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MEDICOM: BUILDING A RESILIENT SUPPLY CHAIN

R. Chandrasekhar wrote this case under the supervision of Professor P. Fraser Johnson solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Late in the afternoon of February 16, 2021, Guillaume Laverdure, chief operating officer at Medicom Group (Medicom), was reviewing a report about a potential investment in a new facility. The facility would manufacture melt-blown polypropylene (melt-blown), a key raw material for surgical and respirator masks. The previous year had been eventful for the supplier of personal protective equipment (PPE), as the COVID-19 pandemic had led to a staggering increase in demand for the company’s products. As one of the largest suppliers of medical masks in the world, Medicom had expanded its global production threefold and was expecting to deliver 2.5 billion masks in 2021. Guillaume explained why the company was considering an investment in melt-blown manufacturing capacity:

Raw material supply shortages have represented a major bottleneck during the past year. We could easily have manufactured 25 per cent more masks if the raw material had been available. Although prices for melt-blown material have more than doubled, the entire industry is experiencing a shortage. One of my priorities is to explore opportunities that will make our supply chain more resilient. One option is vertical integration, where we control raw material supply. However, this approach will require a significant financial investment and commitment of organizational resources for a new facility. We also do not have any experience with melt-blown manufacturing technology.

Guillaume was scheduled to meet with Medicom’s chief executive officer, Ronald Reuben, the following week to review alternatives and to make a decision regarding melt-blown supply. As he examined the report his team had prepared, which showed the financial and production forecasts for the new plant, Guillaume wondered whether vertical integration was the best approach to achieve the company’s strategic objectives.

PERSONAL PROTECTIVE EQUIPMENT INDUSTRY

PPE consisted of specialized equipment worn to protect the wearer from exposure to workplace hazards that might cause injury and illness. Comprising seven product categories, the PPE market was valued at US$7.9 billion[[1]](#footnote-1) in 2019 (see Exhibit 1). PPE products were used in a variety of industries, including manufacturing (22.5 per cent of output), healthcare (16.8 per cent), oil and gas (16.3 per cent), construction (15.6 per cent), chemicals (12.2 per cent), food (10.1 per cent), and transportation (6.5 per cent). During the COVID-19 pandemic, healthcare became the PPE demand leader.[[2]](#footnote-2)

The PPE industry was fragmented, with the top four players combined holding less than 20 per cent of the market share. The industry leader was 3M Company, with 6.4 per cent of market share; it was followed by Honeywell International Inc., with 5.6 per cent; DuPont de Nemours, Inc, with 5.0 per cent; and Ansell, with 2.3 per cent. During the COVID-19 pandemic, the industry faced a major challenge in that demand outpaced supply.[[3]](#footnote-3)

The demand for face masks was particularly high during the COVID-19 pandemic (see Exhibit 2). As manufacturers struggled to increase production to meet the shortfall, shortages were accentuated by panic buying, hoarding, and government restrictions that limited exports of PPE; before the COVID-19 pandemic, China had held approximately 50 per cent of the global capacity for face masks.

The fallout of the mismatch between the supply and demand for masks included an increase in prices and a proliferation of counterfeit products. The prices government healthcare agencies paid for N95 masks increased approximately six times from pre-pandemic levels. Meanwhile, US Customs agents seized nearly 13 million counterfeit face masks in 2020.[[4]](#footnote-4)

**MEDICOM COMPANY BACKGROUND: 1988–2019**

Ronald Reuben founded Medicom in 1988 in Montreal, Quebec, distributing medical gloves under the SafeTouch brand. Demand for medical gloves had expanded in response to the World Health Organization (WHO) recommendation that healthcare workers should use PPE for protection from the HIV virus. During the following years, the company grew its product range to include masks, wipes, disinfectants, and single-use disposables. Medicom positioned itself to provide comprehensive infection-control solutions, distributing products in 95 countries worldwide to manage a range of global health crises that included SARS (2003–2004), H1N1/swine flu (2009–2010), H5N1/avian flu (2014–2015), and Ebola (2014–2016). The company’s brands included Medicom, Kolmi, Hopen, Ritmed, Ocean Pacific, and Hedy.

Ronald reflected on the way Medicom had addressed the evolving requirements of the healthcare field: “There was a new normal at the onset of HIV/AIDS. Dentists and doctors never used to wear gloves, and equipment and supplies were not geared toward single use. Everything was metal and reusable. Then the WHO mandated universal precautions, and the industry transitioned to disposables.”

In 1998, Medicom opened its first manufacturing facility in Augusta, Georgia, which produced medical masks. By December 2019, the company had added three additional mask manufacturing facilities in Angers, France; Shanghai, China; and Yilan, Taiwan. By 2019, the company’s total mask manufacturing capacity was approximately 2 billion units.

Ronald described the evolution of Medicom and the challenges faced by the company:

Our product line has expanded to include a complete range of infection-control products. Our principal customers are large distributors, such as Cardinal, McKesson, Henry Schein, and Patterson in North America, Hartmann in Europe, and Sakura-Finetek in Japan. There were a series of global healthcare crises during the past 30 years, with three to seven years in between. Product demand would go from feast to famine, requiring us to scale up capacity, followed by a sharp decline. For example, we acquired a factory in France at the tail end of the H1N1 pandemic in 2011. At the same time, we expanded our capacity significantly in our factories in China and Augusta, Georgia, driven by promises from large customers looking for increased supply. But as soon as the crisis abated, the economics kicked in and orders dried up, forcing us to idle capacity.

THE COVID-19 PANDEMIC

The WHO declared COVID-19 a global pandemic on March 11, 2020,[[5]](#footnote-5) and within weeks, there was a critical global shortage of PPE. However, the leadership team at Medicom had begun monitoring the developments related to COVID-19 in early January and set up an emergency response team of seven senior executives at the end of that month. Guillaume described Medicom’s response to the looming pandemic:

Our executives in Canada, Australia, the UK, and France were included on the team. We met online at 7:00 a.m. daily for 30 minutes to share information and allocate resources. Pre-pandemic, we had 50 to 60 mask SKUs [stock keeping units], with different colours and sizes. We brought the number of SKUs down to two or three at each plant to simplify supply and manufacturing. The customer did not care—they just wanted a mask.

What followed was a series of events that impeded Medicom’s manufacturing and distribution network. Without warning, Chinese government authorities took control of Medicom’s Shanghai surgical mask factory in the last week of January, during the Chinese New Year. With the plant shut down for the holiday, the authorities brought in workers to start up production. Under temporary government control, the Shanghai factory diverted all output to fulfill domestic requirements. While Medicom was compensated for the masks produced at the plant, the move stripped the company of 50 per cent of its capacity. A significant part of the product from the Shanghai factory had been destined for export to North America and Europe. Then in early February, authorities in Taiwan banned Medicom from exporting masks made at its local plant there. Next, in early March, the French government requisitioned all production from the company’s factory in Angers, Western Europe’s largest N95-mask manufacturing facility. The result was that, in early March, the company’s Georgia plant was the only mask making facility unaffected by government restrictions.

Customers were put on allocation, and existing inventories of masks were drawn down and distributed. Unlike many of its competitors, Medicom focused on honouring commitments to existing customers and did not pursue opportunities to sell its products to the highest bidder.

Sensing a prolonged global healthcare crisis, the company was quick to react by aggressively expanding its mask manufacturing capacity as part of a strategy that focused on a new market segment. Ronald explained:

We had two choices. If we did nothing, we would potentially lose existing customers. If we increased capacity, eventually, there would be a glut of masks after the pandemic subsided, and we would be faced with a situation where prices and margins would drop. So, what did we do? We decided to go after a new channel: government bodies. Our value proposition was that we could not assure supply from other regions during pandemics. You need supply chain sovereignty. Medicom had the industry knowledge, depth, and expertise to establish domestic-based supply.

Medicom secured a multiyear agreement with the government of Singapore in January 2020, which provided purchase commitments to support opening a new surgical mask manufacturing plant. Within months, it had signed similar agreements with authorities in France, the United Kingdom, and Canada. The result was a commitment by Medicom to invest approximately $100 million over an 18-month period to expand its mask manufacturing capacity from approximately 2.1 billion units per year to 6.1 billion units (see Exhibit 3). In a normal year, the company’s capital expenditure plan would be approximately $5 million.

By January 2021, the company had 11 mask manufacturing facilities: two in North America (Augusta, Georgia, and Montreal, Quebec); three in Europe (Angers and Beaucouzé, France, and Northampton, UK); and six in Asia (two at Shanghai, China; two at Yilan, Taiwan; and one each in Hong Kong and Singapore) (see Exhibits 4 and 5). In 2021, the company had 1,700 employees worldwide and sales revenues of approximately $1 billion. The company’s revenues from the mask segment increased significantly in 2020 (see Exhibit 6).

MASK MANUFACTURING

Melt-blown was a nonwoven polymer material used as the middle layer in surgical and respirator masks. The fabric consisted of small-diameter filaments that provided highly effective filtration properties. Melt-blown was manufactured by a continuous process that used a stream of high-velocity air to blow molten polymer resin from an extruder onto a conveyor, where it was collected and wound into rolls. The basic components of the process were the resin feed system, extruder, melt-blown die, metering pump, collector, and roller unit. As the melt-blown material emerged from the extruder die, it solidified on the collector, forming fibres. The random fibre structure from the extrusion process, together with the density and fine fibre size, provided an effective filter for small particles.

The filtration properties of melt-blown fibre had applications in a variety of industries, including the food, industrial, consumer products, and medical sectors. Differences in fabric density, based on the intended application, could be achieved by varying the speed of the collector and the distance between the die and the collector. For example, respirator masks used three to four times more melt-blown material than surgical masks.

Medical masks were produced using automated mask-making machines that assembled three layers of nonwoven material. The inner layer was designed to absorb moisture created as the wearer exhaled, and the outer layer served as a moisture barrier to block aerosolized particles expelled by other individuals. Inserted between the inner and outer layers was a middle layer of melt-blown material that served as a filter. Additional steps of the mask making process included (1) attaching a metal or plastic nose strip, which allowed the wearer to improve the mask seal; (2) adding folds and pleats, which made it possible to adjust a standard mask to suit different wearers; (3) cutting to size and stitching the three layers together; (4) attaching ear loops; (5) disinfecting; and (6) packaging. A standard mask-making machine had a capacity of 100 masks per minute.

MELT-BLOWN SUPPLY

Annual demand for melt-blown material at Medicom’s plants in Europe and North America increased dramatically between 2019 and 2021 (see Exhibit 7). Guillaume explained the effect of increased mask production on raw material sourcing requirements:

Prior to 2020, melt-blown was supplied to our plants in the US, France, and China from local suppliers. We had six melt-blown suppliers, with three providing approximately 70 per cent of our total requirements. Presently, there is a shortage of melt-blown material, and as our production ramped up, we have expanded sourcing to include six new suppliers. Sourcing has become more global, with melt-blown suppliers located in Asia, Europe, the United States, and Mexico. For example, our plants in Augusta and Montreal could receive melt-blown from suppliers located in North American, Europe, or Asia, depending on the availability and cost.

The supply problem for melt-blown was particularly acute in Canada, as Ronald described: “We face different challenges in Canada. We have negotiated a 10-year agreement with the federal government to supply masks, but Canada is the only G7 country that does not have a domestic melt-blown fibre supplier, creating supply and price risks.”

In February 2021, prices for melt-blown material were about $8.50 per pound, approximately double what Medicom had been paying before the COVID-19 pandemic. Suppliers required a 12-month “take-or-pay” contract from customers to assure supply. Guillaume expected that it would be 2023 before prices returned to pre-pandemic levels.

Concerned about the risks for supply, especially for the new mask manufacturing plant in Montreal, Ronald asked Guillaume to evaluate the alternative of opening a plant to produce melt-blown material. The plant would initially support Medicom’s Canadian requirements and would have the option of expanding capacity to support requirements at the company’s plants in the United States and Europe. Guillaume commissioned a study to examine the capital costs for the plant—including land, building, and equipment—and the operating costs (see Exhibit 8). The Canadian government was prepared to provide financial support for a portion of the capital investment. The report showed that a plant with an initial annual capacity of 480 tonnes would cost Medicom $7.045 million.[[6]](#footnote-6) The plant could accommodate a maximum of three additional lines, at a cost of $2.575 million each, representing a maximum capacity of 1,920 tonnes per year (see Exhibit 9).[[7]](#footnote-7) Guillaume commented, “We expect our internal requirements for North American and Europe will eventually stabilize at 1,000 to 1,200 tonnes per year, after demand from the pandemic subsides. This volume could support at least three lines. Any surplus production could be sold to third parties at prevailing market prices.”

Raw material, energy, and labour represented the main production costs. Labour costs were a fixed expense. Sixteen people, including 12 operators, were required to operate the plant, regardless of the production volume and the number of lines. Similarly, administrative staff would consist of nine people (see Exhibit 10).

Raw material and energy costs were variable. Polymer resin was the main raw material used in the production process. Each pound of finished melt-blown product required 1.5 pounds of polymer resin at a cost of $1.10 per pound. Prices of polymer resin fluctuated directly with the price of oil. Production was an energy-intensive process, which represented a cost of $1.20 per pound of finished product.

EVALUATING SUPPLY ALTERNATIVES

As Guillaume reviewed the report for a new melt-blown facility, he reflected on the pressures facing the company:

We have tripled our global mask manufacturing capacity based on an expectation for continued strong demand. If we get a government order to deliver 100 million masks or 200 million masks, our supply chain must be able to respond without compromising financial performance. One of the lessons from the COVID-19 pandemic is the effect of supply chain disruptions on delivery continuity. Raw material supply represents a potential constraint. In addition to providing supply chain resiliency, controlling our own melt-blown supply will enable us to develop proprietary product and process innovation. However, in-sourcing melt-blown production comes with significant costs and risks, including our lack of experience manufacturing this material. A second option is to continue working with our existing suppliers to identify opportunities to reduce risks of disruptions. This approach may involve long-term agreements and holding safety stock inventory. Our industry is characterized by large swings in demand: how do we remain cost competitive during periods of normal while being agile enough to meet a demand surge during the next global health crisis? It is a tough balancing act.

Guillaume was scheduled to meet with Ronald on February 24 to discuss alternatives and review his recommendations. He knew that Ronald expected a thorough evaluation of the options before making a final decision.

**EXHIBIT 1: GLOBAL MARKET FOR HEALTHCARE PPE BY PRODUCT CATEGORY**

**(IN US$ MILLIONS)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Product Category** | **2019** | **2020** | **2025** |
| 1  2  3  4  5  6  7 | Face Masks  Protective Clothing  Respiratory Protection  Eye and Face Protection  Hand Protection  Foot Protection  Head Protection | 3,424.1  1,043.8  894.7  860.4  823.4  676.8  276.6 | 13,696.2  1,400.6  1,228.1  4,019.6  1,099.8  748.7  301.4 | 5,172.2  1,594.8  1,364.0  1,323.6  1,284.8  924.2  419.8 |
|  | Total | 7,999.7 | 22,494.4 | 12,083.4 |

Source: BCC Publishing, *Healthcare Personal Protective Equipment: Global Markets*, Report MDS013A (Wellesley, MD: BCC Publishing, 2020), p. 7.

EXHIBIT 2: GLOBAL MARKET FOR FACE MASKS BY REGION

(IN US$ MILLIONS)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Region** | **2019** | **2020** | **2025** |
| 1  2  3  4  5 | North America  Asia-Pacific  Europe  South America  Middle East & Africa | 620.4  1,648.0  786.8  192.8  176.1 | 2,468.1  6,589.0  3,165.0  772.1  702.0 | 906.2  2,482.7  1,228.9  293.8  260.6 |
|  | **Total** | **3,424.1** | **13,696.2** | **5,172.2** |

Source: BCC Publishing, *Healthcare Personal Protective Equipment: Global Markets*, Report MDS013A (Wellesley, MD: BCC Publishing, 2020), p. 18.

EXHIBIT 3: MEDICOM MASK MANUFACTURING CAPACITY

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **2019** | **2021** | **Increase**  **(%)** |
| Asia | 1,650 | 2,300 | 39% |
| Europe | 325 | 2,200 | 577% |
| North America | 115 | 1,600 | 1,291% |
| **Total** | **2,090** | **6,100** | **192%** |

Source: Company files.

EXHIBIT 4: HISTORY OF Medicom—KEY EVENTS

|  |  |
| --- | --- |
| **Year** | **Events** |
| 1988 | * Founded by Ronald Reuben in Montreal, Quebec, distributing SafeTouch brand medical gloves. |
| 1989 | * Expanded product range into infection control and sterile cotton products under the brand name SafeGauze. |
| 1997 | * Sourced production of masks and paper products to United Medical Enterprises (UME) plant in Augusta, Georgia. |
| 1998 | * Started manufacturing masks by acquiring the UME plant. * Launched medical division by acquiring AMD Ritmed. * Acquired Ritmed brand. * Reached CA$10 million in sales. |
| 1999 | * Set up Medicom BV in the Netherlands, targeting European market. * Moved into making private labels for nonwovens and cotton rolls. |
| 2000 | * Set up Medicom Asia in Hong Kong, targeting the Asian markets. |
| 2002 | * Opened a manufacturing plant in Shanghai, China. |
| 2003 | * Formed Medicom Japan in Kobe, Japan, by acquiring a local distributor. |
| 2008 | * Reached CA$100 million in sales. |
| 2009 | * Acquired a factory in Yilan, Taiwan. |
| 2010 | * Opened a sales and distribution centre in Kiev, Ukraine. |
| 2011 | * Acquired Kolmi-Hopen, a manufacturer of surgical and industrial face masks, located near Angers, France. * Acquired Hopen brand. |
| 2012 | * Got the first apparel patent for its innovation Ritmed Versa Gown. |
| 2016 | * Merged AMD Ritmed to form AMD Medicom. * Acquired Ocean Pacific, a leading Canadian supplier of single-use medical examination gloves. * Acquired Ocean Pacific brand. |
| 2018 | * Reached CA$350 million in sales. * Moved into a state-of-the-art corporate office at Pointe-Claire, Quebec. |
| 2019 | * Acquired Hedy Canada Inc., specializing in infection-control products for the dental industry. * Acquired Hedy brand. |
| 2020 | * Opened the first Canadian plant in Montreal, to manufacture face masks and respirators. * Entered into long-term agreements with Canadian provincial governments, for suppling personal protective equipment. * Entered into long-term agreements with the governments of the United Kingdom, France, and Singapore, to manufacture surgical and respirator masks. |

Source: Company files.

EXHIBIT 5: MEDICOM MANUFACTURING AND DISTRIBUTION FACILITIES

|  |  |
| --- | --- |
| **Head Office** | **Canada** |
| Mask Manufacturing Plants: 13 | Canada, China (2), France (2), Germany, Hong Kong, Netherlands, Singapore, Taiwan (2), United Kingdom, and United States |
| Sales/Distribution Offices: 15 | Australia, Canada, China, France, Germany, Hong Kong, Japan, Malaysia, Netherlands, Singapore, South Korea, Taiwan, Ukraine, United Kingdom, and United States |

Source: Company files.

EXHIBIT 6: MEDICOM REVENUES BY PRODUCT SEGMENT,\* (PERCENTage)

|  |  |  |  |
| --- | --- | --- | --- |
| **Segment** | **2018** | **2019** | **2020** |
| Masks | 13 | 14 | 38 |
| Gloves | 18 | 28 | 23 |
| Protective Products | 22 | 16 | 15 |
| Pouches and Reels | 11 | 14 | 7 |
| Nonwoven\*\* | 12 | 8 | 4 |
| Other | 24 | 20 | 13 |
| **Total** | **100** | **100** | **100** |

Note: \* Data for fiscal year: August 1 to July 31; \*\* Nonwoven includes products such as gauze and sponges

Source: Company files.

EXHIBIT 7: MEDICOM MELT-BLOWN DEMAND (In Tonnes)\*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | **2019** | | |  | **2021** | | |
| **Surgical** | **Respirator** | **Total** |  | **Surgical** | **Respirator** | **Total** |
| France | 145 | 185 | 330 |  | 660 | 385 | 1,045 |
| United Kingdom |  |  |  |  | 415 | 140 | 555 |
| United States | 110 |  | 110 |  | 360 | 80 | 440 |
| Canada |  |  |  |  | 330 | 220 | 550 |
| **Total** | **255** | **185** | **440** |  | **1,765** | **825** | **2,590** |

Note: \* 1 tonne = 2,205 pounds

Source: Company files.

EXHIBIT 8: INITIAL CAPITAL COSTS

|  |  |
| --- | --- |
| **Expense** | **Medicom Cost**  **(in CA$ Thousand)** |
| Land and Building | 1,650 |
| Site Preparation | 550 |
| Research and Development | 400 |
| Other Expenses | 520 |
| Equipment | 1,875 |
| Installation | 2,050 |
| **Total** | **7,045** |

Note: Initial investment for a plant with one line with capacity of 480 tonnes per year, including investment from Medicom after government subsidies.

Source: Company files.

EXHIBIT 9: COST OF ADDING ONE ADDITIONAL LINE

|  |  |
| --- | --- |
| **Expense** | **Medicom Cost**  **(in CA$ Thousand)** |
| Equipment | 1,000 |
| Installation | 1,025 |
| Site Preparation | 300 |
| Other Expenses | 250 |
| **Total** | **2,575** |

Note: Capacity of $480 tonnes per line, including investment from Medicom after government subsidies

Source: Company files.

EXHIBIT 10: DIRECT LABOuR AND ADMINISTRATION COSTS

|  |  |  |
| --- | --- | --- |
| **Administration** | **Number of Positions** | **Annual Cost (in CA$)** |
| General Manager | 1 | 275,000 |
| Operations Manager | 1 | 100,000 |
| Administration | 2 | 165,000 |
| Lab Technician | 2 | 260,000 |
| Business Development | 1 | 150,000 |
| Quality | 1 | 72,000 |
| Engineer | 1 | 80,000 |
|  | 9 | 1,102,000 |
|  |  |  |
| **Direct Labour** |  |  |
| Machine Operators | 12 | 575,000 |
| Supervisor | 1 | 82,000 |
| Maintenance | 1 | 95,000 |
| Warehouse | 2 | 96,000 |
|  | 16 | 848,000 |
| Total | 25 | 1,950,000 |

Source: Company files.

1. All currency amounts are in CA$ unless otherwise specified. [↑](#footnote-ref-1)
2. BCC Publishing, *Healthcare Personal Protective Equipment: Global Markets,* Report MDS013A (Wellesley, MA:BCC Publishing, July 2020), p. 32. [↑](#footnote-ref-2)
3. Ibid, p. 31. [↑](#footnote-ref-3)
4. Yuka Hayashi, “Millions of Counterfeit Masks Flooded U.S. Customs Facilities Last Year,” *Wall Street Journal*, February 4, 2021, accessed February 16, 2021, https://www.wsj.com/articles/millions-of-counterfeit-masks-flooded-u-s-customs-facilities-last-year-11612436403; Mark Maremont, Austen Hufford, and Tom McGinty, “U.S. Pays High Prices for Masks From Unproven Vendors in Coronavirus Fight,” *Wall Street Journal*, April 18, 2020, accessed February 16, 2021, https://www.wsj.com/articles/u-s-pays-high-prices-for-masks-from-unproven-vendors-in-coronavirus-fight-11587218400#:~:text=The%20federal%20government%2C%20scrambling%2 0to,review%20of%20federal%20contracting%20data. [↑](#footnote-ref-4)
5. World Health Organization, “Archived: WHO Timeline—COVID-19,” World Health Organization, April 27, 2020, accessed August 20, 2020, https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19. [↑](#footnote-ref-5)
6. 1 tonne = 1,000 kilograms, or 2,205 pounds. [↑](#footnote-ref-6)
7. Capital costs represented investment from Medicom after government subsidies. [↑](#footnote-ref-7)