Analysing the effect of the pandemic on the roofing manufacturing industry in the Philippines

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This paper aims to provide an analysis on the effects of the Covid-19 pandemic on the roofing manufacturing industry in the Philippines, with the goal of answering the research question: "What factors led to changes in market prices for raw materials and how did it affect the roofing manufacturing industry and its stakeholders in the Philippines between 2020-2022?" The main factors that will be discussed in this paper are the costs of production, shipping bottlenecks, the cut in chinese production and the economic recovery in the Philippines. Then, the effect that these factors have had will be explored through the lens of the main stakeholders of the industry, including consumers and producers. A discussion will then be made of whether governments should intervene in the roofing industry to alleviate the effects of the pandemic on the industry's stakeholders.

Introduction

The Covid-19 pandemic has impacted the Philippines significantly - a total of approximately 4.05 million cases and 64,000 deaths[1]. With a lockdown lasting almost two years and citizens having to abide by curfew hours and having limited access to basic necessities, the country's economy suffered dramatically[2]. More specifically, however, it has had widespread implications for the country's roofing manufacturing industry. With economic activity forced to a halt, the Philippines suffered a 9.5% GDP contraction in 2020, its steepest decline post-WWII3; aggregate demand, the total demand for goods and services in an economy, fell dramatically[3]. Amidst one of the longest and strictest lockdowns in the world, the output of roofing manufacturing firms in the Philippines significantly decreased, as demand for roofs from big consumers, such as housing developers and construction companies who saw their projects put on hold, decreased[4]. Thus, the demand for raw materials, including steel, copper, aluminium and zinc, fell relative to the available supply, creating a surplus that lowered prices. Consequently, this lack of demand, along with environmental concerns and production cost increases, led to an evident decline in steel production from the world's leading steel producers, including China[5]. However, as economies have begun to recover, the demand for these raw materials has skyrocketed and outstripped the lowered available supply, causing a shortage that has jacked up prices[6]. Between 2010 and 2019, the highest proportion of metal imports, 31.31%, in the Philippines originated from China, thus, fluctuations in Chinese economic activity has also had significant implications for the Philippine market[7].

The purpose of the research is to analyse the effects of the Covid-19 pandemic on the roofing manufacturing industry, answering the following question: **What factors led to changes in market prices for raw materials and how did it affect the roofing manufacturing industry and its stakeholders in the Philippines between 2020-2022?** The exploration of this question is significant because it will provide insight into the problems faced by roofing manufacturing firms stemming from the effects of the pandemic, thereby, providing guidance for the preparation of firms and/or government intervention to avoid such problems in the future.

Literature Review

In a recent discussion of the impacts of the Covid-19 pandemic on the roofing industry of the Philippines, a controversial issue has been whether government intervention to support the industry is necessary. It has been agreed upon that the construction industry, which contributed 16.6% to GDP in 2021, was one of the most impacted industries during the pandemic . In fact, it contributed to the decline of the Philippine economy in 2020, as "construction activities shrank 25.3 percent", leading to greater unemployment and reduced household spending .

However, the issue of the necessity of government intervention begun a debate when two government agencies issued a Department's Administrative Order (DAO) which mandated "the product certification of raw materials used for roofing and general applications." According to a Manila Standard article, " the order will result in the undersupply of materials needed to complete housing projects and key government infrastructure projects." On the other hand, The Department of Trade and Industry (DTI) argue that this policy will ensure that raw

materials meet quality standards and is necessary, despite the increase in costs it will bring.

In my own view, this increased regulation in the roofing manufacturing industry has been implemented at an inappropriate time as it has negative implications for the recovery of the industry. Though regulation is necessary to improve the quality of roof products, the state of the economy after the pandemic should serve as an indicator that further increases in prices would not only hamper producers' ability to produce at a low cost and consumers' ability to purchase at a low price, but also hinder the economic progress of the country seeing as the industry is a vital part of the economy.

Results

Cost of Production

One factor that led to an increase in the price of metals was an increase in the cost of production, which led to a decrease in its supply. Firstly, rising energy costs, an input to the production of these metals, have decreased the number of metals being produced. Gas prices for manufacturing businesses have increased by 29%[8]. As demand for energy, mainly produced from non-renewable resources, increases while these energy sources continue to be depleted, prices will only rise further. This greatly impacts the production of metals as the embodied energy, "the sum of the direct and indirect energies of the individual stages along the value-adding chain", of these metals ranges from 20 MJ per kilogram for steel to 200MJ per kilogram for aluminium[9]. Furthermore, the extraction of these raw materials is becoming increasingly expensive. Exploration costs have soared, and labour prices have increased due to global skill shortages, thus making it more difficult to garner supply of raw materials10. Moreover, this supply is becoming increasingly scarce as scientific experts have gathered evidence that suggests that global trade, urbanisation and energy needs have led to the Earth approaching its capacity. Iron ore, the main component of steel, is estimated to have a remaining global supply of 500 years[10]. Although this may seem like a lot, the added difficulty in the complex extraction process of this resource makes it difficult to garner an ample supply of this raw material. This is mainly due to rising exploration costs, increasing labour prices due to a global skill shortage, and increasing tension between governments and mining companies, among many other factors[10].

Furthermore, the pandemic has brought several changes that have led to an increase in the costs of production. Employees are having to extend their working hours in order to maintain levels of output11. Aside from this, companies have been mandated to restructure their working areas in order to comply with their country's health and safety requirements11. This has included spending large sums of money in order to digitise different departments which has allowed workers to work from home[11]. In addition, more delivery personnel have been hired and more delivery trucks have been bought in order to complete deliveries during the days to abide by night curfew regulations[11].

Shipping Bottlenecks

Aside from this, the Covid-19 pandemic has also led to disruptions in the global shipping market, leading to shipping bottlenecks all over the world. With the difficulties caused by last-mile deliveries and route planning being exacerbated by increasing gas and aeroplane fuel prices and limited cargo space due to the pandemic, shipping carriers are given few resources to work with12. On average, it costs $8000 to send a full shipping container overseas in 2021, which is four times the cost before the pandemic[12].

This is mainly due to disruptions in the supply chain, which was caused by merchandise inventory quickly being exhausted, thus allowing for demand to surpass supply. To meet demand, prices increased, which affected parties throughout the supply chain. Aside from this, shipping container processing has become increasingly congested, as "more cargo ships are arriving at importing docks than there is time or space to offload their bulk shipping containers."[12]. This was made worse in Chinese ports after strict health measures were implemented after Covid-19 outbreaks in some areas13. As senior global economist Simon MacAdam said in an article by Philstar, "The latest rise in costs coincided with congestion at global ports and anchorages returning to their 2020 peak with Chinese ports, in particular, seemingly struggling to keep up with demand,"[13]. As a result, cargo ships are having to wait for openings in dock spaces, and this can last days or even weeks. In order to overcome this problem, fewer containers are being loaded onto each cargo ship. However, this decreases efficiency as more trips are having to be made, leading to increases in transportation costs[12]. Finally, with increased consumer demand on eCommerce marketplaces for goods that have become necessities in the new normal (including hygiene kits, office chairs, bookshelves), demand for shipping services has increased as well as it is a complementary service[12].

Cut in Chinese Production

The final factor to be explored in this essay is the cut in Chinese production. China is, by far, the largest steel producer in the world. In 2020, China produced 1053 Million tonnes of crude steel, amassing 56.5% of global crude steel production[14]. In comparison, the whole EU only produced around 138 million tonnes of steel that same year. Similarly, China is one of the world's largest exporters and consumers of steel. China's dominant market share of the steel industry, coupled

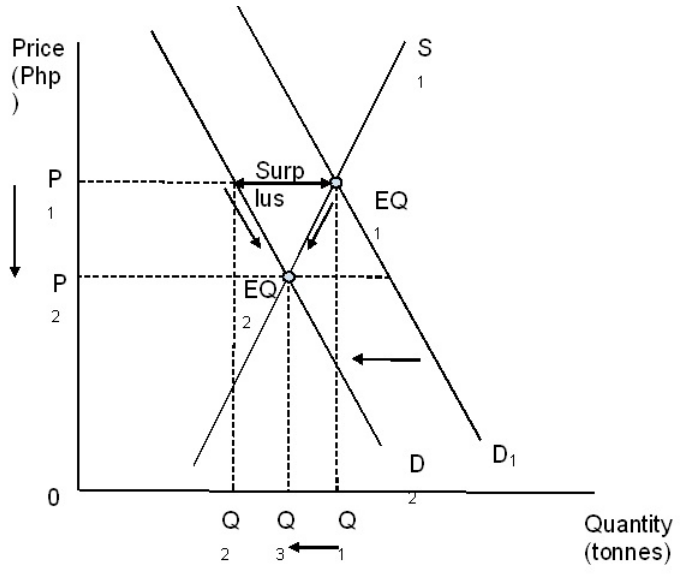

Fig. 1 Market for Metals in the Philippines in the early stages of the pandemic

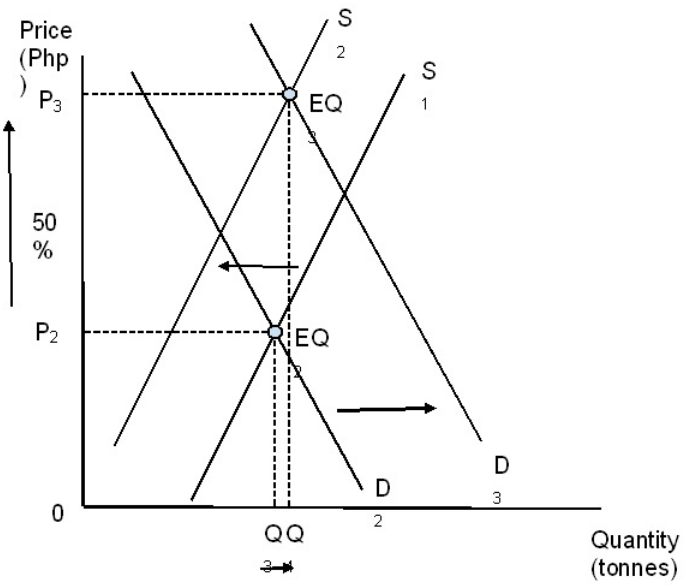

Fig. 2 Market for Metals in the Philippines during the pandemic

with the fact that large volumes of steel are used in different sectors of its economy, means that any decline in Chinese economic activity will have a profound impact on the global steel market.

Amidst environmental concerns raised by smog-covered sky in northern China, Chinese authorities ordered steel mills in 28 cities, including Beijing and surrounding cities, and 8 other cities in Shandong and Hebei, to cut production[5]. These cities were responsible for over 40% of the country's crude steel output in 2020[5]. Steel production greatly impacts the environment as it requires large amounts of coke, a form of coal, and coke ovens emit great volumes of air pollution, including naphthalene[15]. Additionally, each ton of steel produced emits 1.83 tons of CO2, adding to effects of global warming[15]. Under the Paris Agreement, China has pledged to limit the growth of its high-polluting and high-energy intensity sectors[5]. In accordance with this, China's iron ore imports fell by 12%, leading to steel production being cut by 30 million tonnes in 2021.

Economic Recovery in the Philippines

On the demand side, during the early stages of the pandemic, many Filipino tycoons pushed for government stimulus in order to revive the economy, however, the government remained unmoved[3]. On top of this, the Philippines has a vast array of restrictive policies and a high cost of doing business, which led to lower foreign investments in the country, the impact of which was exacerbated by the pandemic[3]. However, on March 16, 2021, President Rodrigo Duterte took action and signed the Corporate Recovery and Tax incentives for Enterprise Act (CREATE), which lowered the corporate income tax rate from 30 percent to 25 percent[3]. Through this expansionary fiscal policy, CREATE was able to boost aggregate demand in the economy by encouraging firms to invest more. As a result of this, it allowed firms to expand and increase their production. To accomplish this, they needed to hire more workers, which led to the number of unemployed people dropping from 3.77 million in June 2021 to 2.99 million in July 2022[16]. These formerly unemployed workers now had more disposable income, and along with loosened restrictions, has allowed them to spend more, increasing consumption in the economy.

Figure 1 above shows the market for metals in the Philippines at the start of the pandemic, which was originally in equilibrium at EQ1, with price P1 and Quantity Q1. Metals are demand inelastic as they are necessities for many producers, especially roofing manufacturers, and supply inelastic as it is difficult to quickly extract metals to change quantity supplied. The Covid-19 pandemic triggered a sharp decline in demand for metals as economic activity was forced to a halt. Having one of the lowest fiscal stimulus packages in Southeast Asia exacerbated this economic downturn for the Philippines' consumption-driven economy[3].

This is illustrated in the figure above as demand shifts left from D1 to D2. At the market price of P1, the quantity demanded became Q2, which led to a surplus equal to Q1 - Q2 as plummeting demand failed to meet existing supply. This excess in the supply of metals sent a signal to producers that the price of metals must decrease. This provided more in-

centive for producers to produce fewer metals, which lead to a contraction in the supply curve. On the other hand, it served as an incentive for consumers to purchase more metals, which resulted in an extension in the demand curve for metals as more consumers were willing to purchase metals at this decreased price. This extension along the demand curve and contraction along the supply curve rationed away the excess supply in the market for metals in the Philippines, therefore, meeting a new equilibrium EQ2, with lower price P2 and lower quantity Q3.

However, just one year later in 2021, the market for metals has undergone significant changes as shown in Figure 2 above. Short and long term supplies were disrupted (the factors leading to which will be discussed in more detail below), which is illustrated in the figure through supply shifting left from S1 to S2. Furthermore, Figure 2 depicts that demand has rapidly increased, mainly due to the global economic recovery. As a result, demand shifts right from D2 to D3. After both these shifts, the market for metals in the latter stages of the pandemic was now in equilibrium at EQ3. At this equilibrium, price has increased from P2 to P3 as indicated by the World Bank's Metals and Minerals Price Index increasing by 50 percent in 2021[17], with steel prices increasing by as much as 215% after the economy's rebound in 2020. Supply has also increased slightly from Q3 to Q4, which indicates that demand shifted more than supply.

Effects on consumers

Both these changes in supply and demand have had a profound effect on consumers. When choosing a roof for a home, one significant factor that must be taken into consideration is a material's viability in specific climates, especially for a country like the Philippines which is the second-most disaster-prone in the entire world. It is estimated that 20 typhoons, with increasing intensity due to global warming, hit the Philippines every year. Metal roofs are able to withstand strong winds and are waterproof, making them a necessity for homeowners in the Philippines. The current increases in metal prices make metal roofs less affordable for consumers, especially for those with low incomes. This is exacerbated by the current inflation environment, with the consumer price index rising by 6.1% in June 2022, according to a Reuters article. As a result, the prices of roofs, along with the prices of houses, will amount to a larger proportion of lower people's incomes, thereby likely worsening income inequality in the Philippines. This will leave them with less disposable income for other necessities and leave these citizens with little-to-no economic or social mobility. In order to be able to pay for this increased price of homes, consumers may look to take out a higher mortgage loan. Although this does allow them to afford suitable homes, there is an underlying risk of changing interest rates if the mortgage does not have a fixed-rate.

Effects on the roofing manufacturing industry

In addition to the impacts on consumers in the Philippines, changes in raw materials prices have also had profound effects on the roofing manufacturing industry. Domestic roofing companies have had to increase their prices in response to both increased demand and increased costs of production. Consequently, profits for many roofing companies have diminished over the course of the pandemic, with foreign competition also playing a significant part. During the tenures of Philippine presidents Cory Aquino and Fidel Ramos in the late 1980s to early 1990s, the Philippines started its import-liberalisation policy, which included tariff reductions, reversing the old protectionist policy under Ferdinand Marcos and preceding presidents. According to an interview conducted with former president of National Steel Corporation Rolly Narciso, domestic producers were, and are still, subject to competition against larger foreign producers, such as China, who experience immense economies of scale due to their large operations and are given large government subsidies and export incentives. This competition has been heightened by the pandemic. As of the moment, unlike the Chinese industry, Rolly Narciso reports the Philippine government has yet to assist the industry in any significant way. As an interview conducted with the CEO of Excel Roof, a leading roofing manufacturer in the Philippines, Edwin Chua notes, the company's clients have taken a hit during the pandemic, with many stating that they are able to find vastly cheaper sources of roofs from Chinese producers.

As metal prices continue to rise and greater importance is placed on sustainability, as demonstrated by more and more countries signing on to agreements such as the Paris Agreement, roofing manufacturers in the Philippines may be more encouraged to look for alternative sustainable roofing materials that may be more cost-effective. The continued metal price increases will severely impact the manufacturing capabilities of roofing manufacturers in the Philippines. One alternative includes plastic polymer roofs, which have already been used in more economically developed countries such as the US. Plastic polymer roofs are made up of 100% recycled materials, are easy to install and provide similar resistance to natural disasters[18]. However, these roofs are still relatively expensive, therefore, profit-maximising roofing companies may not be incentivized to switch to this material.

Discussion

As a result of the profound effects that the pandemic has had on the roofing industry, the government has the choice to intervene in order to lower prices for consumers and lower costs of production for producers to allow them to compete against foreign markets. As of now, the Philippine government has yet to intervene in the industry, however, this intervention may be

necessary as roofs, especially for underprivileged families, are essential for their homes. As noted in a report about Typhoon Goni, which hit the Philippines in 2020, "many roof failures were observed in houses and industrial buildings."[19].

Aside from this, a related market to the roofing industry is the construction industry. An increase in the demand for roofs will lead to an increase in the number of construction projects for the installation of these roofs. This will lead to an increase in employment in the construction industry, a low-skilled labour industry that employs a relatively large number of Filipino workers. In 2019, 7.5 million workers were employed in the construction industry, which constituted 5% of the total workforce in the Philippines[20], and the industry generated over P300 billion in revenue. With costs of production in both the roofing and construction industry inevitably increasing, a lack of government intervention to lower prices may result in a significant fall in employment as employers look to decrease their costs of production.

On the other hand, the government may not choose to intervene in the roofing industry, as it has done in the past. There is an opportunity cost for this intervention as it will likely take time and resources to be effectively implemented. As suggested by the government's lack of action in previous years, the roofing industry may not be at the top of their priority list.

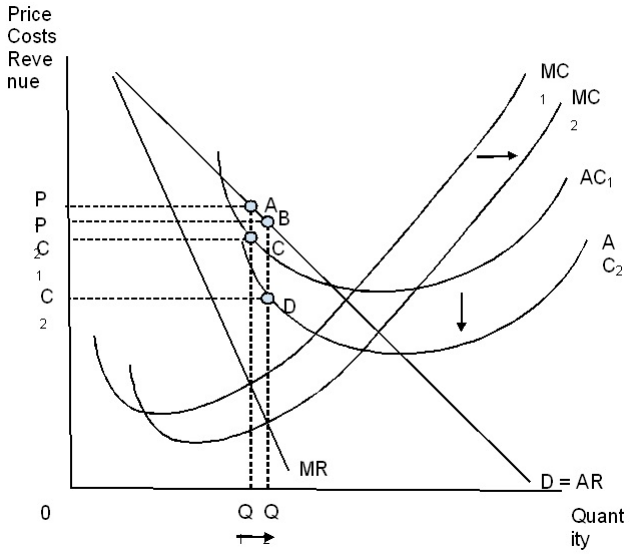

Fig. 3 Roofing Manufacturing industry in the Philippines

If the government does decide to intervene, there are several options that they may decide to pursue. It must be noted that the roofing manufacturing industry is an oligopoly, as Rolly Narciso reports that there are 7 main companies in the industry. Firstly, they may provide subsidies for roofing manufacturers. The subsidy shown in figure 3 above is a percentage subsidy, which shifts total costs down at every quantity produced, thus causing MC to shift down as well. On one hand, a subsidy lowers the costs of production, which allows roofing manufacturers to produce a higher quantity at lower prices, allowing them to earn more supernormal profits. This is shown in the figure above as profits increase from the area of the box P1ACC1 before the subsidy to P2BDC2 after the subsidy. With these profits, firms may look to invest in new technologies that allow them to switch their production to cheaper and more sustainable alternative roofing materials, thereby achieving dynamic efficiency. Furthermore, these lower prices make roofing more affordable, which benefits consumers, especially those of lower incomes. These increases in both producer and consumer surplus increase total welfare in the economy.

However, there are several shortcomings to providing a subsidy. For the government, there is an opportunity cost as they could instead choose to spend on improving different social projects. Other initiatives, such as improving education or healthcare, may be seen as more vital to improving a country's overall quality of life that require immediate attention from the government. Moreover, it may be difficult for the government to calculate the optimal subsidy that must be given to firms such that the roofs are produced at the allocatively efficient level. An incorrect subsidy may lead to overproduction, which has implications for sustainability as these scarce raw materials are being used inefficiently. Dumping, which is when goods are sold at a price lower than costs of production, could also occur. This may lead to firms who are unable to compete with these prices to close down , which is harmful for competition.

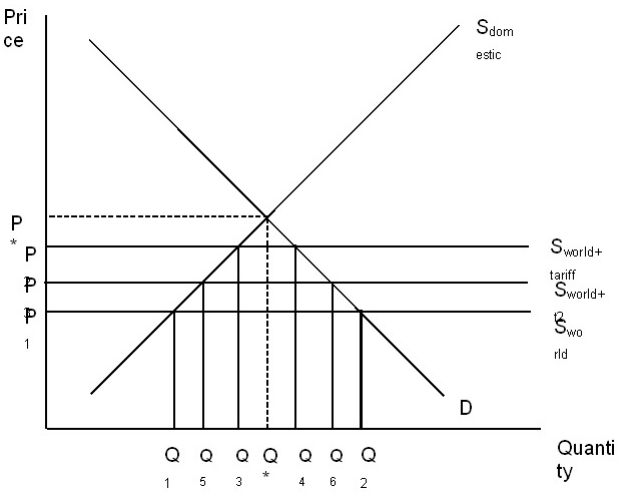

Fig. 4 International Market for Metals

Another possible way the government could intervene is by lowering the tariff on imported goods. In 2020, the tariff rate

for non-agricultural goods was 5.5%[21]. The effect of a tariff is illustrated in Figure 4 above, which shows the international market for metals. Without the tariff, the world supply curve is at Sworld, and this supply is assumed to be perfectly elastic due to the large quantity that it trades. The quantity of domestic production is Q1, quantity of imports Q3 and price at P1. At the current tariff, the world supply curve has been shifted up to Sworld+tariff. This has resulted in a higher domestic production quantity of Q3, a lower import quantity of Q4 - Q3, and a higher price of P2. By lowering the tariff, the government makes the goods cheaper for domestic consumers, thereby increasing consumer surplus. This is illustrated in the graph above as the world supply curve shifts down from Sworld+tariff to Sworld+t2. Thus, domestic production quantity falls to Q5, import quantity rises to Q6 - Q5, and a falls to P3. There is also a smaller welfare loss, and the overall quantity of metals in the Philippines becomes greater, allowing producers to produce more roofs at lower costs of production.

However, by lowering the tariff, the government earns less government revenue. This may be detrimental to the economy's ability to improve its balance of payments account, which has already accumulated a debt of P12.03 trillion as of March 2022 ("National Debt Of The Philippines - Wikipedia"). This may be harmful as it may lead to the crowding out of private investments as there may be less available funds in the economy for borrowing. Therefore, fewer firms will be able to borrow money for investments. Aside from this, if the government wishes to maintain a similar level of public services and benefits, then it may seek to increase taxation in other areas to obtain more revenue. Finally, the increased amount of imported metals may be harmful to domestic metal producers as they are now producing less. As stated in his interview, Rolly Narciso believes that being more import-dependent than the Philippines currently is will only increase the country's likelihood of being impacted by unforeseeable overseas forces, making them more vulnerable to similar supply-side shocks as the one that the pandemic has caused.

Overall, the pandemic has had an extensive impact on the roofing manufacturing industry in the Philippines. In the beginning, draconian lockdown restrictions shut down a large portion of the country's economic activity, leading to a fall in aggregate demand in the economy as consumer spending and investment plummeted. Demand for raw materials fell as well relative to available supply, due to a decreased number of infrastructure projects, leading to a fall in price. The economy has since recovered significantly, raising demand. On top of this, a rise in the costs of production, shipping bottlenecks, and cuts in Chinese production has led to a fall in supply. The combined effects of these changes to supply and demand have led to a 50% increase in the price of metals, the main raw material for roofs, with the price of some metals experiencing an even larger increase. Stakeholders in the roofing industry, namely consumers, firms (including firms of related industries), and the government have been greatly affected by this change. Consumers, especially those earning lower incomes, are now faced with the problem of less affordable housing, impacting their ability to buy other necessities. Firms have experienced a fall in their profits as consumers look to purchase cheaper roofs from foreign producers, which may encourage them to consider shifting production to alternative roofing materials. The negative impacts experienced by firms and consumers provide an opportunity for government intervention, which is yet to occur in the industry in past years. Governments may choose to intervene, even temporarily, through subsidies or the lowering of tariffs, among other policies, in order to provide relief to consumers and firms.

Methods

To investigate the research question, data from secondary sources between 2020 and 2022, including international news articles from Reuters, local news articles from Manila Standard and PhilStar, academic papers, and websites were analysed to discuss the different factors that led to raw material price changes. Findings from primary source interviews with Rolly Narciso, former president of National Steel Corporation, and Edwin Chua, CEO of Excel Roof, a leading roofing manufacturer in the Philippines, will then be used to present specific information about the roofing manufacturing market in the Philippines that is inaccessible from secondary sources. Then, these changes will be evaluated through the lens of the industry's stakeholders, namely the firms (including firms of related industries), the consumers, and the government.

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