in the innovation processes of different businesses are will be identified through an empirical study that includes interviews and some conferences with companies based in Singapore.

This thesis presents firstly the terminology and literature related to every concept used. Secondly, it gives an insight into Singapore and its position and role in Southeast Asia by presenting key concepts and how the pandemic has impacted it. This section also introduces hypotheses on how businesses in Singapore could be undertaking their innovation processes during COVID-19. In the next part, the empirical study will be presented and followed by an analysis based on the interviews and conferences. Finally, the outcomes of the empirical study will be presented and possible case scenarios, which could be used for further research, will be given.

2. Main Concepts

2.1. Pandemics and COVID-19

2.1.1. General Concept

According to the WHO, a pandemic is a worldwide spread of a new disease against whom most of the people do not have immunity. On March 11th, the World Health Organisation (WHO) classified COVID-19 as a pandemic. This happened, a few days after the total number of confirmed cases, in over 100 countries, reached 100 000 (WHO, 2020).

COVID-19 is an infectious disease caused by a Coronavirus. This virus belongs to the large family of coronaviruses that can cause respiratory infections in animals and humans (WHO, 2020). The infections can range from a common cold to more severe diseases such as Severe Acute Respiratory Syndrome (SARS). Most people infected with COVID-19 do not require special treatment against the disease because it can have a moderate impact on the respiratory system. However, older people, and people with delicate medical records, such as diabetes or cardiovascular diseases are more likely to develop a serious illness (WHO, 2020).

The virus is highly infectious, it can be spread through droplets of saliva or nose fluid. In order to control the spread of COVID-19, the WHO introduced a guideline with the necessary preventions, such as avoiding touching one's face, the constant use of alcohol-based hand rub, and the practice of physical distancing.

2.1.2. Impact on the global economy

Due to the highly infectious nature of COVID-19, measures were taken one step forward by many governments around the world, implementing social distancing and compulsory lockdowns. For example, France started banning meetings of more than 100 people from mid-March until a national lockdown was officially declared (Gouvernement de France, 2020); Australia closed its border to any non-Australian citizen for the rest of

2020 (Australian Government , 2020); Singapore closed all non-essential businesses for more than two months (Singaporean Government , 2020). These measures have had an impact at a social, economic, and political level that the world has not experienced before (OECD, 2020).

According to the OCDE, expenditure and consumption, in the first half of 2020, dropped around one third due to the measures that governments around the world had taken in order to control the spread of COVID-19. Around one third of the world's total population was living a sort of lockdown (Sault, 2020), which happens to be an effective way in controlling the number of infections in the long run (Ferguson, Laydon, & Nedjati-Gilani, 2020). However, this has had a massive impact in the level of global output produced since global demand has dropped, in part, because only essential services, such as supermarkets, were allowed to remain open (OECD, 2020). Since the first half of 2020, the OECD forecasted economic decline in many economic sectors, each with a different impact. Businesses such as retailing and real estate services had the worst impact in the first quarter of 2020¹.

The German Chamber of Industry and Commerce (DIHK) had also predicted very negative outcomes during the COVID19 crisis, especially for German companies with operations overseas². The DIHK had stated that German companies around the world were going through a crisis. The results of a survey showed that many of these companies were expected to have major losses and even stop operations in certain countries (DIHK, 2020). The critical questions are the changes in demand for goods and services. However, the impact and forecasts are different depending on country or region, and the sector of the company. Around 80% of the companies expected the situation to worsen in North America and Europe. China and Southeast Asia were reported to have a weaker impact; China even had the highest percentage of German companies having a better economic expectation in the survey. This is due to the region's fast recovery after being the first to be infected. During the second week of March, the number of COVID-19 cases

¹ OECD Graph, Annexes: 1.1.

² DIHK Graph, Annexes: 1.2.

around the world outnumbered the number of cases in Asia in a matter of days (The Straits Times, 2020).

The COVID-19 pandemic has also made economic stimulation policies essential (OECD, 2020) (World Bank, 2020). According to the World Bank, economic stimulus packages have been determinant for many businesses to go through the crisis. However, this can also have a negative impact in the long run. National budgets could collapse, and countries would get indebted, thus deepening the crisis even more.

As the pandemic advanced, and some governments managed to control the number of infections and death tolls, some national restrictions started to be eased (OECD, 2020). However, many businesses continued to be frozen. Entertainment and trade fairs, for example, depend on crowds and gatherings, therefore they are not able to resume operations as fast as other businesses, since COVID-19 can be spread easily. A second wave of infections is expected, as people start to go out and have contact with other people. The OECD states that, if not handled carefully, a second wave of infections could have worse outcomes for the global economy. European economies from the G7 would have the biggest impact in case of a second wave of infections³. Global GDP is expected to have the worst contraction in the century, and it would take years for it to recover (OECD, 2020) (World Bank, 2020).

2.1.3. Economic impact of previous pandemics

The COVID-19 pandemic is a global public health crisis without precedent in living memory (OECD, 2020). Nevertheless, the world has gone through different pandemics throughout history. Besides the Black Death, which is responsible for the death of more than 30 million people in Europe by the end of the 14th century, Influenza has been one of the biggest pandemics ever (TED-Ed, 2012). Although most of the time the virus that causes influenza usually ends up causing common flu, the virus can mutate and cause new diseases. The Great Flu Pandemic (19-18-1919) killed an estimated of 50 million people (CDC, 2020). A more recent pandemic, that took place in 2009, was AH1N1 also

³ OECD Graph, Annexes: 1.3.

known as *Swine Flu*. The pandemic had a serious sanitary impact in countries, such as the USA and Mexico (Brito, 2020).

Besides the social and sanitary impact, pandemics have an important economic impact. The world has experienced one of its worst economic situations during COVID-19, yet other pandemics or epidemics - which are limited to a certain area (CDC, 2020), have had serious economic consequences. As mentioned before, during the AH1N1 pandemic, Mexico's GDP fell by -5.28% (Brito, 2020). Some economic sectors, such as tourism and transportation were frozen for weeks and the recovery was slow after the end of the pandemic. In many states of the USA, businesses also reported staff shortage and considerable losses due to the AH1N1 pandemic (Rebmann, Wang, Swick, Reddick, & Minden-Birkenmaier, 2013). Productivity in many companies was also at low levels since employees could not go to work for days, in order to avoid infections. In the UK, according to an article of the London School of Hygiene and Tropical Medicine (BMJ, 2009), the pandemic influenza alone reduced gross domestic product by 0.5 - 4.3%. The article also states that government restrictions against a pandemic could worsen the economic performance of the country, if they last for long.

In the past, governments have had to control the spread of disease by taking strict measures (Thompson, Pendell, & Boyel, 2009). Although measures such as movement restrictions could be effective to control the spread of a disease, if they are prolonged, a strain in cash flow for business can happen (Thompson, Pendell, & Boyel, 2009). It is bad for businesses to have restrictions in their operations and it is also bad for planning, since there is a lot of uncertainty. However, not adopting strict measures in times of pandemic can increase the number of fatalities. This can have not only a negative impact in the healthcare system of a country, as it has seen with COVID-19; previous research shows that when fatalities are high people are discouraged on going out, or even to go to work (BMJ, 2009). This can also have a negative impact on the economy because people would consume less, leading to a drop in demand. Companies would therefore produce less, and a vicious cycle in the economy would be created.

2.1.4. Outcomes of previous pandemics

The importance of previous pandemics is not only to understand what the challenges have been but also what have been the outcomes and solutions that companies adopted. With a pandemic, like in any other crisis, companies learn how to adapt and how to keep their operations running.

One of the main points of learning is that companies look at aspects that they were ignoring before. During and after AH1N1, many companies realized that they did not have efficient hygiene protocols and thus were not ready for another pandemic (PROFESSIONAL SAFETY, 2009). Small things in different processes that, at the beginning seemed to be insignificant, resulted to be crucial after the pandemic. Some companies have since encouraged their staff to have better hygiene practices and have introduced better hygiene protocols (Rebmann, Wang, Swick, Reddick, & Minden-Birkenmaier, 2013).

Another important aspect of a pandemic, like in any other crisis, is that managers learn how to prioritize and make decisions. The perception of risk management becomes larger and a company can use the experience of a pandemic and use it for other kind of crisis, natural disasters, terrorism, etc. (Rebmann, Wang, Swick, Reddick, & Minden-Birkenmaier, 2013).

Thus, it is evident that pandemics not only represent challenges for companies and the economy in general, but they also represent opportunities in various processes. COVID-19 has had an economic impact that has never been seen before. Yet, since companies learn from it and adapt as much as they can, the COVID-19 contingency is the time for innovation processes to take a leading role (Harvard Business Review, 2020).

2.2. Innovation

2.2.1. What is Innovation?

Innovation is a vast concept. Schumpeter (1912) is often seen as the father of innovation. In his work *Theorie der wirtschaftlichen Entwicklung* (Schumpeter, 1911), he stated that an evolutionary development, a cycle breaker of existing processes, is necessary to grow profit. Innovation can thus be defined as a process of change in which a business is able to challenge existing rules to make its profit grow and secure its long run success (Christensen, 1997) (Schumpeter, 1911) (Drucker, 1985). The changes can be large or small, radical, or incremental (O'Sullivan & Dooley, 2008). Through innovation, inputs of labour capital, information, material, and energy are transformed into outputs of greater value (Christensen, 1997).

Companies are the main “creators” of innovation (Schumpeter, 1911). They can innovate in different ways, since economic development is linked to different production factors. Schumpeter (1911) defined the different types of innovations that a company can carry out. First, innovation can be the development of a new product, e.g. a beverage company launching a new mango-strawberry smoothie into the market. Then, innovation can be a new production method, e.g. robots used in the automobile manufacturing industry. Also, the opening of a new market, e.g. an Italian e-commerce platform expanding to India. Finally, the adoption of a new business model, e.g. when a company turns some of its physical processes into digital processes, such as payments.

2.2.2. Factors that influence innovation.

There are many factors that determine how innovation can be stimulated: the size of a company, external factors such as market structure, competition, government funding, or a change in the environment (Griffith, Huergo, Mairesse, & Peters, 2006).

Research and Development expenditure (R&D) is an important measure for innovation (UNESCO, 2020). According to UNESCO, global spending on R&D is almost US\$ 1.7 trillion. South Korea, Switzerland, Finland, Singapore, are some of the countries

with the highest R&D expenditures rates. Many of the countries with a relatively high expenditure on R&D are also some of the top countries at the ease of doing business (World Bank, 2020); this suggests that national institutions have a major role in the stimulation of R&D and innovation. Griffith, Huergo, Mairesse, and Peters (2006) carried out a study by comparing four European countries. The main outcome was that firms in countries with more governmental subventions were more engaged in R&D.

In a normal situation, companies have many reasons to innovate. Usually, demand is seen as the main source of company's need to innovate (Kline & Rosenberg, 2009). Schumpeter (1943), emphasized on the complexity of capitalism as a motor of innovation itself. This is because competition pushes companies to be looking for an advantage in order to succeed. Furthermore, capitalism is subjected to change, meaning that it is an evolutionary process (Schumpeter, 1943). It is also because of capitalism's lack of immobility that existing entities can always be replaced with new and better entities. This concept of the destruction of old entities by the creation of new ones is defined as creative disruption (Schumpeter, 1943) (Christensen, 1997).

Innovation is a process that costs work and money and is not always a short-term solution (Drucker, 1985). Companies want to make sure that they will have an advantage if they decide to innovate. There has been a debate on the ideal market structure to encourage innovation. According to Schumpeter (1943), competition pushes innovation, however, companies would not be encouraged to innovate if there is too much competition. As mentioned before, companies are expecting to make profit by innovating. Too much competition means that companies can have lower returns (Pender & Woerter, 2013). A monopolistic market structure, which according to Schumpeter (1943) is ideal for innovation, is not seen as positive either because companies would not be under the pressure of being threatened by competitors, thus, they will innovate less (Pender & Woerter, 2013). Therefore, a balance between enough competition and enough investment in R&D seems to be the ideal condition to encourage innovation. It is important to mention that patents play an important role, regardless of the market structure, because businesses can protect what they create (Cockburn & Long, 2015).

The size of a firm also plays a major role in the stimulation of innovation. The larger the company, the more likely it is to spend in R&D (Griffith, Huergo, Mairesse, & Peters, 2006). In 2018, Amazon.com Inc, Alphabet Inc., Volkswagen AG, and Samsung Electronics were the companies that invested the most on R&D (Startegy&, 2019); they are also some of the world's largest companies. However, Start-ups also are also an important source of innovation since they need to have constant and fast growth compared to other types of companies. Start-ups tend to be founded with the advantage of serving more innovative activities (Choi, Sung, & Park, 2020); e.g. many Start-ups are born with digital processes nowadays, other older companies have to adopt these processes, which is costly but necessary if they want to adapt to the environment.

2.2.3. The Innovation Process

When companies decide to innovate there is a path that they have to follow to turn new or existing knowledge into marketable solutions (LEAD, 2020). This path can only be effective if the company that wants to innovate sets clear objectives (O'Sullivan & Dooley, 2008). However, there is no exact formula on how companies should reach their targets; thus, their innovation process can have different approaches. Rosenberg and Kline explained that innovation can be efficient yet very uncertain because the environment changes constantly and innovation is not a fast process itself. In many cases, companies fail to innovate because there is no clear understanding of the process of innovation or be because there are no clear objectives set (O'Sullivan & Dooley, 2008) .

One approach to the innovation process is the linear model⁴. O'Sullivan & Dooley (2008) divide the process in four linear steps: Idea Generation, opportunity recognition, development, realisation. The first step consists of generating creative ideas for the development of the company. In order to do so, there must be an analysis of the external environment or of the company's internal processes. When it comes to identifying opportunity, a company must target its biggest potential but also by considering the possible risk. Once the opportunities have been identified, a company can then proceed to develop the innovation. Realizing, is launching this innovation into the market, or

⁴ Linear model, Annexes: 1.4.A.

adopting within the internal processes of the company. Finally, learning comes in as a nonlinear step (Kline & Rosenberg, 2009); it is one of the final outcomes of the whole process, because companies gain experience for the future by “building up and following the path’ towards innovation.

Rosenberg and Kline criticise the linear model of the innovation process because initially there are no feedback loops at every stage, which means that learning outcomes are not as significant. Thus, they introduced the chained linked model of the innovation process. This model shows the relationships between research, invention, innovation, and production⁵. What is important about this model is that learning and knowledge loops are present in every part of every sub process, this means that learning becomes proactive and can generate new knowledge that , at the same time, can be applied at any stage of the process.

There are other practical factors that belong to the innovation process. These contribute to the generation of ideas, give a structure to the process, or help to have a better understanding of the environment. Budgeting is an essential element for the structure of any innovation process (O'Sullivan & Dooley, 2008). As previously mentioned, innovation represents an investment for companies; as for any other investment, a profit is expected in return. Therefore, the costs have to be identified and a budget needs to be set.

Another important factor of the innovation process is the source of ideas and R&D. There are companies that have a strong inhouse R&D; therefore, they produce and apply their own knowledge to their own processes. Then, there is the idea of collaboration between companies. Many other companies decide to adopt an open innovation approach, in which they collaborate with other companies to innovate. Whether a company decides to have an open or closed innovation approach, this is a strategic choice (Cassiman & Veugelers, 2006).A balance between in house R&D and open

⁵ Chain linked model, Annexes: 1.4.B.

innovation would be the ideal approach to increase output successfully (Cassiman & Veugelers, 2006).

When it comes to collaboration, networks become an essential part of the innovation process. The information and knowledge flow can only be transmitted by having a vast network. For businesses, this means that different clusters of industries or services can be very valuable, because they all have different perspectives on how the markets work (Breschi & Lissoni, 2009). Customers networks are also important because companies depend on their demand and any possible change on the environment will be directly manifested by them. Therefore, the larger the customers network, the better understanding on how to adapt a company's innovation processes.

Innovative activity tends to be clustered in geographical areas, because of the concentration of knowledge (Audretsch & Feldman, 1996). Silicon Valley, in the USA, or the greater bay area in China are some examples of how innovation tends to cluster. In the case of this thesis, Singapore will be taken as an innovation cluster.

2.2.4. Innovation in times of crisis

One of the reasons why companies innovate, is to manage a crisis. During a crisis, there is a sudden change in the environment for which companies are not always prepared. **Innovation is indeed very effective to the survival of a company during a crisis (Guerzoni , Nava, & Nuccio, 2019).** Through innovation and entrepreneurship, companies need to adapt to these new changes to go through a crisis and reestablish economic growth after it. This reason will be essential for the next analysis in this thesis.

Economic crises provoke environmental complexity, increases perceived environmental uncertainty, and determines how well service firms can understand or predict the external changes and trends affecting their businesses (Martin-Rios & Pasamar, 2017). In some cases, entrepreneurship and innovation happen to have a better outcome during a recession than during a boom period (Devece, Peris-Ortiz, & Rueda-Armengot, 2016). According to Martin-Rios and Pasamar (2017), firms that are

very cost-oriented tend to have more innovative activity- based on its R&D expenditure, in periods of sharp decline in the economy.

During a crisis, size plays a crucial role. Since they have more resources, large companies are usually less affected than small companies. From a country' s perspective, after the 2008 economic crisis, the strongest European economies , such as Germany or Sweden, came out with more successful innovative activities than smaller economies (Filippetti & Archibugi, 2010) However, start-ups tend to be ready for crises because they are funded with modern processes that older companies have to adapt, such as digitised processes (Choi, Sung, & Park, 2020) .

The need to innovate during a crisis also depends on the sector of the company, as in normal circumstances. Real estate will not always have the same impact as biomedical manufacturing. As mentioned before, for businesses the main cause of a crisis is usually the drop of demand (Thompson, Pendell, & Boyel, 2009); taking the example of a pandemic, the demand for medical equipment tends to increase whereas the demand for textiles tends to drop. Thus, these two industries will have two different approaches in the way they innovate.

3. Singapore in Context

3.1. Singapore - Background

There are three different ways in which Singapore can be seen. First, it is an independent and sovereign nation. It can also be a city, in fact, one of the few remaining city states in the world together with Monaco and The Holy See. Lastly, Singapore is an island, also called Singapore mainland because the country is composed of smaller islands. This section introduces an insight of Singapore, and how COVID-19 has impacted its economy.

The Republic of Singapore is a Southeast Asian country located at the tip of the Malayan peninsula. It has only one land border to Malaysia and it is surrounded by many islands in the south that belong to Indonesia. With 721.5 km², Singapore is one of the smallest countries in the world and has almost no natural resources. Despite its small size, the country is very diverse ethnically; it has four official languages: English, Mandarin, Malay, and Tamil. Furthermore, since its independence in 1965, Singapore has become one of the richest countries in the world. In 2019, its GDP per capita surpassed 65,000 USD. In comparison, France and Germany had a GDP per capita of 40-46, 000 USD, respectively (World Bank, 2020). Singapore is also one of the biggest financial and innovation hubs in Asia and the world.

Singapore's GDP shares are very diverse. The biggest sector is manufacturing, representing 20.9 % of its total GDP, followed by wholesale and retail trade, 17.3%, and business services, 14.8% of its total GDP (SingStat, 2019).

The city state is considered as one of the four Asian tigers; these countries have managed to reach a standard of wealth and economic development in less than 30 years. Today, Singapore is not only one of the richest countries in the world but also the most competitive economy (World Economic Forum, 2019) and the fourth country with the lowest corruption index (Transparency International, 2020).

The wealth and economic success of the southeast Asian nation has numerous reasons. First, its geographical location. Despite its size, Singapore is located in a strategic spot at the tip of the Malayan peninsula, between the Indic Ocean and the South China Sea⁶. In the past, the island was already an important trading post due to its geopolitical advantage. Today, Singapore has the second busiest container port in the world, only behind Shanghai, China (Radio Free Europe, 2018).

Another factor that plays an important role in Singapore's stable economic development is its business-friendly environment. Besides being the most competitive economy, the city state is also the second place in the world at the ease of doing business (World Bank, 2020). It is understandable that, due to its small size, the country has always tried to attract as much foreign investment as possible. Some of the policies that allow the creation of companies in Singapore or the settlement of foreign companies include financial assistance. Grants, loans, and tax deduction are some advantages that motivate businesses to start up or settle in Singapore (Enterprise Singapore, 2020).

3.2. Singapore - Innovative Nation

There is an essential link between government policies and measures, and innovation (Basant, 2018). Local governments not only control important resources, such as administrative examination and approval, land acquisition, loan guarantees, and preferential policies, but also bear important responsibilities such as public goods input and regional economic construction (Bhattacharya,, Hsu, Tian, & Xu, 2017). Good innovation policy improves innovation ability, and good innovation ability helps companies to deal with external competition and establish unique competitive advantages (Bhattacharya,, Hsu, Tian, & Xu, 2017)

As a result of the favourable policies for business, Singapore is becoming an innovation hub. In 2019, the country invested 2.1% of its GDP in R&D, from which 60% came from the business sector (UNESCO, 2020). Furthermore, the country is considered

⁶ Map of Southeast Asia, Annexes: 1.2.

as the 1st on property protection in Asia (World Economic Forum, 2019). As mentioned before, this motivates businesses to innovate more because new products and inventions can be protected under a solid legal regulation.

Singaporeans are aware of the challenges that they face for being in a small country. As a result, innovation processes are part of Singapore's day to day life. One of the most innovative projects that the country has developed is the Smart Nation initiative (Smart Nation Singapore, 2020). Driven by the ongoing digital revolution around the world, Singapore's government is aims to fully digitalised most of its processes for the benefit of its citizens.

According to the Singaporean government, some of the main goals of the Smart Nation initiative is to facilitate electronic payments for everyone, to digitalise administrative processes fully , such as business licencing, to give its citizens an easier access to public data and re-enforce cyber security; and to make its healthcare system more efficient. The Smart Nation Initiative also comprises other aspects such as smart urban mobility and smart logistics. Through Smart Mobility solutions, the city is aiming to manage everyday challenges such as traffic flow and parking space (Smart Nation Singapore, 2020). Also, in the urban planning sector, the Smart Nation Sensor Platform (SNSP) has allowed the city to have a more efficient management of water, electricity, and other facilities.

Another massive ongoing project is Tuas Mega Port. The port is expected to be fully completed by 2040 but its opening would be in phases, with the first phase opening in 2021 (Maritime Singapore Connect , 2020). It also will be fully automated thus making port operations more efficient and safer.

With so many projects based on digitalisation and automation, is not a coincidence that Singapore is the world's fourth exporter of integrated circuits, only behind South Korea, Taiwan, and China (OEC, 2018).

3.3. Singapore and ASEAN

It is difficult to speak about Singapore without speaking about its neighbouring countries and the region where they are located. Singapore is one of the founding members of the Association of Southeast Asian Nations (ASEAN), and many consider it as the heart of southeast Asia.

The Association was established in 1967 by Thailand, Malaysia, Singapore, Indonesia, and the Philippines. Brunei, Vietnam, Myanmar, Laos, and Cambodia joined the association a few years later (ASEAN, 2020).

ASEAN aims to promote the collaboration of the region in topics such as economic growth, culture, and trade. To ensure this collaboration, there is a constant exchange of expertise, countries that specialise in a certain topic assist the other countries in form of training, education, and professional exchanges, or by developing infrastructure projects (ASEAN, 2020).

A notable initiative, which is also related to Singapore's Smart Nation Initiative, is the ASEAN Smart Cities Network (ASCN). Urban populations in ASEAN are increasing, Jakarta, Indonesia and Bangkok, Thailand are some of the urban centres with the largest population. This implies that cities will need to introduce new smart solutions to facilitate the management of their urban planning and administrative processes. ASCN includes the largest cities in ASEAN and more, and it aims to facilitate collaboration between them (ASEAN, 2020).

3.4. Singapore - Challenges

Despite its wealth, political stability and outstanding infrastructure, Singapore has some considerable challenges. The country's high income also means that labour force is largely more costly than in other countries in the region, such as Vietnam, Thailand, or Indonesia. The city has also been classified as one of the most expensive in the world.

Singapore's most notable challenge is its size. The small southeast Asian nation has practically no farming land and natural resources are very limited. It has been working on the development of vertical farms to satisfy the local demand. However, these sorts of incentives can take years before being effective. As a consequence, Singapore is strongly dependent on neighbouring markets, such as Malaysia and Indonesia, and the global supply chain, in which China plays an important role. According to the OEC (2018), China is Singapore's most important trading partner, with the majority of its exports and imports going and coming from the Asian giant.

Lastly, Singapore's position in ASEAN is an advantage, but this can change in special circumstances. As mentioned before, thanks to its business-friendly environment, good infrastructure, and stable institutions, businesses prefer to settle in Singapore when they enter the southeast Asian market. However, many of their operations do not happen in Singapore but in other ASEAN countries⁷. Thus, business travelling is essential for companies to develop their businesses around the region. In case of a pandemic, as it happens with COVID-19, travel restrictions are a serious problem for businesses settled in Singapore.

3.5. COVID-19 in Singapore

3.5.1. General Numbers and travel restrictions

Singapore was one of the first countries to react to the pandemic. As China started to register more and more cases, it imposed travel restrictions on people coming from China, or that had been in that country 14 days before traveling for Singapore (The Straits Times, 2020).

As the time went and the number of infections increased, Singapore closed its borders to any non-Singaporeans or Permanent Resident (PR). By the end of March, with 35 thousand cases, the island became the 3rd country in all of east and south Asia in

⁷ Annexes: Interviews

number of COVID-19 cases, only behind China and India (The Straits Times, 2020). This is also due to the massive testing campaigns that the Singaporean government carried out. Despite the rise in numbers by the end of March 2020, the death toll remained one of the lowest in the world. Between January and July 2020, there were only 27 fatalities caused by COVID-19 (MOH, 2020).

Eventually, essential travel was allowed again in June. However, there were a lot of restrictions for the people coming to Singapore. Non-Singaporeans or non-PRs must serve a home stay notice (HSN) at one of the facilities designated by the government for 14 days and do the COVID-19 test (Singaporean Government , 2020). Both procedures must be payed from the visitor's own pocket and the prices can go from SGD 2000 for the HSN and SGD 200 for the test. Only a list of visitors from designated countries that represent a minor risk, such a New Zealand, China, or Vietnam, do not have to serve the 14 days of HSN at the facilities designated by the government (Singaporean Government , 2020).

3.5.2. Safe Distancing Measures

Numbers of COVID-19 cases kept rising in Singapore in the first quarter of 2020. In order to keep the number of infections under control, the government introduced the Circuit Breaker (CB) measure. With this measure, only essential businesses, such as supermarkets, pharmacies, and transport, were allowed to remain open (MOH, 2020). Any other businesses were requested to close their offices and keep their staff working from home as in many other countries around the world. Meetings of less than five people were allowed at an initial point but eventually the measure got stricter until the people were not leaving their homes or direct neighbourhoods.

The CB ended on June 1st, 2020 and business started to reopen gradually (MOH, 2020). However, as people were not going out, and businesses were closed for almost three months, demand dropped, as in many other countries.

3.5.3. Impact on the Economy.

COVID -19 and the introduction of the CB put the country in a critical situation, for its GDP had already contracted by - 12.6% (SingStat, 2020), the first and worst contraction in its history. Wholesalers were among the most affected around the world; in Singapore, they were expecting losses of more than 58% for the second half of 2020 (SingStat, 2020). Other sectors, such as accommodation, expect a decrease of more than 90% in the first half of 2020.

Other factors that have largely affected Singapore are the travel restrictions. As mentioned before, the country is small, and many companies that settle there have clients and suppliers from all over the ASEAN region. Singapore's direct neighbours, Malaysia, which has the only land border to Singapore, closed its borders on March 18, and Indonesia on April 2 (The Straits Times, 2020). Thailand, Vietnam, and other ASEAN nations also closed their borders to any foreign visitor, thus stopping completely the business mobility from Singapore.

Although there were no restrictions for import and export during COVID-19, many business transactions, or the search for new partners in the region had been affected. Merchandise trade declined around - 6.6% by June 2020 (SingStat, 2020).

However, the situation had a different effect on the different players of the Singaporean economy. According to Singapore's Economic Development Board (EDB) Manufacturing output increased by 13.0% as of April 2020 and. Biomedical manufacturing had, unsurprisingly, the highest increase with 100.5% more output, followed precision engineering 5.9%, and Electronics 0.8% (EDB, 2020). By June 2020, only biomedical manufactured output kept rising by 5.9% while other types of manufactured registered a decline in output.

Another important impact on the economy is how customers behave in Singapore. COVID-19 is seen as a turning point for e-commerce because customers become more familiar with new platforms and may keep shopping online after COVID-19 (The Strait

Times, 2020). According to a report by the Strait Times (2020), online retail became the trend since customers were encouraged to stay home during the CB.

COVID-19 has had an evolutionary impact for business in Singapore. In a series of surveys published by the SGC in the first half of 2020, 55% of the surveyed companies confirmed that the impact of COVID-19 was severely disruptive. The vast majority of the companies also confirmed that they were expecting a decrease in income of at least 20% (SGC, 2020). Companies had also stated that they were going to proceed with lay-offs and salary cuts in the worst-case scenario. After the end of the CB, 80% of the companies declared to maintain operations without having to make salary cuts or laying off despite having a more pessimistic forecast. By the end of the CB, 87% of the surveyed companies were expecting losses of at least 20% (SGC, 2020). Between March and June 2020, 60% of the companies declared that support from the Singaporean government helped to mitigate a lot of the impact of COVID-19.

3.5.4. Government support for businesses.

The Singaporean Parliament approved the Unity Budget for the fiscal year 2020 on February 18th, 2020 (Singaporean Government, 2020). Due to the evolution of the COVID-19 pandemic and its economic impact, the government parliament introduced three additional budgets that had a main focus on supporting families, business, and workers (Singaporean Government, 2020).

The Unity Budget introduced the Stabilization and Support Package in order to cushion the initial impact of COVID-19. This Package included programs such as the Job Support Scheme to support companies with the payment of their wages as well as self-employed people. This scheme represented wage credits of more than 500 million SGD. Another way of stimulating companies was by an income tax rebate of 25%, this represented more than 15,000 SGD for some companies (Singaporean Government, 2020). The solidarity budget was not only focusing on economic support but also on the transformation of the economy and economic growth (Singaporean Government, 2020). These packages are also in line with the already mentioned Smart Nation Initiative because they encouraged the development of platforms for the digitalisation of

transaction between the government and businesses (Singaporean Government , 2020). With the Unity Budget, Singapore is aiming to provide training for workers in different companies, so that they can develop new skills in fields such as digitalisation and industry 4.0.

As COVID-19 developed three new budgets were approved. The first additional budget to be introduced was the Resilience Budget. Introduced on March 26th, 2020, only three days after Singapore's borders were closed to any short-term visitor, this budget was allocated to support business in three main areas affected by COVID-19, cash-flow, cost and credit (Singaporean Government , 2020). In order to maintain cash-flow, around 5.6 billion SGD were expected to be paid out by the end of May 2020. Also, to give business a relief on their fix costs, the payment of property tax was reduced by 30% for some business (Singaporean Government , 2020). The most affected businesses, such as hotels, were totally exempted from paying property tax. In general, the dynamic of this measure was that the smaller the stakeholder, the longer they could enjoy the rental waivers. Hawkers Centres, traditional family run food courts, could be exempted for paying rent for three months (Singaporean Government , 2020).

The Solidarity Budget is the second additional budget. Announced on April 6th, 2020, this budget was destined to support business, workers, and families during the CB period (Singaporean Government, 2020). It introduced additional schemes to the Resilience Budget. The Singaporean gave additional support to business and workers that could not operate at all due to the CB. With the introduction of the Solidarity Budget, The Ministry of Law (MOL) dictated the COVID-19 (Temporary Measures) Act 2020 (MOL, 2020). This act regulated the contractual obligations of entities that were affected by the COVID-19 contingency from February 1st onwards.

Lastly, the third additional budget, or Fortitude Budget, destined new supports for families, businesses, and workers. This Budget allocated additional stimulus packages and allowed new credits for companies (Singaporean Government, 2020). Due to the ongoing changes of the environment, the fortitude Budget also reintroduced the importance of getting Singapore's population ready for the "the new normal". Support for

e-payments solutions and bonuses for the digitalisation of companies were included in this budget (sg government). According to the Singaporean government, the loss of more jobs is expected as the global economy faces very difficult times, however the creation of new jobs that are adapted to the ongoing trends is the priority.

3.5.5. A “new normal” for businesses

In one of his speeches (CNA, 2020), Singapore’s Prime Minister, Lee Hsien Loong, made an emphasis on the disruptive effects of COVID-19. He pointed out that many jobs will disappear, but also new ones will be created, and that economy is not expected to go back to normal. Instead a “new normal” will arise from COVID-19. If this new normal can change the dynamics of businesses in Singapore and the region, how will they prepare for this “new normal”?

During the COVID-19 pandemic, uncertainty and risk have had a negative impact in businesses and the Singaporean economy in general. Until an effective vaccine against COVID-19 is developed, companies in Singapore face various challenges. There are also other possible threats for the Singaporean economy and businesses, such as a new wave of infections. As mentioned before, if the Singaporean government loses control over a new wave of infections, a new sort of lock down or CB could be introduced. This has been the case in other cities such as Melbourne, Australia (BBC, 2020). However, during times of uncertainty, companies do not stand still and wait for the economy to get better. Instead, they try to adapt to the changing environment by spotting the main challenges and developing innovative solutions (Harvard Business Review, 2020). In theory, innovation and entrepreneurship could be the difference between businesses that will survive a pandemic and businesses that will not.

The most prominent challenges for businesses are perhaps travel restrictions and disruptions in the supply chain. As mentioned before, companies choose to settle in Singapore because of its geographic location and efficient infrastructure and institutions. However, since the country is small, businesses depend on international mobility to find new partners or customers, to attend important events outside of Singapore, such as trade fairs, or to get skilled labour from abroad. Travel restrictions make these aspects

difficult to be carried out. One of the possible scenarios for many businesses in Singapore is that they will try to deepen their operations in Singapore itself. For the moment, there is no clear date on when the country will reopen their borders, therefore companies could tend to regionalise more their operations and create new services or products for customers in Singapore. However, this should not be that case for all companies. As mentioned before, size, and economic sector can play an important role. This is the case of biomedical manufacturing, which has increased its output by the end of the first half of 2020 (SingStat, 2019) due to the global rise of demand in biomedical products.

Disruptions in the global supply chain is the next main concern. As Singapore's Prime Minister, Lee Hsien Loong, stated, the country's economy relies heavily on the global supply chain and trade; with COVID-19, many companies will have to make modifications or even reinvent themselves. In order to avoid dependencies on certain countries, one of the changes that companies could be looking for is to diversify their supply chain (Harvard Business Review, 2020).

Moreover, the “new normal” could rather be called a “digital normal”. With the COVID-19 pandemic and the safe distancing measure carried out by the Singaporean government, many had to work from home and physical meetings were not allowed. This implies that companies had to develop their IT to allow their staff to work from the distance but also to carry out presentations and conferences online. Furthermore, solutions for customers such as, e-payments are essential when no physical contact is allowed. Thus, the hypothesis is that the digitalisation of more processes within a company will be a reality for the “new normal”.

Lastly, there is a question of collaboration vs. competition in the innovation processes of a company. With COVID-19, many companies might be looking for information in order to learn how to react to the crisis. In that sense, one of the hypotheses is that companies could collaborate more to a certain degree in order to go through such a crisis. Also, since companies are limited by travel restrictions, deepening the collaboration between existing partners could be essential for the innovation processes to happen. However, it is hard to determine at what point this collaboration is really happening because companies

would also aim to find innovative solutions to have an advantage over their competitors (Pender & Woerter, 2013).

From digitalisation, to the development of new solutions, COVID-19 could be seen as an impulse of innovation. Different processes need to take place for companies to adapt to the current situation and become part of the “new normal”. The next section of this thesis presents an empirical analysis on how companies are adapting to COVID-19 and how they develop their innovation processes.

4. The innovation process of businesses during COVID-19

4.1. Innovation Process – Introduction

As section two mentions, the innovation process is the “path” that a company creates and follows in order to innovate. In a normal situation, companies have to identify opportunities and risks before innovating, then generate ideas, and finally turn those ideas into tangible solutions (O'Sullivan & Dooley, 2008) . However, innovation is a slow process (Kline & Rosenberg, 2009). A company can take months or even years before producing ideas, and it takes even longer to create a tangible solution. When COVID-19 hit Singapore, the environment changed drastically, and companies needed to adapt to it and find solutions as fast as they could. To add complexity to this problem, Singapore's environment was changing day to day, based on the decisions made by the government to control the spread of COVID-19. Under these circumstances, business in Singapore not only had to react quickly, but also had to adapt to the changes made by COVID-19 in the country on a daily basis.

Based on the experiences shared by companies for this study, which for practical reasons will be referred as “the companies” (unless there other organizations mentioned), this section presents an analysis of the innovation processes of the businesses in Singapore starting from the recognition of challenges and opportunities, followed by the different internal processes involved to finally have an innovative outcome. To have a better visualization of this section, the diagram below shows the different stages and dynamics of the innovation process business in Singapore during COVID-19. It is based on the common points shared by the companies. It also takes COVID-19 as a factor that pushes businesses to innovate. The time frame for this examples is the first half of 2020, more specifically, from March to late June 2020.

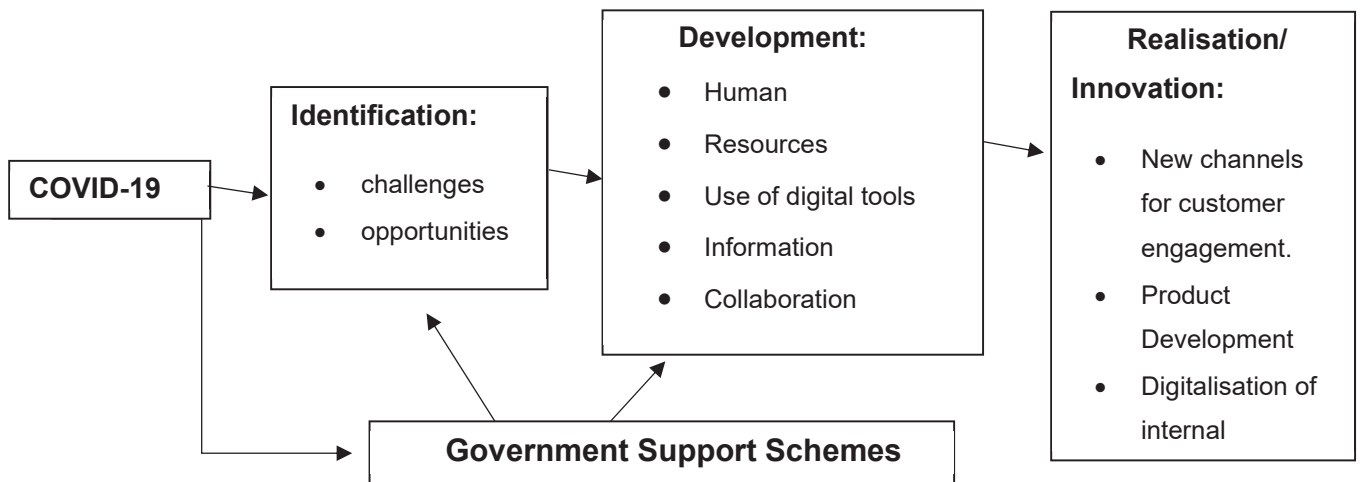


Diagram 1. The innovation process, and dynamics of businesses in Singapore during COVID-19⁸.

4.2. Companies' Profile

For this study, six companies based in Singapore are taken as example. The information has been taken from their website, conferences, and interviews where top managers shared their experiences on how their companies had to deal with COVID-19 by identifying challenges and looking into opportunities. Through these empirical examples, this section analyses what are the factors involved in their innovation process and how they are influenced by the COVID-19 contingency.

As chapter three explains, Singapore is a preferred city for companies to settle because of its business-friendly environment. With a considerable number of multinationals but also with many Start-ups and SMEs, Singapore business environment is very diverse. The companies included in this study have different sizes and serve different markets and sectors of the economy. The section introduces the companies in other of size, starting with the smaller companies, and ending with the biggest multinationals.

⁸ Self-produced; based on diagram presented by O'Sullivan & Dooley (2008)

4.2.1. Spenmo

Spenmo is a Singaporean Star-up that started operations in 2019 and operates in the financial technology sector. Spenmo has a staff of around 25 people. It works in a B-to-B basis and their main product is a spend management platform in which companies can visualize and take control over their spending; this platform is attached to a corporate card. Spenmo also gives its customers direct contact with lenders around Southeast Asia if credit is needed. The company's clientele is mainly other start-ups or SMEs, and they have over 25 partners in Singapore which offer awards or advantages by joining Spenmo (Spenmo, 2020).

According to the Singapore Business Review (SBR, 2020), the Start-up innovative field has allowed them to get funding from different companies. Google, Netflix, and Alibaba have been some of the angel investors of the company. It has also been granted more than 150,000 USD in funding by the American money seed startup accelerator.

4.2.2. AB Enzymes GmbH

It is a multinational that belongs to the Associated British Foods (ABF), which in 2019 registered an annual revenue of GBP 7,532 M (AB Enzymes, 2019). The company was founded in 1907 and its headquarters are in Germany. It develops, manufactures, and supplies enzyme preparations for industrial applications around the world. Enzymes are living organisms that speed up chemical reactions (Live Science, 2020). In Singapore, the company has a head office for sales in Southeast Asia that was established in 2002.

AB Enzymes has a vast application range for its products. From baking and processing food, to technical applications in the paper and textile industry. The company has its own R&D and manufacturing facilities in Germany and Finland. Its R&D is mainly focused on the different applications of enzymes in the industry (AB Enzymes, 2020).

The company runs a fully integrated end-to-end supply chain and it aims to fulfill its customers demand with the quality of its products, which are presented in a liquid or solid form (AB Enzymes, 2020). It has sales offices and customers in other countries such as the USA, Brazil, China, and Germany. In order to share knowledge, and identify new

trends and needs, AB Enzymes has a considerable number of affiliations around the globe, such as the Singapore Chinese chamber of commerce and industry.

4.2.3. LEONI (SEA) Pte. Ltd

LEONI Singapore is the regional office a logistic centre for the German cable manufacturer LEONI AG. The company had a total of EU 4.8 bill. in global sales in 2019 (LEONI, 2020). It is project oriented and serve a provide a wide range of special cables for the automobile industry, construction, railroads, and the energy sector, among others. The regional office for Southeast Asia was established in Singapore in 1997 and, besides Singapore, it distributes cables to Malaysia, Indonesia, Thailand, and Taiwan.

The cables produced by the company are destined to different markets. Factory automation is one field that has been developed a lot in the past years. It also comprises drive technology and robotics. Transport and optic fibre for internet are important field of application fields, and also industrial processes and energy and infrastructure. However, the biggest market for LEONI is the automotive industry; the company itself divides its sales in automotive and no-automotive industry (LEONI, 2020).

As a player in the global supply chain, the company has its own infrastructure for logistics, from warehouses to distribution centres in different locations around the world. The company is very involved in innovation, especially in the automotive industry. Besides high-quality wiring, the company offers innovative solutions, such as software for modelling, and they are part of the development of the final product form the early stages. Digital solutions and intelligent cables are also part of the company's portfolio of innovative products (LEONI, 2020).

4.2.4. Bystronic Pte Ltd

Bystronic is a Swiss company that specializes in solution for the sheet metal processing industry. The company settled in Singapore in 1996, it is the head office for Asia and Australia. Nowadays, the company has around 3400 employees worldwide, around 1000 are in Asia. In 2019, Bystronic had a revenue of 936 million CHF (840 million

EUR, 941 million USD) (Bystronic, 2020). Sales in Asia, represent around 21% of the company's total revenue.

The company offers a vast range of products and solutions for its industry. Technologies such as laser cutting machinery, automation lasers, press brakes, and software, are part of the company's product portfolio (Bystronic, 2020). Bystronic also provides different services such as maintenance for its products or trainings and consultation, so that companies can identify new technologies for the industry and have an assisted transition from one technology to another.

Bystronic is divided in five competences centres and it has its own R&D department. Besides innovating in the sector of sheet metal cutting, the company also develops digital solutions and has highlighted the importance of automation and industry 4.0 for the past years (Bystronic, 2020).

4.2.5. Boehringer Ingelheim International GmbH

The company has its headquarters in Ingelheim am Rhein in Germany. It is one of the biggest pharma companies in the world, with presence in more than 100 countries. In 2019, the company had 19.0 billion EURO in sales (Boehringer-Ingelheim, 2020). In Singapore, the company has its headquarters for the region Southeast Asia and South Korea, however, they have facilities all around the region, such as manufacturing plant in Indonesia and a global business services centre in the Philippines. In Singapore, the company has around 250 employees, and around 2000 in the rest of the region⁹.

Boehringer Ingelheim has three main businesses: human pharma, animal medicine, and biotechnology manufacturing. Human pharma is the largest business, in 2019, it represented more than 60% of its total sales (Boehringer-Ingelheim, 2020). In the human Pharma, the company manufactures different chemicals for the different medicine fields: respiratory, oncology, cardiovascular, metabolic diseases, among others.

Boehringer Ingelheim puts a lot of importance in its innovative activity. In 2019 the company invested more than 3.5 billion EURO for research and development, this

⁹ Annexes: Transcription of the Interview with Gerrard Mckenna

represents around the 18% of its total sales (Boehringer-Ingelheim, 2020). Innovation processes are well incorporated into the company; although it has a strong internal R&D, 50% of its research is made through collaborations (Boehringer-Ingelheim, 2020). As result of their strong R&D, the company as managed to introduce new medicines and cures into their portfolio. R&D for new cures or treatments for different diseases is an ongoing process for the company. For the past years, the company has also embraced digitalization and has developed new virtual solutions and services for its customers. Internally, the company is oriented towards change management, and it constantly prepares its employees for changes in the environment (Boehringer-Ingelheim, 2020).

4.2.6. SIEMENS AG

SIEMENS is one of the biggest manufacturing companies in the world. They have presence in 190 countries and have around 379,000 employees worldwide. In 2018, the company reported a global revenue of EUR 83 billion (SIEMENS, 2020). In Singapore, the company has a long history; SIEMENS opened a technical bureau in 1908, making it the first German company to settle in the Southeast Asian nation (SIEMENS, 2020). For the past 100 years, SIEMENS has been developing multiple innovative products related to infrastructure and digitalization, among others. It remains one of the largest European business entities in the island, with a revenue of around EUR 319 million (SIEMENS, 2020).

SIEMENS has a large portfolio of products and services. Their solutions are applied in many fields, such as IT, industry, finance, and energy (SIEMENS, 2020). For the past years, digitalization, IoT, and smart infrastructure have been the main centers of development for the company in Singapore and around the world. The company is also very long term oriented, under the vision SIEMENS 2020 +, the company aims to give more freedom to three main operating companies under its brand: Gas and Power, Smart Infrastructure, and Digital industries (SIEMENS, 2020).

The company has had a very active innovative activity in Singapore. Besides the development for smart infrastructure in Singapore, such as smart buildings with sensors or even smart roads, SIEMENS introduced Self-driving vehicles and an autonomous

vehicle test center. The company has also been awarded with multiple contracts for the supply of depot equipment for different construction projects (SIEMENS, 2020).

4.3. Innovation Process – Challenges During COVID-19

With COVID-19, companies have been pushed to innovate, because the whole dynamics of the market changed in a matter of days. This also means that their innovation processes had to be adapted to the situation. In these circumstances, the recognition of challenges becomes crucial, because companies are looking to innovate not only to have an advantage over their competitors but in order overcome the drastic change in the environment.

The complexity of the challenges for companies during COVID-19 goes far beyond Singapore. According to the companies in Singapore, the main challenges that came with COVID-19 were linked to the situation of COVID-19 in other countries, because Singapore is highly dependent on the global supply chain. Although, many businesses have also identified challenges that are linked to government measures, these measures were taken because of the infection waves that came from the outside. Consequently, these external factors created challenges within companies in Singapore, for example staff employment, or cashflow.

Based on interviews and conferences with companies in Singapore, four main external and internal challenges have been identified: Disruption in the supply chain, travel restrictions, staff safety, and default payments. It is important to emphasize, that companies face more challenges, and because of the high uncertainty during COVID-19, new challenges might appear. The challenges presented for this study, were identified by the companies during the first half of 2020. Furthermore, customer engagement has been identified at the center of most of the challenges. Therefore, it will not be included as its own subsection.

4.3.1. Supply Chain Disruptions

In one of the first surveys published by the SGC (2020), about 37% of the companies that took part, marked the *“Inability to meet contractual delivery deadlines due to disruption to logistics”* (SGC) as one of their main problems. On the next survey published in April 2020, that same percentage rose to 47%. Disruption in the supply chain have had a negative impact for businesses in Singapore because many of them have no manufacturing facilities in Singapore itself and need to get supply form the outside, most of the time, form China, and neighbouring countries, such as Malaysia. *“...we always depend on the original equipment manufacturer...”*¹⁰. However, the disruptions on the supply chain do not affect companies in the same way. As mentioned before, there are factors that influence the impact of a crisis in a company.

Size, and sector or industry of the company are the main factors. The disruption on the supply chain affects mostly companies that work with physical products. From the consulted companies, Spenmo did not classified disruptions in the supply chain as one of their main challenges, because they work mostly with digital and financial services. Also, it is a small sized company that operates locally. Manufacturing multinational, on the other hand, need to keep the flow of the supply chain to satisfy the needs of their customers. Then again, it depends on what sector; the fashion industry is having a more difficult time because their main suppliers, such as India and Bangladesh are frozen¹¹. On the other hand, medical supply is booming.

According to Boehringer-Ingelheim, pharmaceutical companies were not having problems with the decline in demand but experienced exactly the opposite. The demand for manufactured medical products grew so much that the main concern was if the industry had the capacity of supplying enough medical and pharma products. *“...there was a certain degree of nervousness of certain form major stakeholders, like*

¹⁰ Annexes: Transcription of the Interview with Chai, Chee-Ming

¹¹ Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

governments, on whether pharmaceutical companies could continue supplying during the pandemic or not...¹².

For other manufacturing companies in Singapore, the management of the supply within Singapore and other countries in the region was big concern. By having their headquarters in Singapore but operations all over ASEAN and other Asian countries, many companies faced the challenge to ensure supply in their respective region by looking for partners. *"...the question is how you get a partner that fits the deal, has the financial strength, and is able to manage the supply locally in the country..."¹³*

Furthermore, with the drop in demand, the volume of containership and shipments had to be drastically modified, and the network of shipping routes had to be reorganized due to new special regulations¹⁴. As a result, the cost for the logistics increased. *"...the next challenge is managing the logistics, how to find the container, the shipment and so on. Air shipping price increased three by times during the pandemic..."¹⁵*

With the improvement of the restriction, the supply chain started to stabilize slowly. However, by facing these challenges, companies in Singapore understood that they needed to look for fast solutions, but also develop long-term solutions, such as diversifying their supply chain¹⁶. Although, finding new partners is necessary, it is very difficult due to the travel restrictions.

4.3.2. Travel Restrictions

Singapore closed its border in March 23rd. Essential travels were not allowed until June and yet with a lot of restrictions. The travel restrictions represent one of the biggest challenges for the companies during the COVID-19 pandemic, because of the difficulties of suing business. According to the consulted companies, with travel restrictions, their

¹² Annexes: Transcription of the Interview with Gerrard Mckenna

¹³ Annexes: Transcription of the Interview with Chai, Chee-Ming

¹⁴ Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

¹⁵ Transcription of the Interview with Eliff Kotman-Goetsch

¹⁶ Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

relationship with major stakeholders became more delicate. Managers cannot look for new partners, they have difficulties engaging current costumers, and the search for new customers becomes harder.

Singapore has a strategic position, yet a very small size. For this reason, businesses settled in Singapore have partners all over Asia. In the case of companies, such as LEONI, major projects in the energy sectors are being developed in Thailand and the Philippines. Whit the travel restrictions they cannot visit their partners and make sure that everything is working¹⁷. However, the main problem of travels restriction is how to keep customers engaged for the majority of the companies. Even with the new applications of digital tools, which will be discussed later on, keep customers engaged is not an easy task. Furthermore, the complexity of the company plays a major role when it comes to keep customers engaged. In the cable industry, for example, it is hard to set a platform online for customers support because every country has different regulations on what colour should the cable have, what size, or what material¹⁸.

Most of the consulted companies assumed that physical contact was necessary for sales, and that digital interaction could hardly replace traditional sales.

“...In sales you cannot stay in the office, you need to meet with customers. In that case this has been bad for productivity and we cannot continue doing that for long...”¹⁹

When comes to look for new customers, events, such a fairs or conferences are very important because through physical contact and body language salesmen can promote their product better.

“...In our industry, face to face dialog events, big meetings, are an important part of the communication effort between physicians and the pharmaceutical company, the medical division, and the medical representative division. All of a sudden, you cannot do these things anymore, you cannot organise bog meetings, you cannot bring speakers

¹⁷ Annexes: Transcription of the Interview with Chai, Chee-Ming

¹⁸ Annexes: Transcription of the Interview with Chai, Chee-Ming

¹⁹ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

from overseas, you cannot have a regional conference. So, that question that came up was how are we going to deal with this?”²⁰

The interactions with salesmen and potential costumers result very hard to do in a digital form, especially in Singapore and ASEAN because of its cultural diversity. When sales or business are done through e-mails or virtually, there is an absence of the visual and contextual cues that physical presence provides, meaning that communication might not be as successful since there is no real awareness of the cultural differences (Meyer, 2014).

Travel restrictions, and disruptions in the supply chain represent external challenges that might create some internal challenges for companies, creating a sort of domino effect like in any other crisis. Delay in payments is one of these consequences.

4.3.3. Delay in Payments and cash flow

Businesses in Singapore were struggling with their payments due to COVID-19. According to an article published by The Strait Times (2020), delayed payments went from 36.5%, during Q12019, to 45.8%, during Q12020. Unsurprisingly, slowed, or delayed payments are part of a bigger vicious cycle. Put in a simple way, with an example, if a local retailer has a retail store in Pagoda street²¹ and all of a sudden his customers cannot go to the store, or he has to closes because of government regulations, bills are still needed to be paid . This local retailer might have also a date where he pays his suppliers, but now that he does not have any income, he will be unable to pay back. Consequently, his suppliers will have less cashflow because of the delay in payments, and they might not be able to pay their employees, who then will have less money to spend.

The impact on the cash flow because of delayed payments is a problem for any kind of company in Singapore from start-ups to multinationals. However, several multinationals are usually more able to resist delay in payments because they have very diversified

²⁰ Annexes: Transcription of the Interview with Gerrard Mckenna

²¹ One of the main streets in Chinatown, Singapore

business, this is the case of SIEMENS²². The other big exception to delay in payments, are companies with essential services. Boehringer Ingelheim did not considered delayed payments as one of their main challenges because its sector had the biggest demanding during the pandemic. For Ab Enzymes, the food industry is also an essential service, nevertheless, its problem can be found in the non-essential services. *"... the hard hit was on the textile industry. Our partners are not selling..."*²³.

In order to soften the hit of delayed payments, many businesses look for new partners and customers, nevertheless, this is a long process. *"... For us, it took us a year to find a partner..."*²⁴. According to LEONI, companies are even more careful when they look for new partners because any business is vulnerable to cashflow problems caused by delayed payments. ... *"When you start looking at the cash position you can tell whether the company is going to survive the pandemic or not. If we get into default payments that would be a bad case scenario, so everyone is very cautious about it..."*²⁵.

Finally, there are other challenges that can result from delayed payments and low cash flow. All businesses have costs that they need to cover. When they have less cash flow, they might be forced to reduce some of their costs. These might include reducing working space or reducing staff.

4.3.4. Staff Safety

During a pandemic, companies should take care of their major stakeholders: customers, society, and their staff²⁶. Staff safety resulted to be one of the main concerns and challenges for the biggest multinationals in Singapore²⁷. This includes not only

²² Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

²³ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

²⁴ Annexes: Transcription of the Interview with Chai, Chee-Ming

²⁵ Annexes: Transcription of the Interview with Chai, Chee-Ming

²⁶ Web-Conference "Meet The CEO". 2020, 18 June

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

²⁷ Web-Conference "Meet The CEO". 2020, 18 June

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>.

ensuring that the company will not cut off anyone, but also making sure that uncertainty and speculation within the company does not impact communication, and also that the staff remains physically healthy.

According to the consulted companies, COVID-19 brought a lot of uncertainty and nervousness for the part of their staff, people were not sure if they could keep their jobs or if the pandemic were going to last for long. For this reason, communication within the company became very fragile. So, one of the main points is how to keep your staff well informed about the situation. *“...They have to remain safe and informed about how to go throughout a period that is unknown...”*²⁸.

For many companies, keeping their staff physically safe is another important point. With numbers of infections increasing in Singapore, companies needed to adapt to the current regulations and start putting into place measures that they did not have before the pandemic. Making sure that there is at least one meter of distance, disinfecting working materials, or working from home, are all measures that companies needed to adopt. *“...we have to keep our staff in good health and keep social distance between us and our customers...”*²⁹. This represents a challenge initially, because many of their staff might not be familiar or comfortable with the new measures.

“...Now in many countries in Asia, people are not used to teams or these suddenly necessary digital tools, and they do not feel comfortable. I remember my colleague in India or the Philippines asking me if we could just communicate on WhatsApp”.³⁰

4.4. Innovation Process – Opportunities during COVID-19

In the Chinese language, the word for crisis is “危机” (*Wéijī* in Mandarin), where 危 represents danger and 机 represents opportunity. In any crisis, there are also opportunities to seek. According to Singapore’s PM, Lee Hsien Loong, this has been a very common discourse in Singapore’s history, for the country succeeded economically

²⁸ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

²⁹ Annexes: Transcription of the Interview with Norbert Seo

³⁰ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

in a time extreme crisis (CNA, 2020). This same discourse applies to companies. During COVID-19, companies identified a lot of challenges, but almost in parallel they have identified a lot of potential in the in the Singaporean and ASEAN markets. Opportunity, then, sets the path towards innovation. This subsection presents the main opportunities identified by companies, based on interviews and conferences.

4.4.1. Digitalization of processes

Taking the same example of the retailer in Pagoda Street, when he realises that customers cannot come to his store, one of the first solutions that might come to his head is to try to sell his product online. However, there might be a lot of other retailers that had sales online even before the pandemic, which means that their customers are already familiar with their services. Although this is a fictional example, it is the reflection of Singapore's reality during COVID-19, especially during the CB. The digitalisation of processes became crucial for the everyday life in Singapore because people had no other option than shopping, working, and communicating remotely.

In the middle of the CB in Singapore, when people where practically not leaving their homes, online shopping increased unsurprisingly. According to an article published by The Strait Times (2020), Singapore's consumers behaviour had also interesting shifts, because people where buying items online, that had a lower demand before the CB. These trends were not registered only in Singapore, but all over ASEAN.

The same dynamic of consumers buying online can be applied to the dynamics between businesses. According to the companies, the biggest opportunities and potential during the pandemic is digitalisation. In fact, before COVID-19 there was already a trend of moving more processes online, many had already invested in internal digitalization or have products related to related fields, such as automation. "...*We already had live streaming training for our customers last year...*"³¹. Furthermore, the companies see Singapore as a country where that government pushes innovation and creates many opportunities in the digitalisation field. An example for this is the Smart Nation Initiative, discussed in the past sections. According to the interviews, when the pandemic hit and

³¹ Annexes: Transcription of the Interview with Norbert Seo

businesses began to face the challenges, digitalisation became the best way of keeping customers engaged and internal processes running.

The section on challenges for companies explains that have costumers engaged was at the centre of almost every challenge faced by the different companies. No travelling hinders companies from visiting customers and making sure that everything works well. With delays on payments and disruptions on the supply chain, customers will be less engaged. Here is where the use of digital solutions come into action.” ... *you realise that you don't want to take risk on your employees or patients, that your customers don't want to gather anymore so here is when you start thinking virtual...*”³². Almost all the interviewed companies, agreed on the use of new digital channels for the communication with their customers. These include the development of a platform where the business can exchange directly or web conferences.

AB Enzymes and Boehringer Ingelheim, were convinced that it is hard to replace traditional sales, because direct contact is very important in this field. However, were also convinced that there is an enormous potential for innovation in the way they, and other companies promote their products. An important way for companies to promote their products is through trade fairs, which could not happen in a physical format for the first half of 2020 because of the restrictions on travelling and gathering. Many trade fairs have then gone online, in Singapore this is the case ITAP³³ or IBEW³⁴. Although the digitalisation of trade fairs is an innovative solution, it is important to understand that many users or customers might not be familiar with the new format, therefore they might be sceptic. In this case, the question *How can a company engage their customers through digitalisation?* comes again and might be interesting to develop in the future.

The grow of digitalisation during COVID-19 appears be an advantage for companies that had digitalised processes or operate in the digitalisation and automation industry before COVID-19. Like many other Star-ups, Spenmo was born with digitalised products and processes, so instead putting effort into looking for new digitalised channels, they

³² Annexes: Transcription of the Interview with Gerrard Mckenna

³³ <https://www.industrial-transformation.com/>

³⁴ <https://www.ibew.sg/>

had to innovate in other ways of keeping their costumers engaged. *“...Customers that already had the platform were not spending as frequently as we wanted them to spend”*³⁵. For bigger companies like Bystronic, their business model allowed them to keep operating with no major interruption, because it includes of digital processes. *“...We are quite busy, and our engineers are working hard...”*³⁶. This is also the case of SIEMENS, although its projects in construction where practically frozen, the projects related to Smart Infrastructure and digitalisation kept running even the lock downs in Singapore and the other countries in ASEAN³⁷.

Digitalisation has also been identified for many companies as an opportunity to optimise internal processes, according to the interviews. Perhaps the most representative example of the digitalisation of the workplace is telecommuting, or home office. All companies with no operations in the essential services were requested to keep their staffs working from home in Singapore. Although this could be seen as a challenge at an initial point, almost every company explained that working from home could have a big potential for the development of the company in the future. They also agreed that more internal development of IT is will be necessary for the companies. *“... because of the home office measures and digitalisation, many new solutions are needed, and our company provides these solutions...”*³⁸.

Another important point evoked by the companies is, that thanks to digitalisation, companies can become more cost efficient. In other word, when people are not allowed to go to the office, then there is no real need of having a physical office. Therefore, fix costs such as rent and services for the office can be saved. *“... office rent was actually taking a lot of cash...”*³⁹. Almost all the companies agreed that productivity was not affected at all by having their staff working from home.

³⁵ Annexes: Transcription of the Interview with Ernest Teh

³⁶ Annexes: Transcription of the Interview with Norbert Seo

³⁷ Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

³⁸ Annexes: Transcription of the Interview with Norbert Seo

³⁹ Annexes: Transcription of the Interview with Ernest Teh

“...in the general management like finance, projects and so on, there has not been a negative impact. Working from home is as good as working from the office. Now, what we are doing in Germany is that we are not encouraging people to work in the office, only if they must go to the office...”⁴⁰.

For some companies, digitalisation can even increase the level of productivity in the company.

“...What is fantastic is that now I can actually participate in a lot more meetings and in a lot of more external meetings. Take for example the German chamber of commerce. You always have to decide if you sacrifice lunch in order to go to that meeting but now it is a webinar. In a short period of time you can just decide if you want to join, and if the topic happens to be not as interesting as you thought it was you can always do some work aside. So, there are a lot of opportunities if you open your mind to it...”⁴¹

4.4.2. Optimization of internal processes

When COVID-19 hit the Singaporean economy, many companies had a major slowdown in their operations. Although this is negative for their performance, many companies saw this slowdown as the perfect opportunity to have a look at their internal processes, and even develop a long-run strategy.

According to the interviews, for the first time in many years they had the time to look into what they were doing and rethink how it could be improved. By looking into the processes that could be improved, companies aim to be more efficient and to optimise cost. Digitalisation was indeed one solution for the optimisation of costs, as discussed earlier. However, there are more processes that do not necessarily involved digitalisation. In the case of Spenmo, the pandemic gave enough time to its staff to see what costs they were could be optimised. “...we cut a lot of the marketing budget that we have previously allocated....”⁴². In this way, they could make strategic decisions on where to invest the

⁴⁰ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

⁴¹ Annexes: Transcription of the Interview with Gerrard Mckenna

⁴² Annexes: Transcription of the Interview with Ernest Teh

money. Other companies even considered in changing their business model. LEONI, for example, started outsourcing their warehousing, because it was more cost effective.

Having the time of improving internal processes and developing long-term strategies was not seen as an opportunity for bigger multinationals. According to Boehringer Ingelheim, a company must act quickly in times of crisis and long-term plans have to be developed even before a crisis hit. *“... you must have the basic capabilities already in place because without basic capabilities you cannot get into a more sophisticated level of capabilities...”*⁴³.

Optimising internal processes can be a very long process, yet it is necessary for the competitiveness of any business. According to the interviews, companies should learn from this pandemic and remember that they always have to be prepared for the worst, especially when they are doing good.

*“...when companies are making profit the need to innovate on the idea of the worst-case scenario. In good times, when you are making money, that is the best time to innovate and to look at the business model and ask yourself how we could react if a pandemic breaks out or if there is a recession. That is always missing...”*⁴⁴.

4.4.3. Other Opportunities

Besides digitalisation, and optimisation of internal processes, other fields, such as Energy were identified by the companies mentioned in this study, with no further development as the first two. SIEMENS is one of the leading companies on the development of green energies, and LEONI, as a cable manufacturer, is already involved in multiple projects across Southeast Asia. *“... we found a partner in Thailand that could work on renewable energy. And Thailand has just started putting emphasis on solar energy...”*⁴⁵.

⁴³ Annexes: Transcription of the Interview with Gerrard Mckenna

⁴⁴ Annexes: Transcription of the Interview with Chai, Chee-Ming

⁴⁵ Annexes: Transcription of the Interview with Chai, Chee-Ming

With the rise of awareness, companies include the society as part of their stake holders⁴⁶. This means that the development of greener and more innovative alternatives of energy will be needed for the future.

Another sector that has been identified with a lot of potential is biomedicine. According to SIEMENS and Boehringer Ingelheim, the pandemic has shown that a solid supply of medicine and biotechnology is needed, this opens the door for further innovation and development in Singapore and ASEAN.

4.5. Innovation Process – Development and Outcomes.

The drastic changes of the environment due to COVID-19 put companies in a vulnerable position. Therefore, they had to make fast decisions and innovate. Once challenges and opportunities have been identified, companies undertake different actions in order to have an outcome. As discussed in the past sections, this is an integral part of the innovation process. This section introduces the development of actions undertaken by companies, as well as the outcomes, in their innovation process. It is important to emphasize that the development of these actions also depend on external factors. Such is the case of Government support, that will be discussed at the end of the section.

4.5.1. Human Resources

As the past sections explained, one of the main concerns of the companies was the safety of their staff. This was, in particular, important for bigger multinational companies such as SIEMENS and Boehringer Ingelheim because they have the largest number of employees in Singapore and Asia, among the companies that were consulted for this study.

The most important aspect mentioned by the companies is communication with their staff. Because of the high levels of uncertainty, people start worrying about what is going

⁴⁶ Web-Conference "Meet The CEO" 2020, June 18:
<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

to happen within the company, for these reasons many companies agreed that communication must be as transparent as possible during a time of crisis. It is also important to keep in mind that the companies in Singapore are usually at the head of the APAC division. So, what some companies did is to also have a straight communication with their offices all around the region, to make sure that staff was well informed and safe.

The bigger companies happened to be prepared even before or at the very early stages of the pandemic. Boehringer Ingelheim had developed a plan for the pandemic, where the constant exchange of communication between staff in Singapore and offices around Southeast Asia was an essential part. “... *We communicated with our countries to see if we all had pandemic standards for the protection of our employees.*”⁴⁷. The most common solution for the safety of the staff was to have them working from home by using different platforms, such as MS Teams. However, companies also had to make sure that there were some safe distancing measures for essential workers that needed to stay at the workplace⁴⁸. For AB Enzymes, plans for keeping their staff safe were also developed before the government took special measure to stop the spread of COVID-19. According to this company, the trend of having staff working from home was set by the bigger international companies, such as Google or Apple, therefore they took the decision of following their example. Taking early measures against COVID-19 for the staff happened to be beneficial for companies because by the time every company in Singapore had their staff working from home, these companies’ staff were more used to it. “...*we are lucky because we had the infrastructure for telecommunications even before the pandemic...*”⁴⁹.

Having the staff working from home was hard for many companies at an early stage, yet it was necessary. There were various opinions on whether if working from home was good or bad:

⁴⁷ Annexes: Transcription of the Interview with Gerrard Mckenna

⁴⁸ Web-Conference "Meet The CEO" 2020, June 18:

<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

⁴⁹ Annexes: Transcription of the Interview with Norbert Seo

“...I think there are pros and cons...”, ⁵⁰

“...Well, I would say that if I needed to think a lot, I would enjoy working from home...”

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“...Yes and no. To be honest with you, the first week I stayed in the office as long as possible...” ⁵²

*” ...At the beginning I struggled because I am an extrovert person...”*⁵³

At the end, almost every company agreed that there are good and bad aspects and that a hybrid model for both, presential work and home office, would be ideal. The big challenge was at the beginning when the staff was not familiar form working from home. specially in Singapore, where telecommuting was not well integrated in the working culture.

*“...I think for Singapore the idea of working from home is very foreign. You see some companies made their employees go back to the office once the circuit breaker ended even though they could have still worked from home. So, it is more traditional in that sense...”*⁵⁴.

Therefore, in order to make sure that employees where comfortable with telecommuting, there companies had to communicate even more, sometimes only by calling and asking if everything was working well.

Finally, telecommuting worked very well for the companies, productivity for internal administration was not negatively affected and the staffs got more and more familiar with the idea of working from home. This development of telecommuting is Singapore quickly became a trend, and many consider that will stay even after the pandemic ends.

⁵⁰ Annexes: Transcription of the Interview with Ernest Teh

⁵¹ Annexes: Transcription of the Interview with Chai, Chee-Ming

⁵² Annexes: Transcription of the Interview with Gerrard Mckenna

⁵³ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

⁵⁴ Annexes: Transcription of the Interview with Ernest Teh

4.5.2. Deeper collaboration with partners and share of information

“...we cannot rely on Singapore alone because it is too small. So, when we expand in the region, we need to look for partners in order to grow. When we work with partners, a lot of innovation has to come, not only in technology but in the way, business is done...”⁵⁵

COVID-19 is a global pandemic and is affecting at somehow business of every sector. Even the businesses that are booming, such as biotechnology and pharma, are vulnerable to the extreme high demand and capability of supply of their products⁵⁶. It is for this reason that some companies decided to collaborate with other companies in order to go through the crisis. Now collaboration is a very complex word, because during very unstable situations businesses also aim to “stay in the game” while their competitors struggle. *“...you are never surfing alone; you are always surfing with your competitors...”⁵⁷*. For these and more reasons, it is very difficult to determine if companies are competing more or collaborating more to go through the crisis. However, there are degrees of cooperation that have been identified. For bigger multinationals in Singapore, the exchange of information regarding the current regulations in the country and region happen to be a common point of cooperation. For other business, there is indeed a deeper collaboration with partners in other countries because they depend on them to ensure supply and engagement of customers.

According to the interviews, companies are more open to share how they are dealing with the crisis. In this dynamic, third parties such as the chambers of commerce and other organisation played an important role because they organised different online events where companies could share their information with other companies.

“...I am more engaged to attend webinars, and we are sharing more information, because we are all sitting all somehow at the same level, but we cannot know what is happening outside of Singapore. At our level we are travelling a lot. Usually I travel 200 days a year

⁵⁵ Annexes: Transcription of the Interview with Chai, Chee-Ming

⁵⁶ Annexes: Transcription of the Interview with Gerrard Mckenna

⁵⁷ Annexes: Transcription of the Interview with Gerrard Mckenna

but now, all of a sudden, I cannot go anywhere. So, in order to find more solutions, it is very important to share information with the others⁵⁸...

More than sharing information, there is no sign of a bigger level of collaboration between multinationals. In the case of this study, this can be explained because of the booming sectors of the companies and also their size. With presence in practically every country in APAC, SIEMENS, Boehringer Ingelheim, and Bystronic, depend less in partner companies than smaller multinationals.

For other companies that have operations in Singapore and APAC two types of collaboration were identified. Firstly, between partner companies. Even before the pandemic there was a strong importance given to partners to ensure local supply⁵⁹. When the pandemic hit these companies needed to deepen their collaboration with partners even more because they were unable to leave Singapore. Secondly, collaboration within the value chain, or supplier -customer. Because of the need of keep customers engaged, companies started to be more flexible with their customers, by accepting some delays in payments for example. Besides being more flexible, companies also tried to look into possible solutions for the impact of the pandemic with their customers. we show the customers that we are there for them. *“...we try to show them that we could be flexible, sometimes we call them just to ask if they are doing good....”⁶⁰.*

A real degree of collaboration can be seen between the smallest businesses in Singapore. This was not a part of the experiences of the interviewed companies, but it was mentioned as an important example. Many Hawker Centres, small family owned businesses that serve Singaporean traditional food, could still operate because they are an essential business. However, with some of them lacking a digital platform in which they can keep their customers engaged (The Business Times , 2020). Therefore, online delivery platforms partnered up with these hawkers to get their orders delivered, some of them for a lower commission than for normal restaurants (The Business Times , 2020).

⁵⁸ Annexes: Transcription of the Interview with Norbert Seo

⁵⁹ Annexes: Transcription of the Interview with Chai, Chee-Ming

⁶⁰ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

“...Food delivery companies have also done fundraising for the hawkers, they just delivered around 30 thousand SGD. I thought that was quite amazing...”⁶¹.

With these examples, collaboration might not be easy to identify but it was definitely part of the innovation process of many businesses in Singapore, at a certain degree.

4.5.1. Customer engagement

When companies shared their experiences on where they see the biggest opportunities during the pandemic, digitalisation is the predominant topic. Through digitalisation, many companies have found one solution to one of their biggest problems: keep customers engaged.

According to the companies, one of the most common forms of keeping customers is through web seminars (also called *webinars*), or online conferences. This was almost an immediate response following the travel restrictions in Singapore and other ASEAN countries. *“...That is sort of the major topic in a lot of companies, including ours, which means the speed of moving from your traditional way of doing things to the virtual way of doing things...”⁶².* According to the interviews, webinars were not only a way of keeping customers engaged but also a necessary way of sharing information an experience with other businesses, as it was mentioned on the past subsections. In order to do so, companies had to look a diverse digital platform to conduct conferences and get businesses done, such as MS Teams or Zoom.

Furthermore, if transparency and good communication was important internally, it was also crucial for their relationship with customers. AB Enzymes mentioned to have put a lot of effort in keeping the trust and good communication with their customers, and in order to keep this trust digital tools where needed. On that matter, some companies developed live streaming for their customers, so that they would have a look how the companies were operating, and thus create more trust and engagement⁶³. Other companies, such as Bystronic, had developed different platforms and software for online

⁶¹ Annexes: Transcription of the Interview with Ernest Teh

⁶² Annexes: Transcription of the Interview with Gerrard Mckenna

⁶³ Annexes: Transcription of the Interview with Eliff Kotman-Goetsch

trainings, consulting, or even technical assistance. However, this was possible thanks to of existing technology and a strong R&D within the company. “...we had a quite smoother transition in our learning curve...”⁶⁴.

For bigger multinationals, such as SIEMENS, customer engagement had a different approach. Because the company was already taking part in the development of big projects in Singapore and other countries in ASEAN, they approached their customers to first understand their needs and then collaborate with the government in order to find these solutions⁶⁵. This is also possible thanks to its balanced business model, with business that are blossoming, and where society (in this case Singapore and ASEAN) is kept as one of their main stake holders⁶⁶.

Finally, only the star-ups happened to innovate in the way they keep their customers engaged through product development. For Spenmo, the main problem was its core business: spend management. “...The main challenge that came with the crisis was that companies were not spending. So, we actually had to innovate in the ways we engage our customers...”⁶⁷. Like many other start-ups, they developed new services, in this case, invoice management. Also, as it was mentioned in the past sections, smaller and also some big businesses considered the pandemic as an opportunity to look into their internal processes. Spenmo, took this opportunity to develop a more cost-efficient marketing strategy, to engage more costumers at a lower cost.

4.5.2. Influence of Government Support

Singapore’s Prime Minister, Lee Hsien Loong, emphasised the fact that Singapore’s and the world’s economy would never go back to normal and that some jobs were very likely to disappear (CNA, 2020). Although this was a rather pessimistic assumption, he also added that the country was working hard in order to transform it and deepen the

⁶⁴ Annexes: Transcription of the Interview with Norbert Seo

⁶⁵ Web-Conference "Meet The CEO" 2020, June 18:
<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

⁶⁶ Web-Conference "Meet The CEO" 2020, June 18:
<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

⁶⁷ Annexes: Transcription of the Interview with Ernest Teh

capabilities of its people. Developing plans for the future economy, digitalising the private and the public sectors, and building Singapore's innovation and R&D capabilities.

Not in many countries, the government is as constantly engaged in innovation as it is in Singapore. "...*The Singaporean Government has always encouraged companies to innovate, especially in digital processes...*"⁶⁸. Many companies admitted that the Singaporean and the release of support packages has been key to their development during the pandemic. This subsection will not analyse the Singaporean government and the impact of their actions, but rather how they influenced the innovation process of businesses.

Firstly, the economic support given by the government was key for many companies to keep their staff⁶⁹. Many companies agreed that without the government support, they would have had to lay off staff or start with salary cuts. In the surveys published by the SGC, around 60% of the companies that took part said that the government support help to mitigate the negative impacts of COVID-19.

Secondly, the government also understands the potential and future of digitalization. As mentioned before, it plays an important role in the development of skills for small businesses.

*"...the Singaporean government is paying trainees for small businesses such as hawkers so they can adopt these new digital methods like e-payment and such. That is really great, I think on the one hand for business and on the other hand for the consumers as well..."*⁷⁰

Through these measures, bigger companies can achieve their goal of keeping their staff safe and, on the other hand, smaller businesses can develop themselves in a more digital way and have more competent skills for the future.

⁶⁸ Annexes: Transcription of the Interview with Chai, Chee-Ming

⁶⁹ Web-Conference "Meet The CEO" 2020, June 18:
<https://www.anpasia.com/newsletterweb/41435C43774946504578454B59/42465E4570484251467442435C43>

⁷⁰ Annexes: Transcription of the Interview with Ernest Teh

5. Conclusion

The COVID-19 pandemic has been the greatest shock of the 21st century (OECD). There is no doubt that the innovation process of businesses are stimulated during a pandemic or a similar crisis because they need to adapt to the extreme changes in the environment. And even with Singapore's position as a rich and stable country, where the government pushes innovation, business cannot stay still, they need to innovate to go through the crisis, or even to grow, in the case of certain industries. Although the pandemic has impacted all the industries in Singapore, the size and the sector of a company happens to play a determinant role in its innovation process.

As a result of the pandemic, the integration of digital tools into the innovation processes of companies has been speeded up. Through telecommuting and web conferences, companies have shown that digitalization can be very good to keep productivity going on. Also, customer engagement results to be the common challenge for all companies in Singapore. Through digital solutions, companies have innovated in the way they engage their customers, and depending on their size and sector, different processes are involved. Bigger companies result to be more focused on their HR processes and long-term strategy, while smaller companies focus more on product development and deeper collaboration with partners in the regional market, which also means that businesses aim to reinforce their presence not in Singapore alone but in the rest of the region. Any other type of collaboration, besides the share of information on the current situation, has not been clearly identified. Furthermore, the government in Singapore results to play a key role for the innovation processes of businesses. With its budget destined to business during the pandemic, companies of all sizes got at least some relieve from the high levels of uncertainty.

Finally, the most important lesson from this pandemic is that business and other organizations always need to get ready for the worst. When businesses find themselves in a stable position, it is the perfect time to think about potential threats. The question: *what threats could appear after COVID-19?* is subjected to further research. For example,

now that digitalization is growing, cyberattacks or massive hacking could be a potential threat that organizations need to consider. Also, business might consider developing a plan on how to handle a new pandemic, how to ensure supply, and how to have a good HR management.

Similar actions could be adopted by companies that decide to settle or are already settled in countries that share similar characteristics with Singapore: small population but with an strategic geopolitical location in their region; business-friendly environment; stable institutions; e.g. Panama, the United Arab Emirates, or Hong Kong SAR. Businesses need to find the right partners to collaborate in the respective regions, and they need to prepare their staff, so they can exploit digital tools and learn how to always be ready for change.

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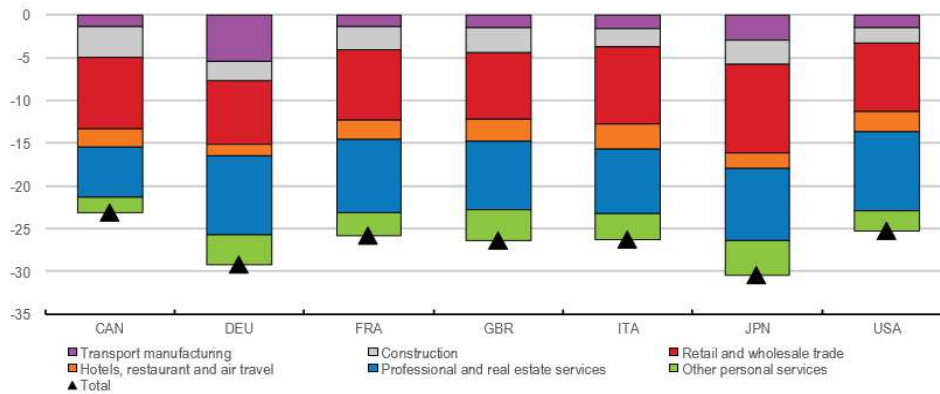
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Annexes

1. Graphs and Models

1.1. The potential initial impact of partial or complete shutdowns on activity in the G7 economies. (OECD, 2020)

Per cent of GDP at constant prices

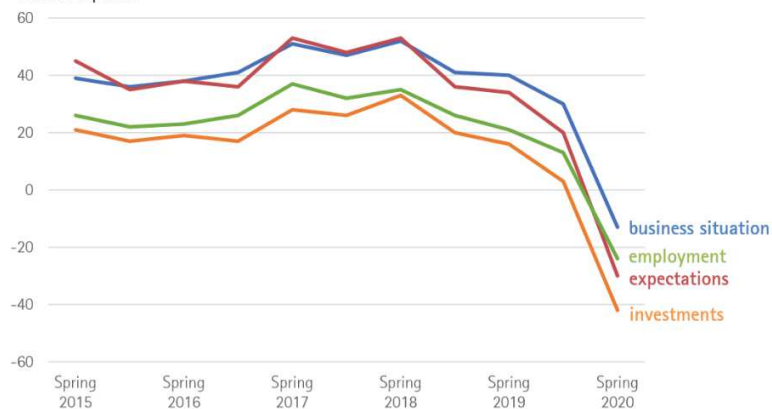


Note: The sectoral data are on an ISIC rev. 4 basis in all countries. The sectors included are manufacturing of transport equipment (ISIC V29-30), construction (VF), wholesale and retail trade (VG), air transport (V51), accommodation and food services (VI), real estate services excluding imputed rent (VL-V68A), professional service activities (VM), arts, entertainment and recreation (VR), and other service activities (VS). The latter two are grouped together as other personal services in the figure. Real estate services excluding imputed rent are assumed to be 40% of total real estate services in countries in which separate data are not available. Full shutdowns are assumed in transport manufacturing and other personal services; declines of one-half are assumed for output in construction and professional service activities; and declines of three-quarters are assumed in all the other output categories directly affected by shutdowns. The calculations are based on an assumption of an economy-wide shutdown, rather than a shutdown confined to particular regions only.
Source: OECD Annual National Accounts; and OECD calculations.

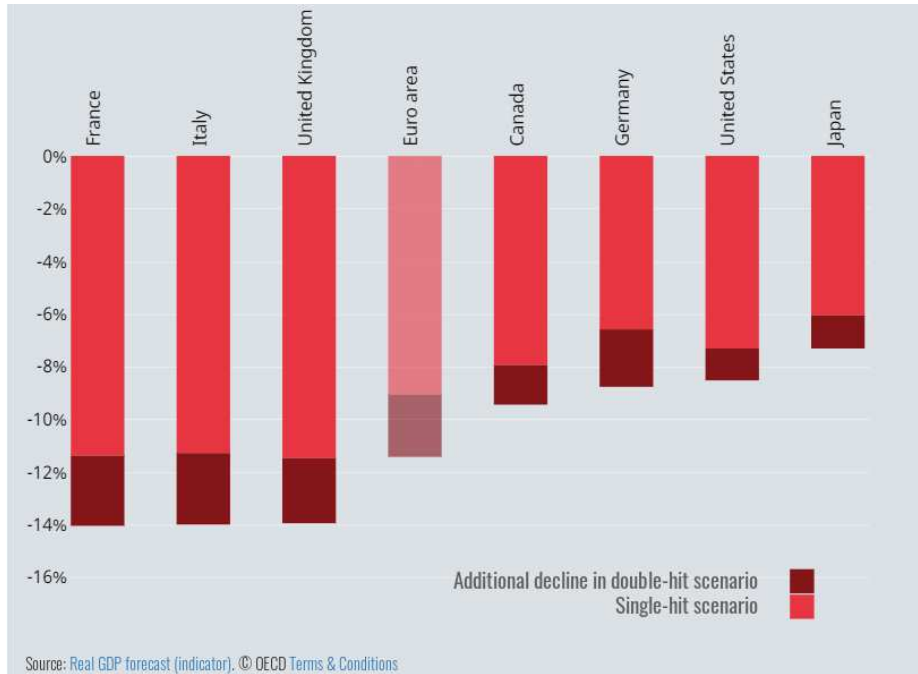
1.2. Development of German companies abroad. (DIHK, 2020)

German companies abroad

Balance in points



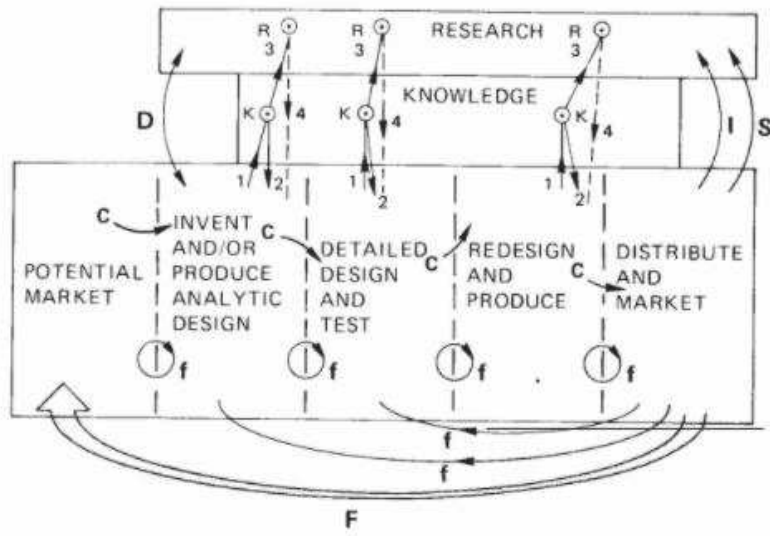
1.3. Projected change in GDP in a double and single COVID-19 hit scenario (OECD, 2020).



1.4. Linear (A) and Chain linked (B) models of the innovation process (O'Sullivan & Dooley, 2008) (Kline & Rosenberg, 2009)



B.



2. Maps

2.1. Singapore and Southeast Asia



2. Interviews

Interviews Questionnaire

1. What have been the major challenges for your company during COVID19?
2. Can you think of some positive things and opportunities that came with the crisis in your company? Which ones?
3. Do you enjoy working from home?
4. In your opinion, is there something that the business community should do as a whole to go through this sort of situation?
5. Do you see a certain level of cooperation?
6. In your opinion what are going to be the major changes in the environment, and how should firms get prepared for the future?

Transcription of the Interview with Ernest Teh

(Partnership Manager at *Spenmo*, Singapore)

08/06/2020

L: Luis Aguilar (The interviewer)

E: Ernest Teh (the interviewee)

L: Could you please introduce yourself and the company?

E: Sure. So, my name is Ernest and I am currently working at this fintech B-to-B Start-up called Spenmo. It is essentially a smart cover card programmed for founders for start-up to manage cash flow and to get access to capital if they need more cash. So, my role is focused on business development. that includes strategic partnerships, talking to customers on a daily basis, and anything that will drive the growth of the company.

L: Thank you Ernest. So, in these difficult times what have been the biggest challenges?

E: Yes absolutely. So, Spenmo is a spend management platform. The main challenge that came with the crisis was that companies were not spending. So, we actually had to innovate in the ways we engage our customers. When I was doing the promotion of our product, I got a lot of feedback saying that the companies were not even spending. We had to change the angle. Customers that already had the platform were not spending as frequently as we wanted them to spend.

L: Correct

E: So, what we did was actually to change the angles and introduce new services such as invoice management, foreign exchange transfers. That means that with your Spenmo card you can do other operations. The other thing we did is that in these times

we focus more on our product development so that one this crisis has slowed down we'll be ready to hit the market with our products.

L: Nice. You already mention some solutions, and do you see more positive things or opportunities that came with the crisis?

E: In general, or for Spenmo?

L: For your business.

E: Yes. Now that people are spending less, now the company has the time to find ways to extend its runway by saving costs. what we started doing is that we cut a lot of the marketing budget that we have previously allocated. So, we could rethink some of the strategies. Now we can reinvest that money in new strategic areas that are more cost effective and even find ways in which we can acquire customers at a lower cost. If we are not doing marketing, what else can we do?

L: So, in general it has been the internal structure of the company?

E: Yes correct.

L: I bet you are still working from home, right?

E: Correct.

L: Do you enjoy Working from home?

E: I think there are pros and cons. Number one it makes sense during these times, because you can save a huge amount of money that you pay for rent... Luis I'm losing you.

L: Sorry, the connection is bad. Can you hear me?

E: I can hear you. Your screen was frozen for a while.

L: Good! Please continue, I can hear you perfectly.

E: Sure. So, what I was saying is that we realised that office rent was actually taking a lot of cash. Now that we have all workers working from home that money has been saved. And working becomes more flexible, you can start and stop at the time you want. You can also have an added value when you work from home. But also, when you work from home you have more social interaction and it is way easier to communicate. You can ask questions to your teammate whenever. The problem with that is that sometimes you get distracted and cannot add value to your work. So, in that way I would definitely say that working from home does have a benefit in that sense.

L: Do you think working from home is more productive for your company?

E: I think a hybrid model would be really good. From this situation I think home-office works very well. We are also a small team, so it is easier to manage.

L: In your opinion do you think there is something the business community should do to go through this crisis? Do you see a level of collaboration?

E: The business community in general?

L: The business community in Singapore.

E: Yes definitely. It is all over the news, you see the delivery companies that have partner out with hawkers, small local business. So, definitely see how, in different ways, this crisis collaboration has been formed. Food delivery companies have also done fundraising for the hawkers, they just delivered around 30 thousand SGD. I thought that was quite amazing.

L: Ok. My last question is, in your opinion, what are going to be the major changes in the environment after this crisis and how should companies prepare for that?

E: Wow. It is hard to predict. Companies have been forced to digitalise. Even consumers had to digitalise more, now you see people looking at more e-commerce sites. This hasn't worked for companies that work in a more traditional way. So, it is interesting because I think that e-commerce is here to stay, and it will be interesting to see how companies will digitalise. Something I really like is that the Singaporean government is

paying trainees for small businesses such as hawkers so they can adopt these new digital methods like e-payment and such. That is really great, I think on the one hand for business and on the other hand for the consumers as well.

L: Correct.

E: Also telecommuting. I think for Singapore the idea of working from home is very foreign. You see some companies made their employees go back to the office once the circuit breaker ended even though they could have still worked from home. So, it is more traditional in that sense. You have to stay at the office for x number of hours, so I know that you are working. Home-office mindset is complete from western countries. I definitely think that Singapore will be more open to telecommuting. With that I also mean that the actual workplace will be perhaps disrupted. There would be a price of more coworking spaces, perhaps not for every single day but there will be a rise. It is interesting to see how it is going to develop.

L: Perfect. That was it. Thank you, a lot.

E: My pleasure, Luis.

Transcription of the Interview with Chai, Chee-Ming
(Managing Director at LEONI (SEA) PTE LTD, Singapore)

11/06/2020

L: Luis Aguilar (The interviewer)

C: Chai, Chee-Ming (the interviewee)

L: Could you please introduce yourself and the company?

C: Sure. So, my name is Chai, Chee-Ming. I am originally from Malaysia. I graduated in finance and I have done public transportation operations. I worked with Voith Turbo, which is a German company, for eleven years, and now with Leoni for about two years. Leoni is a cable manufacturer and we have two divisions. One is dedicated to the automotive industry, and the other to non-automotive industry, ship building, construction, and so on.

L: Great. And tell me what have been the biggest challenges for your company during these difficult times of COVID?

C: So, Leoni has always been, what we call, not a front liner in the business. We always depend on the original equipment manufacturer. So, I don't take care of the automotive industry, I take care of the non-automotive. For LEONI, the effect of COVID-19 was that when the automotive industry stopped, we got the impact. We are very interdependent; if they grow, we grow, if they don't, then we have a problem. That's for the automotive industry. For us, in the non-automotive industry, we are more diverse, and every business has a different recession cycle. What I mean is if for example you have solar panels that are in the picking up phase, then we are also growing. The oil and gas industry is not doing well, so we are not doing well in that industry. So, what happened to us is that we are growing in Southeast Asia. That is why I came on board, to expand to the other markets and to change the business model.

L: Right.

C: So, when I took over, Singapore's operations were 80% Singapore centric operations and 20% Southeast Asia. That is where the contribution comes in. What I have done is that I have shifted that because we cannot rely on Singapore alone because it is too small. So, when we expand in the region, we need to look for partners in order to grow. When we work with partners, a lot of innovation has to come, not only in technology but in the way, business is done. So, the question is how you get a partner that fits the deal, has the financial strength, and is able to manage the supply locally in the country.

L: Correct.

C: I don't know if you call that innovation, but it is definitely thinking out of the box. So, we have some head start and we found a partner in Thailand that could work on renewable energy. And Thailand has just started putting emphasis on solar energy. Before COVID-19, we started the first badge of delivery of solar cables to Thailand. After that we have problems with the COVID. Now, even in our business we are not a front liner to the customers. We need a lot of innovation; for example, we need to find the right way to have an e-store or platform to help either our partners or either our customers.

L: I see.

C: But this is not so straight forward because the cable industry business there are many constructions of the cables, and each country may have different requirements. I don't know, different colours due to regulations... There are lots and lots of combinations due to it. So, then the question is how do you find a balance to make it happen. What we have done in Singapore when COVID started, we outsourced the entire warehousing and we have basically removed managing the cut line business. In the cable industry you sell in length, customers will order ten or twenty meters of cable. We have decided that this is not the model we were going for. So, we looked for a partner that could do that for us and we removed the entire warehouse management. What happened is that when we did that, we reduced our rental cost and the cost of space. We have basically made the fixed cost of running a business as low as possible.

L: Ok.

E: I really think that, whether it is in the COVID-19 or not, to run a business you need to know how to manage costs. It is not about overspending and underspending; it is about what makes sense. You need to have costs that you know that are necessarily fixed and you need to have other costs that you know you can fluctuate. But of course, this can be a very sensitive topic specially with European companies. You don't want to enter into an antitrust position. You need to find synergies. So, that is another side just to say that you cannot do everything yourself. This is why you need a lot of thinking out of the box. The concept is easy but to find that partner that works for you is not straight forward.

L: Correct.

C: A lot of senior companies question themselves "why do I need to carry someone else's name if I have my own?" so, unless they have the same mindset where they realise they cannot innovate alone and carry all the costs, it is very hard. For us, it took us a year to find a partner. So, when COVID hit us, it wasn't terrible like for other companies because a lot of the preparations, partners, and cost savings, we had done before the crisis started.

L: I see.

C: So, the lesson learned, I think, is that when companies are making profit the need to innovate on the idea of the worst-case scenario. In good times, when you are making money, that is the best time to innovate and to look at the business model and ask yourself how we could react if a pandemic breaks out or if there is a recession. That is always missing.

L: So, you were always getting prepared for the worst-case scenario?

C: I mean we wanted to expand, and also innovate what we had in Singapore because we needed to grow.

L: Do you also see some positive aspects or opportunities that came with the pandemic for your business?

C: So, for our division we are not really high tech. Cables are cables, they transmit power. So as long as there is a requirement to transmit energy cables are required. So, it is only how you will do if you hold too many stocks. You need cash flow. And if you have countries like Vietnam or the Philippines that want to develop more “Green Energies”. Now, if they are really green, that is another story, but if they officially are developing new energies for the countries then demand will come back up. The other opportunities are there but the question is always how you serve the customers. That would mean you need a platform where you can interact with your customers so that you can engage them.

L: Correct.

C: Now, another problem that I forgot to mention is that because we want to have more operations in the region, but we cannot travel, the pandemic has created a problem for us. That is why having a partner in every country becomes more essential. Without that the company would not have a fall-back plan. Right?

L: Correct. And now that you are into that topic Mr Chai, I would like to ask if you see more collaboration between business?

C: Yes, I think you are right, there is a need to find collaborators. But even if there are collaborators how do you find the right one?

L: What about relying more into the partners that you have already?

C: Correct. We do. But we also need to understand that collaborators are also businesses. They run risks like we do and are also hit by the crisis. So, how could you manage these financial risks? We have a very old partner in Indonesia. We know how they operate and even if they take a time to pay back, we know that they always pay. So, the risk assessment is very different from a Start-up collaborator. When you start looking at the cash position you can tell whether the company is going to survive the pandemic or not. If we get into default payments that would be a bad case scenario, so everyone is very cautious about it. In a business like ours, you cannot have too many collaborators because of the number of competitors.

L: Yes correct. Now, many of the operations that you have mentioned already are done from home now that we are in a Circuit Breaker here in Singapore. My question now is if you actually enjoy working from home?

C: Well, I would say that if I needed to think a lot, I would enjoy working from home (laugh). This topic will change. A lot of companies will innovate and will have more people working from home. As I mentioned before, when companies are doing well, they don't think about the worst-case scenario. So, there are a lot of companies that are still very traditional and think that you must work in the office. I think it is a trust question, but for me this trust has nothing to do with the staff, it has to do with the manager. You will definitely see that that will change but it also depends on the industry. For ours perhaps less than for an accounting firm, where you don't need everyone to be in the office at the same time. They just need to measure the output and the quality of the work done from home.

L: Correct the productivity. And besides that, how do you think the environment is going to change and how should firms get ready for that?

C: Wow. Ehm... I think in the Singapore view, in my personal view. The Singaporean Government has always encouraged companies to innovate, especially in digital processes. So, In the Singaporean context there will be a lot more adoption in IT to do things, which means that the reliance on foreign workers will reduce. That is where Singapore will be heading. For other countries, a lot of manual labour will still come in. Singapore has understood that people coming from Malaysia to work with this COVID-19, you know, the fear manifested in this situation. The government is pushing digitalisation a lot and getting ready for the worst, and it happened. So, now this situation has made the Government to push for more innovation and change on how small companies will use digital tools to make their business better. And that is why you see why the government has given a lot of grants with this year's budget.

L: Correct.

C: Yes. Singapore will be ok. The real question, in the worst-case scenario, is where do you draw the line between Innovation and people losing jobs?

L: True. It is an interesting question. That was all so far. Thank you so much for your time and input.

C: No, you are most welcome.

Transcription of the Interview with Gerrard Mckenna

(Regional Managing Director, Boehringer-Ingelheim (SEASK), Singapore)

16/06/2020

L: Luis Aguilar (The interviewer)

G: Gerrard Mckenna (the interviewee)

L: Could you please introduce yourself and your company?

G: Yes, I can! So, my name is Gerrard Mckenna I'm the Regional Managing Director for Boehringer-Ingelheim. We have a regional office here in Singapore. The region, we referred to as SEASK, it stands for Southeast Asia and South Korea. We manage the businesses and services out of this part of the world for Boehringer-Ingelheim. We have around 250 employees here in Singapore and around 2000 here in the region. The focus is, on the one hand, on medical marketing and sales, as well as enabling functions for the region. We ran operations from Singapore, but we have locations in most of Southeast Asia and of course South Korea. We have a manufacturing plant in Indonesia; we have global business services run out of the Philippines, and the two main businesses that we have are as you mentioned before, animal health and human pharma.

L: Great. Thanks. My first question for you is, what have been the major challenges for your company during this crisis?

G: Let me think for a second before I give you the answer. I think when you think of it in terms of priorities in challenges, maybe we start with the big picture and then we can come to the operational challenges.

L: True.

G: Challenge number one in the pandemic is to take care of your employees. So, you have a lot of employees and then a lot of uncertainty and then disease outbreak. You

don't want anything to happen to your employees and their families. If I think about how we reacted in the early days, January, and February, that is where the focus was: what do we need to do? We had a pandemic plan. We communicated with our countries to see if we all had pandemic standards for the protection of our employees.

Luis: Yes.

G: Then, the next goal you have is your customers, and in the case of the pharmaceutical industry you are talking about patients. So, people that are ill and need medicine and they are depending on you to provide them with medicine, even if there is potential supply chain production. That was one of the big topics at the beginning, to what extent our supply chain in pharma is going to be affected? So, along with that there was a certain degree of nervousness of certain form major stakeholders like governments on whether pharmaceutical companies could continue supplying during the pandemic or not. And in order to safeguard their own interest and their own patients they started increasing their inventory levels, purchasing more. So first you can think "Oh that is nice" because you are going to be selling more. Now the negative side of it is that the amount of the manufacturing capacity is not enough to serve all your customers.

Luis: Correct.

G: So, in that case you need to start making some decisions on to what extent you are going to increase your capacities in the short term, to what extent you have to prioritise what you are producing. So, those are the first concerns. The first one is the safety of your employees; the second is continuity of supply of our medicines to patients and having enough to serve equally. After that, the next thing again and look back to your employees, many things that you are doing suddenly have to go a little bit outside of the established routines and processes. Some things have to be done differently; others have to be done quickly.

L: Yes.

G: I'll give you an example. In our industry, face to face dialog events, big meetings, are an important part of the communication effort between physicians and the

pharmaceutical company, the medical division, and the medical representative division. All of a sudden, you cannot do these things anymore, you cannot organise bog meetings, you cannot bring speakers from overseas, you cannot have a regional conference. So, that question that came up was “how are we going to deal with this?” and then, after realising it, we stated that there is hope for the long term. We can hang on things and it is important that the company gives clear guidance to the teams as early as possible, for planning purposes. Then you realise that you don’t want to take risk on your employees or patients, that your customers don’t want to gather anymore so here is when you start thinking virtual. That is sort of the major topic in a lot of companies, including ours, which means the speed of moving from your traditional way of doing things to the virtual way of doing things.

Luis: Correct.

G: And doing that in a context where people are not sitting in the offices anymore and can be together as one team in their homes but also where people can be also dispersed around the city and the region, the communication becomes a little bit unusual and uncomfortable for the very beginning. Those were probably some of the challenges that we were facing.

Luis: So, you also mentioned one advantage, but could you think about other positive things or opportunities that have arrived with the crisis for your company?

G: Yes, and I think that what I am going to tell you is not going to surprise you. I tell this to all of our HR heads of the region. This morning at a meeting I said that this is a little bit like wind surfing. On a normal day you go to a certain speed, You have a direction you are heading to and you know more or less the amount of time that is going to take you to get there. We talk a lot, going to market transformation, changing the channels in which we engage customers, and so on. So, we knew where we were heading. Increasing digitisation in communication with customers, increasing the individualisation of communication. Medical representatives that traditionally were salesmen for one on one were meant to become orchestrated for customer engagement. But with COVID-19 suddenly the typhoon came in and put a lot of wind into our sails, which means we were

getting where we wanted to, but we were getting there a lot faster. However, you must have the basic capabilities already in place because without basic capabilities you cannot get into a more sophisticated level of capabilities. So, the work that you have done in the previous years is critically important. But then there is also an important topic that is the mindset topic. You need to understand, accept, and bring into your organisation that the changes that are occurring around you are only temporary in nature and going to go away. You don't want COVID, but you appreciate the wind that comes with it and that is helping you to transform. Now, you are never surfing alone, you are always surfing with your competitors.

L: Yeah correct.

G: Your fundamentals and mind-set are going to be critical. In general, your ability to adapt is going to be critical and I think that is where the opportunity is. Accelerating trends or directions you are heading to, increasing productivity as a consequence and the trading effect that it has when the people suddenly need to move and change the way they are operating. You can talk about it and use the big bright words in the context of your culture and things like that. But in times like this you can see if you are up to it or if you are not, and also see who will succeed and who will not and think about what that means for you.

L Nice. So, you mentioned that the different teams are now working from home. Let me ask you if you actually enjoy working from home?

G: Yes and no. To be honest with you, the first week I stayed in the office as long as possible. Of course, under legal compliance in order to do. Number of cases were increasing, and we tried to keep numbers low but as the boss I was in a position where I could say "Ok, for certain meetings and other things I am going to be there" But then when it was not possible again I left the office. At the beginning it was not so comfortable I must say because it is unusual, is different way of working. And sitting in front of a screen the whole day and communicating through it the whole day is not my thing. I like people, I like to see them directly.

L: Correct.

G: But the more you get used to it, the more you start appreciating certain advantages such as personal productivity advantages. Today for example I got at 6:30 am to go for a walk and when I come back and am a little bit sweaty, I can still work. I do not need to take a shower to go somewhere. Today I had lunch with my wife, the last time I did that during working days was perhaps 30 years ago. So, there is a new dimension of quality of life. But there are other things that need to be in the office. I asked my crisis management when in measure of the law when is the earliest time that I can start having meetings at the office again because I want to create that team atmosphere. So, this is really a yes and no thing.

L: Interesting. I, actually, share your point of view. It was hard for me at the beginning.

G: What is fantastic is that now I can actually participate in a lot more meetings and in a lot more external meetings. Take for example the German chamber of commerce. You always have to decide if you sacrifice lunch in order to go to that meeting but now it is a webinar. In a short period of time you can just decide if you want to join, and if the topic happens to be not as interesting as you thought it was you can always do some work aside. So, there are a lot of opportunities if you open your mind to it.

L: Also, in your opinion, what do you think the companies in Singapore should do to go through a crisis like these? Do you see a certain level of collaboration?

G: Collaboration between companies in terms of...?

L: I mean in a general matter, like sharing information on how to deal with this and so on.

G: Correct. I think the chambers play a role in that. Providing platforms where others can share their experiences, share information, articulating some of the concerns, making sure that you have a similar understanding of the regulations in Singapore. I really encourage my directors to reach out to people they know in other companies in the same industry, to see if the companies interpret the measures in a similar way. So, I see that collaboration... Specially multinationals having people traveling, coming from overseas and need more clarification in terms of travel measures, so they reach the chambers...

Surveys conducted by different chambers... so I think yes there is a big collaborative spirit in that situation. I even think the level of collaboration has increased.

L: Ok, my last question is in your opinion what are going to be the major changes in the environment and how should companies get prepared for that?

G: Yes.

L: The million-dollar question...

G: Yes, it is not only a million-dollar question, it is very complex. You can go to many topics out of that. I think the major changes are going to be the work flexibility, going through this experience we have understood that we don't need to be in a specific place to work. Of course, technology usage has always been important and has increased dramatically over the last months. People are seeing the benefits of that and will digitalise more. Customer engagement, topics that I mentioned later, multichannel engagement as. So, not focusing on a personal channel, have alternatives to traveling and having face to face meetings. Actually, that is also good for you. I travel a lot and it is very exhausting when every week you need to go to a different place, it is trying. So, it is good for a lot of entities: it is good for the planet, good for our health, good for the company because we are saving money, and good for productivity because you don't lose time. Of course, the airlines are suffering but eventually it will bounce back to some degree but definitely not to what it used to be before COVID.

L: A new normal as people say.

G: Yes, that's what people say. Even new norms that were not normal before like wearing the mask in Europe. I remember when I went to Japan in 2003 and saw a lot of people wearing masks and realised that was weird for me. Now in Europe people are wearing masks. Safe distancing measures and such things.

L: Okay. That was it. Thank you so much for your time.

G: I am happy to help.

Transcription of the Interview with Elif Kotman-Goetsch

(Regional Director South East Asia Pacific, Ab Enzymes GmbH, Singapore)

18/06/2020

L: Luis Aguilar (The interviewer)

EI: Elif Kotman-Goetsch (the interviewee)

L: Could you please introduce yourself and the company you work in?

EI: Sure. My name is Elif Kotman-Goetsch, I've been working with AB Enzymes for over 10 years now but in Singapore I've been residing since August last year. Only so, I took over the region and lead role as the regional director in Southeast Asia Pacific. The region consists of about 15 countries. From India all the way to New Zealand, Japan and on the East. So, it's a very diverse region and I took the lead there, as I said, in August last year. I don't know if you are familiar with Enzymes but basically, they are living organisms. They are produced by living organisms and in the industrial scale, they go into various production processes to act like a catalyser in many cases. So, they improve the efficiency of the production process or improve the qualities of the end product. The company is quite old, actually it was founded in 1907, and our products go into baking applications like bread, cakes and so on, but also on paper and textiles. So, you can imagine, it's extremely wide and actually that made it very interesting for us to go through the pandemic as well. I will catch up on that later.

L: Sure.

EI: And yeah, you probably know that we are just a part of a very big British company called Associated British Foods. That is our mother company, or in short "ABF". They are in very diverse industries as well. Originally the key and most historically industry is British sugar and sugar. However, since then, they've been adding ingredients like enzymes into their portfolio for groceries, but also textiles. So, Primark is actually part of our clientele.

Probably you know Primark. So, they are part of the Associated British Foods family. In every regard, I think I could sum up the sentiment of my region and my company, I would say it's all about diversity.

L: Yeah, my first question will be, what had been the major challenges for your company during this current crisis?

EI: I think the biggest challenge is, first of all, to make sure that your people are safe and healthy. They have to remain safe and informed about how to go throughout a period that is unknown. How long is going to last unknown. So, to prioritize safety. However, ensuring the continuity of the business is also a challenge. I mean, even making the first call about the fact that we are now going to work from home was a hard one because we didn't wait for the government to come up with that. Honestly, I think in almost all countries it was maybe the leading trend. Companies like Google, Apple, Facebook, you know those modern companies, that set the trend. So, we kind of made those decisions before the government made the decision. Uncertainty was definitely the second biggest challenge because we don't know how long this is taking and we don't know how the consumers are going to react, since there is a recession after the pandemic. Having alternative plans has taken a lot of management time but it is necessary. The disruption of the supply chain has also been affected. We all need to get our raw materials for the production. But our supply chain is quite simple so we could manage. Now the next challenge is managing the logistics, how to find the container, the shipment and so on. Air shipping price increased three by times during the pandemic. Besides the cost you also need to keep your customers engaged and maintain a good relationship with them. This last point is maybe the biggest challenge because we don't know when we can do international travels again.

L: also, with this crisis some opportunities may appear.

EI: Correct, yes.

L: What kind of opportunities do you think this crisis has brought to your company?

EI: Yes, I always say that there is something good with adversity. The first thing that comes to my mind is that we show the customers that we are there for them. I mean, we try to show them that we could be flexible, sometimes we call them just to ask if they are doing good. They have been hit hard by the crisis. For us the crisis has not been as bad on the enzymes part. People need to eat and drink anyway; the hard hit was on the textile industry. Our partners are not selling, so we have been there for them.

L: I see.

EI: Also, we have innovated in the way of getting our customers engaged. You know, to gain customers you need sales techniques, and for that we would need to be present to gain the business. All of a sudden, this is not possible. so, the question was how to remain in the game. I think we have been exploding webinars and calls at much as possible. Now in many countries in Asia, people are not used to teams or these suddenly necessary digital tools, and they do not feel comfortable. I remember my colleague in India or the Philippines asking me if we could just communicate on WhatsApp. So, there I see more opportunities on the development of new channels. There is going to be a big development in trade fairs for example, because many of them will go digital this year. And now, I also have to say that with this flexibility, we gained a lot of new customers because many of our competitors could not supply customers in the Philippines or Malaysia. Also, something I think is interesting is that we never had time to think long term before. Now our management has taken the time to evaluate and design a new strategy for the long term.

L: It is actually a common trend for companies to look into their internal structure. So many of these processes need to happen from home, due to the current regulations, my next question would be do you enjoy working from home?

EI: (laughing) At the beginning i struggled because I am an extrovert person. I like to see people interacting. but now I have to say that the more I use it the more I get used to it. Teams are super convenient, it is so similar to skype, yet so different. I feel I can contact my colleagues at any time. I need to contact my colleagues in Germany and Finland, where we have a manufacturing plant. Because I cannot travel, I can just call them on

Teams. So, I started liking it. I would not say that I like it more than the office, but it is not bad.

L: Do you think it is rather positive or negative for the productivity of the company.

EI: It depends. In sales you cannot stay in the office, you need to meet with customers. In that case this has been bad for productivity and we cannot continue doing that for long. But in the general management like finance, projects and so on, there has not been a negative impact. Working from home is as good as working from the office. Now, what we are doing in Germany is that we are not encouraging people to work in the office, only if they must go to the office.

L: Right. Now, do you think there is something that the Business community in Singapore could do as a whole to go through this sort of crisis?

EI: The Business community in Singapore. Actually, I was a bit worried until the announcement of the restriction because I think the measures were a bit over the top. So, I am not sure how much the companies were there to remind the government that we have to keep the open economy scheme. Singapore has an economy that is very controlled by the government, they set the rules and sometimes companies need to be there to influence a little bit more the decisions of the government. If they haven't done so I think that is a good thing to do.

L: And do you see a certain collaboration between companies?

EI: I mean I honestly do not see it if they are not peers. I think that if they have a relationship, like a supplier -customer, then yes, within the value chain the collaboration has deepened but between industries I have not observed so.

L: Okay. so, my last question will be what changes do you think will occur in the environment after the crisis?

EI: Yes. I definitely think that we will travel less. A lot of the budget allocated to traveling will be reduced. Also, different ways of engaging with the customers. In our laboratory we are putting devices so that our customers can see how everything is being

done live. And lastly working from home. I don't think I will ever tell my team that they have to go back to the office because there is no reason to. We have seen that people can also be productive from home, so why should I insist?

L: That was all. Thank you so much for your time.

EI: Thank you for the opportunity. It was good to make me reflect more about it.

Transcription of the Interview with Norbert Seo

(Senior Vice President Market Division Asia & Australia, Bystronic Pte Ltd, Singapore)

19/06/2020

L: Luis Aguilar (The interviewer)

N: Norbert Seo (the interviewee)

L: Could you please introduce yourself and the company?

N: Yes. My name is Norbert Seo. I am in charge of the Division Asia and Australia. In my division we cover 12 countries including New Zealand and India. We are a solution provider for sheet metal processing business, which means we are providing industrial goods for laser cutting pending automation, cutting software, and services. In Singapore we have been since 1996 and in Asia we have our direct sales in 8 different countries. We have around 3400 employees worldwide. Our headquarters are located in Switzerland and our R&D are also there. We have a refurbishment plant in Romania and 2 factories in China and 2 in Italy.

L: Thank you. My first question is, during COVID-19, what have been the major challenges for your company in Singapore?

N: yes. We actually have more or less overcome COVI-19 Most of our customers are not located in Singapore. Probably only 5% are in Singapore. We constantly support them with our services during COVID-19 because many of them are essential businesses that continue operating during the circuit breaker.

L: And have you also seen positive aspects that have come with the crisis?

N: Yes. So now shops are reopening slowly, but in countries like China, there are new cases. In this case, if there is a new wave of infections in Singapore we are prepared for uncertainty. Because it was planned already during the first impact of the pandemic.

Some of our customers see a lot of opportunities in a middle and long-term base. So, there are manufacturers that see those chances and we have to go with them.

L: So, this has been the time to look at your internal processes?

N: Yes. It is quite complicated. We have to keep our staff in good health and keep social distance between us and our customers but many of our customers are seeing lots of opportunities, so we go with them.

L: And also, with the digitisation initiatives, has there been a boost for your industry?

N: Yes. So, because of the home office measures and digitalisation, many new solutions are needed, and our company provides these solutions. We also have software that supports this activity. We have had a lot of requests for the monitoring of production remotely, from the computer or mobile phone. Because many of our machines are automated, customers can monitor the production from home. So, these sort of services and solutions are more requested from our customers.

L: Nice. Now that you mention it, a lot of these processes happen from home. My next question is if you enjoy working from home?

N: Enjoy? It is very subjective. I think it is a challenging time for everybody. I think that our employees have very different opinions about it, but the trend is that they prefer to work from the office. For many of them this is not very efficient because there are many things to do from the office.

L: Now, in your opinion, do you think the business community in Singapore could do something, as a whole, to go through this sort of crisis?

N: What do you mean exactly?

L: More collaboration between partners, or sharing information?

N: Well, that is more or less what we do. I am more engaged to attend webinars, and we are sharing more information, because we are all sitting all somehow at the same

level, but we cannot know what is happening outside of Singapore. At our level we are travelling a lot. Usually I travel 200 days a year but now, all of a sudden, I cannot go anywhere. So, in order to find more solutions, it is very important to share information with the others.

L: My last question is how will the environment change after the crisis?

N: We are seeing a lot of changes already. All of our staff is working from home. For Bystronic, we are lucky because we had the infrastructure for telecommunications even before the pandemic. So, we had a quite smoother transition in our learning curve. We already had live streaming training for our customers last year. It was somehow lucky that we ran demos before the pandemic. In terms of cash flow operations, it is hard to say because all the businesses are going through a difficult time. Other than that, our revenue is acceptable. We are quite busy, and our engineers are working hard. We did not have to lay off staff.

L: Do you see a future for telecommuting?

N: Depends on the job you have. Some functions can be done from home. But others might need to be done from the office.

L: Okay. This was the last question. Thank you for your time.

N: Thank you.

STATUTORY DECLARATION

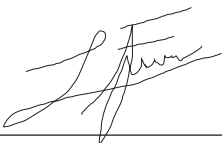
I declare that I have developed and written the enclosed thesis entitled

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entirely by myself and have not used sources or means without declaration in the text. Any thoughts or quotations, which were inferred from these sources, are clearly marked as such.

This thesis was not submitted in the same or in a substantially similar version, not even partially, to any other authority to achieve an academic grading and was not published elsewhere.

Singapore, 26th August, 2020.



Luis Aguilar Alvarez