

3M: Rethinking regionalisation to adapt to supply chain disruptions



3M: RETHINKING REGIONALISATION TO ADAPT TO SUPPLY CHAIN DISRUPTIONS

The best and hardest work is done in the spirit of adventure and challenge. Mistakes will be made. But if a person is essentially right, the mistakes he or she makes are not as serious in the long run as the mistakes management will make if it undertakes to tell those in authority exactly how they must do their jobs.

-William McKnight, Former CEO and Chairman, 3M

It was April 2022, and Singapore was buzzing with executives going back to work-from-office. Kevin McGuigan, former Vice President & Managing Director of 3M Southeast Asiaⁱ, sipped his morning coffee as he read a news report on the ongoing supply chain crisis in Asia. 'Asia has experienced an outsized impact in comparison with the rest of the world, stemming from global container shortages, due to the region's stronger recovery at the onset of the pandemic. This has led to lengthened turnaround times and a dramatic increase in ocean freight rates; trends that will collectively change the supply chain landscape and call for new strategies', read the report.ⁱⁱ 3M was heavily affected by these supply chain disruptions, and McGuigan wondered when his company, or for that matter other manufacturing companies caught in the supply chain tornado over the past few years, would be able to truly come out of it.

In 2020, when the COVID-19 pandemic unfolded, 3M had faced major hurdles in manufacturing, operations, and distribution, due to disruptions caused by the pandemic and a sudden spike in demand amidst a reduced workforce and other challenging working conditions. The company implemented many strategies to cope with the challenges posed by the pandemic. These included a new operating model, digitalised information sharing on a global basis, and expansion of its supplier base.

During early phase of the pandemic, the company struggled to cope with an almost 400 per cent increase in demand for some of its healthcare products like N95 masks and Personnel Protective Equipment (PPE) and launched a new operating model to realign its business group and streamline operations. A year prior to that, the company had embarked on a digital transformation journey and implemented organisation-wide enterprise resource planning (ERP) solutions to connect supply chains across its global operations. These initiatives, among others, had acted as a boon towards helping the company cope with the demand during the pandemic, and in 2020, the company had reported a less than satisfactory year-on-year sales growth of 3.5 per cent in safety & industrial, 1 per cent in healthcare, and 4.1 per cent in consumer product sectors, with a drop of 7.1 per cent in transportation & electronics.

This case was written by Professor Steven Miller and Lipika Bhattacharya at the Singapore Management University. The case was prepared 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.

Copyright © 2022, Singapore Management University

In 2021, there was a promising recovery and 3M reported robust sales growth of 7.8 per cent in safety & industrial, 8.6 per cent in healthcare, 9.3 per cent in the consumer sector, and 9 per cent in transportation & electronics. However, 2022 had brought in new worries with more supply chain issues and operational disruptions following fresh lockdowns in China, a January winter blizzard in North America and the ongoing Russia-Ukraine war.

As McGuigan contemplated the strategies to tackle the supply chain disruptions, he wondered if these current events would foster increased regionalisation amongst multinational companies like 3M. Separately, could further digitalisation and virtualisation of operations help alleviate some of the bottlenecks in the supply chain disruptions?

3M: History Steeped in Innovation

3M was established in Minnesota, U.S. in 1902 as the Minnesota Mining and Manufacturing Company. Over the years, the company earned a nickname of being the “innovation machine”, launching several pioneering consumer-oriented product families like Post-it® Notes and Scotch-Brite™ hand pads, healthcare products under the Nexcare™ brand, and a wide range of highly specialised engineered materials used across a range of commercial and industrial application settings.

Fast forward to 2022, 120 years after its founding, 3M continued to stand strong as an ‘innovation machine’. The percentage of revenues fuelled back into innovation was around 6 per cent yearly, of which about half went into new product development and the rest into improvements related to supply chain technology, including manufacturing methods. As a testament to this investment, the company boasted over 55,000 products produced across more than 150 manufacturing facilities in 36 countries.ⁱⁱⁱ

3M in Singapore

3M’s roots in Singapore dated to 1966, when the company initially established its office in the country with eight employees, and gradually expanded to more than 1800 employees with multi-faceted operations. Its vision was to build local capabilities to serve local, regional, and global customers.^{iv} The company invested well over US\$ 0.7 billion (S\$1 billion) in Singapore to establish manufacturing, R&D, customer support, and operations facilities.^v

The multiple facilities were established across different parts of Singapore with the largest facilities clustered in the three areas of Woodlands (manufacturing plant and R&D centre), Tuas (manufacturing plant), and Ang Mo Kio (customer technical centre, supply chain, and business operations).^{vi} The regional headquarters were housed in a 10,000 square meters office space in Ang Mo Kio.

Built in 1998, the Woodlands plant produced optically clear adhesives, Command™ brand hooks and strips, custom flexible circuits, sintered abrasives, electronic adhesives, surface mount supply carrier and cover tapes, abrasive belts for fine finishing applications, and converted clean sanding discs for automotive applications for customers throughout Asia,

the U.S., and Europe. Over the years, the Woodlands plant was conferred with several awards including the Singapore Quality Award in 2003, Operational Excellence award in 2007, and the Green Mark Gold Award (by the Building and Construction Authority) in 2010.

The Tuas plant started production in December 2009 and manufactured specialty film products, respirators, polymer processing additives, and traffic safety systems for customers in Asia, Europe, and the U.S. This plant was also a zero-landfill site, where 100per cent of the waste generated was either converted into energy or recycled. Both plants had certifications in various international quality metrics including ISO 9001, ISO 14001, ISO 13485, and OHSAS 18001.

The R&D Centre in Woodlands focused on new products and technology platforms and performed multi-disciplinary research in the areas of smart urban solutions, electronics, optics, circuitry, adhesives, and coatings, specialising in 51 science-based technology platforms as well as analytical and weathering capabilities. The customer technical centre in Ang Mo Kio allowed visitors to explore 3M innovations and core technologies in product categories like abrasives, adhesives, and nonwovens, as well as learn about 3M's technologies and solutions in key industries like electronics, construction, and retail using interactive demos.

Singapore as a Regional Hub

3M's regional hub in Singapore came about because of the company's regionalisation strategy, whereby the International Office that managed regional operations was dissolved and the focus of operations was shifted from 'local for local' to 'region for region' for decision-making purposes.

A key reason for selecting Singapore as the regional hub was the city-nation's geographic location, which was ideal for serving the Asia Pacific region. Other reasons included its significance as a major transportation hub and trans-shipment port in the global supply chain ecosystem, strong national framework for protecting intellectual property (IP) rights^{vii}, language advantages, an educated workforce, and a supportive government.

The country's many benefits had been even more visible during the COVID-19 pandemic, when operations at its manufacturing facilities were extended to 24/7, supply chain issues were speedily managed and resolved through active involvement of the government, and products continued to be shipped from the country globally. This was especially important as many other countries had imposed export and import restrictions on products like respirators, face masks, and other PPE gear.^{viii,ix} Because of Singapore's stability as a hub, 3M had also launched a global supply chain hub, managed from Singapore in 2021. McGuigan explained,

Singapore is one of the most advanced countries in the world when it comes to infrastructure, technology, manufacturing, and supply chain. When you layer on top of this the fact that the country is geographically small, it makes it easier to collaborate with the Government, other multinationals (MNCs), small and medium enterprises (SMEs), etc. Singapore also has an amazing pool of talent and

start-up companies that offer opportunities for potential joint ventures that can help to supplement our efforts to develop and manufacture differentiated solutions for our customers.

During the COVID-19 pandemic, the Singapore Government has done an amazing job supporting our efforts to help protect healthcare workers and other essential workers around the world. We manufacture N95 respirators at our manufacturing facility in Tuas, which supplies these critical pieces of Personal Protective Equipment to countries in Asia Pacific. While some countries in the region enacted policies that prohibited import or export of essential goods, Singapore never restricted our ability to operate our supply chain and also serve other countries.

Moreover, stable and transparent legislative and regulatory frameworks, access to talent, and supportive taxation policies also added to Singapore's attractiveness as a hub. Patricia Lim, 3M's Asia Acquisition Leader, felt that human talent was a key appeal in Singapore,

Singapore offers a diverse talent pool at entry-level with good English communication skills and solid understanding of international work culture. As for mid to senior leadership level, Singapore offers talent with strong regional and international management experience.

Singapore also provided a safe and secure environment for registering Intellectual Property (IP) – second to none in the region. The robust IP regime in Singapore played an important role in key investment projects, particularly those dealing with high-value and knowledge-intensive products, like optically clear adhesives, N95 respirators, and specialty industrial tapes and adhesives. Regulatory support for IP also strengthened the country's position as a global innovation hub.^x

As a world-renowned port and logistics hub, Singapore had invested heavily in tech tools like AI and blockchain to ensure that ships could arrive and depart on time, had short waiting times, and lower fraud related risks. Overall, executives in the company felt that the city's advantages as a global 'port hub', its technology infrastructure, availability of human talent, and political stability guaranteed its long-term sustenance as the Asian hub.^{xi}

3M's Global Expansion Strategy

3M initially adopted a 'localisation' strategy ('local-for-local') for global expansion that allowed its international offices to curate its own products for their specific customers and territories, rather than simply selling products manufactured in the U.S. The global growth initiatives had started as early as 1922, when 3M extended its footprint to Europe.

Regionalisation

Once revenues from international operations started growing, 3M adopted a regionalisation strategy to manage the company's international growth. A key benefit of regionalisation was footprint optimisation, which helped minimise handoffs due to scale, enabling efficiency in the manufacturing process. Footprint optimisation also allowed the firm to concentrate activity in its most capable operations, which generated the productivity and velocity that supported growth. For example, its largest plants, on average, were as much as 40 per cent more productive than the smaller facilities.

Larger plants were also more efficient from a cost perspective and enjoyed roughly 15 per cent faster inventory turnout. The same phenomenon was true for the distribution centres (DC's), where larger, regional DCs enjoyed lead times that were up to 20-25 per cent faster than smaller, local operations. Raymond Tan, Director of APAC Manufacturing & Supply Chain, explained,

Our footprint optimisation strategies are constantly evaluated and executed. For example, automotive films are produced at our Japan factory and shipped to multiple locations, including Singapore, China, India, Thailand, and Indonesia. Recently, some product portfolios have been transferred to plants in India and China to accelerate localisation to improve speed and efficiency. In another example, traffic safety reflective sheet was a solo supply from the U.S. and shipped globally including APAC. We then made large investments in Singapore's plants and built the product's manufacturing capability here to serve the APAC customers.

The second benefit was related to remaining competitive; regional management of product development and R&D allowed the company to be closer to its customers and its regional and local markets, find new opportunities and retain its talent. McGuigan explained,

Competition is big - we have many competitors. We have global competitors who operate like 3M, and regional players who are fast followers and come up with similar products that we have launched in a short span. While they do not match 3M's product quality, they are marketed at much cheaper prices, so sometimes we have to adjust our prices to remain competitive.

While we have many long-standing customers in all markets, due to competition and copycat products, we have to be constantly on our toes. We go to our biggest customers and keep informing them why they need to do business with us, and what more we can do to help them.

We are also constantly innovating new product categories at a regional and local level and creating new opportunities.

Finally, retaining employees in certain markets can be a tough challenge, and we keep coming up with new policies to develop and retain our staff and let them know they are valued.

Thirdly, a distributed manufacturing strategy allowed the firm to serve its customers on a regional level, while enabling diversified production and reducing local risks (like sudden climate or political events) on its operations.

Fourthly, regional supply chain centres of excellence (COE) supported expansions into new markets by consolidating and managing the supply chain with a regional focus, thereby promoting better management of manufacturing and engineering activities, which in turn facilitated improvements in working capital requirements and overhead costs.

Transformation for Long-Term Value Creation

Despite successful growth using regionalisation strategies, 3M suffered a setback in April 2019 after a dip in reported earnings and a lower-than-expected growth prediction for the near future. The share price of the company's stock posted its biggest one-day drop in decades, falling nearly 13per cent after the company reported first-quarter results that fell short of analyst projections.

Soon after this setback, Mike Roman, the then newly appointed CEO of 3M, outlined a five-year transformation plan, which focused on the four key priorities of portfolio, innovation, transformation, and people & culture.^{xii} 3M launched a new operating model and accelerated its digital transformation initiative as part of this five-year plan, with a goal of positioning the firm for long-term growth and value creation.^{xiii,xiv}

Digital Transformation

As part of its digital transformation agenda, 3M launched several new initiatives to automate processes and improve efficiencies. In October 2019, it launched a digital transformation vision called PACESetter (acronym for Proprietary Process technology, Automated processes, Connected data, Efficiency, Safety and Sustainability) to support its various product lines to digitise and optimise manufacturing processes and build “factories-of-the-future.”

A few months later, the company also implemented an enhanced Enterprise Resource Planning (ERP) system to further align and integrate common front-end interfaces with back-end processes across supplier management, capacity planning, and network optimisation to promote supply chain efficiency. These enhancements enabled the company’s supply chain to talk directly with supplier systems and their factories, many of whom were also using the same SAP-based ERP systems.

For suppliers who used different ERP systems, a cloud middleware was used as a translation layer. This helped create transparency in 3M’s massive supply chain and provided a stronger foundation for enabling long-term transformation. As an enabler for this new ERP system upgrade, 3M also shifted its enterprise IT infrastructure to the cloud and chose Amazon as the enterprise cloud provider for supporting ERP and other aspects of its digital transformation efforts.^{xv,xvi}

Increased digitalisation provided several benefits. Senior executives in the company, including McGuigan and Tan, felt that friction in the supply chain occurred at the connection points, and part of that friction was due to a lack of “trust” across different internal and external groups.^{xvii} Digitalisation, common platforms, and more seamless data flow across both internal and external systems provided information that allowed different parties to avoid such frictions, improve transparency, and build trust. Suppliers could see 3M’s consumption needs, while the latter could get a peek upstream at supplier capacity. This helped to secure and protect supply even in situations when unexpected events occurred. The digitalisation efforts provided 3M with the much-needed agility during the pandemic, as Tan observed,

Agility within operation is critical to manage uncertainty in demand for all portfolios. One example is the mobilisation of resources by implementing multi-skill training/certification at the shop floor.

Standard operation procedures are managed as digital templates (using Dozuki) to help speed up the learning curve. 3M continues to evolve digital transformation at the shop floor (date automation, e-work flow, reporting) through automation of manufacturing process using robotic, camera inspections, sensing, and auto-guide vehicles.

Digitalisation also aided the company’s sustainability efforts. For example, a digital partner-to-partner information flow was implemented to enforce sustainable sourcing by working with paper suppliers

to track back the trees from which the products (like the Post-it® Notes) originated, improving the tracing of annual supply chain spend from 50per cent to 89per cent. The technology-involved bar codes were inserted into trees by forestry partners, scanned by loggers using handheld devices, and input into the ordering system to verify sustainable sourcing.^{xviii} 3M also partnered with not-for-profit organisations like Forest Trust^{xix} and cloud-based application provider Supply Shift to implement more sustainable supply chain practices and track responsible sourcing and traceability.^{xx}

New Operating Model

As part of its new operating model (announced in January 2020), 3M's existing five business groups were restructured and consolidated into four business groups and the approach to managing across global markets and supply chains was substantially changed. The restructuring was estimated to generate hefty pre-tax savings of about US\$350 million in two years, due to the consolidation of departments, streamlining of operations by eliminating redundancies, and positioning the company to capitalise on global trends. The operating model was backed by advanced analytics implementations to drive additional efficiencies, extend marketing capabilities based on data insights, and activate digital engagement with customers.

The four reorganised business groups - Safety & Industrial, Transportation & Electronics, Health Care, and Consumer Business Groups - all changed their go-to-market models so that each of these four major product-family groups would have end-to-end responsibilities for serving their customers. This contrasted with the prior approach, which involved a complicated matrix of marketing and fulfilment responsibilities for each 3M country subsidiary as well as for regional units. 3M believed this major change in its go-to-market approach would enable them to take greater advantage of global market trends spanning diverse areas such as e-commerce, personal safety, health care, automotive electrification, and home improvement.

To support the new operating model and ensure cross-functional efficiency, the company made enhancements to its business group support functions through three key initiatives. First, a new Enterprise Operations organisation was established, and manufacturing, supply chain, and customer operations were consolidated under this office to optimise the customer experience end-to-end. Second, a new global Corporate Affairs organisation was formed to focus on sustainability and advancing and protecting the company's brand and reputation in all regions of the world. Third, all existing corporate functions were realigned to drive more effective operations across geographies.

Each of 3M's four main business groups now had full responsibility and related decision-making authority for all facets of strategy, marketing, portfolio optimisation, and resource prioritisation for all the products within its product family across all global operations. Under the prior model, regional and country teams (which comprised 3M's prior International Operations organisation) were responsible for setting product and customer priorities in their respective regions and countries.

Additionally, all of 3M's international employees changed their reporting into either one of the four global business groups or into one of the few horizontal corporate groups. The intent was to eliminate the inherent tensions that would inevitably arise between country and region-specific organisations (who put their geographies first and foremost) and the globally oriented product-based business groups and the overall corporation strategies for seamless global integration and cross-geography synergy and adaptability.

New digital initiatives were also launched to support the new operating model. For example, a digital science centre was established in Dublin, Ireland (the corporation's first R&D technical centre focused on digital technology with an emphasis on digital data security and privacy, cloud-based solutions, and AI methods and applications) to work closely with the Health Care's Health Information Systems Division.^{xxi} A vendor-partnership with C3.ai was expanded to use the partners AI and IoT platform to develop and deploy AI-based applications for predictive healthcare and supply chain analytics.^{xxii} A vendor partnership with software company Palantir was announced to advance 3M's analytics capabilities for supply chain alerting, demand forecasting, and business planning technology.^{xxiii} Explaining how the new model affected various functions, Ang Chin Guan, an R&D Lab Manager based in 3M Singapore elaborated,

Generally, the R&D division operates as one global lab with shared resources of talent, lab facilities, etc. to meet customer needs regardless of local or regional context. For instance, we will align with local strategy to focus our R&D's support on prioritised segment with new application development.

These localised R&D's support can be replicated swiftly across the region for countries with similar aligned strategy. Most importantly, we align our R&D's support towards the division's strategy and focus on our customers' and governments' priorities (local or region).

From the go-to-market and supply chain perspective, the new operating model with its global orientation was implemented in a way that still had strong advantages for regional business development and operations. McGuigan elaborated,

Our Southeast Asia regionalisation effort took 3M from an individual, country-led model to a regional, Business Group-led model. This allows our four Business Groups to benefit from their combined scale across countries in the region to improve penetration.

From a supply chain standpoint, we have certainly been able to improve our demand planning – we have instituted a standard process as opposed to having differing country-specific methods, which was problematic and led to back-orders or excess stock. Manufacturing and supply chain continues to focus on driving end-to-end execution across our global supply chains by applying domain expertise by business function and delivering accelerated results against customer and business expectations.

The aim of all these transformation initiatives was to drive long-term value creation and enhance the financial, social, and environmental value of the company in the long run. Investment approaches in the supply chain were often based on the paradigm of efficient markets and maximising shareholder value/stock prices - but such approaches focused primarily on the financial value in their financial risk and return space. By contrast, 3M had implemented the above strategies based on the adaptive market hypothesis, which stated that it took time for markets to adapt to new risks (for example, carbon risk).^{xxiv} The objective was to optimise a careful balance of the three factors of shareholder, social, and environmental value for long-term sustainability.

Disruption Tests Resilience

Product Demand Surge

When the COVID-19 crisis unfurled, 3M struggled to meet the massive and unprecedented increase in demand for critical medical and other equipment in the early months of the pandemic. Amongst the host of products manufactured at the plants in Singapore were respirators and various types of PPEs.

Demand for these products surged by almost 400 per cent within the first year of the pandemic.^{xxv,xxvi} 3M rose to this challenge by mobilising resources and utilising agile processes, and quadrupled production over two years to meet the unprecedented demand.

In addition to high demand, 3M also faced supply chain disruptions and other challenges in manufacturing its products. A key challenge was the supply of raw materials during lockdowns as ports were facing major delays in sending and receiving shipments. For example, for the respirators, the elastic raw material came from China, but due to stringent lockdowns there, it was difficult to ship the materials. Another challenge was the requirement of safe distancing in factory premises that required adjustments to existing operations. Even the ability of factory workers to get to work was a problem, in particular for those who would normally travel across the Malaysia-Singapore border to commute to work in 3M factories in Singapore. These types of obstacles not only increased the cost of raw materials but also impeded the production of finished goods.

3M used multi-pronged strategies to adapt to the constraints emerging from the crisis. An Emergency Response Team (ERT) met daily to resolve supply chain issues on the ground and enable operational continuity in production facilities. Additionally, multiple ERTs were formed to coordinate strategies to manage supply chain operations, protect people, and ensure business continuity in Singapore and the region. The company's globally connected SAP platform helped in building transparency and flexibility for sourcing raw materials, packaging products, and logistics.

Immediate short-term strategies focused on 30-, 60-, 90-day cycles of planning and management of supplies were implemented to cope with the uncertain conditions. In addition, additional suppliers were on-boarded to help alleviate issues where demand far exceeded supply or where there were export restrictions. For resolving lockdown-related distribution issues for critical products like respirators and protective gear, a strategic decision was made to use airfreight and absorb various costs when other channels (like ships and road transport) became impossible or difficult to use. The tier meetings with global division planning helped forecast based on a 30-, 60-, 90-days' time frame, as lead times would change based on the mode of transport. Tan elaborated on the various strategies,

Firstly, we tried to rigorously follow our supply chain roadmap and focused on supply chain regionalisation. Secondly, we implemented sustainable optimisation practices using our global ERP capability, footprint optimisation (to improve customer service, accelerate operational efficiency, and increase cash flow) and disruptive technology deployment to provide highest quality and shortest lead times to our customers.

We also set up agility teams under the Project Management Office (PMO) to resolve service issues like container shortages, and a swarm team formed from respective functions to quickly-address the challenge, get necessary approvals from management, and execute resolutions.

During the lockdown, 3M also worked with the Singapore government to provide in-country accommodation and other support to Malaysian workers who otherwise commuted daily across the country border for their work. Policies for overtime work for production employees were also changed given the special circumstances to minimise the impact on manufacturing operations.⁶ The firm also hired more contingent workers to sustain 24/7 operations, implemented staggering shifts, reorganised how work was done to increase social distancing, and allowed remote working wherever possible.

Disruptive Supply Chain Impact

One of the biggest challenges that 3M faced during the pandemic was the delay in receiving and shipping goods due to disruptions in the global supply chain because of reduced manpower, container shortages, and logistics bottlenecks at major ports worldwide. Singapore, as a key node in the global supply chain, was not immune to these disruptions. Congestion at upstream ports caused inbound ships to arrive off-schedule at the Singapore container terminals, thereby propagating delays to outbound ships. Globally, shipping vessel schedule reliability fell from an average of 75 per cent to 35 – 40 per cent in 2021, and ships arriving at Singapore were late by an average of 7.5 days.^{xxvii}

Additionally, the company faced challenges due to the global issue of semiconductor shortages, as the semi-conductor industry faced massive production shortages due to long-standing issues within the industry.^{xxviii} 3M suffered production cutbacks, as its major industrial customers produced fewer vehicles, washing machines, and other devices that used semi-conductors as a component due to the chip shortage. The semiconductor shortage also impacted businesses that did not directly rely on computer chips; for example, 3M's paint manufacturing business was impacted due to reduction in sales of glass, paint, and industrial sandpaper due to the chip shortage.

Another global event that threatened to impact global supply chains towards the end of February 2022 was the escalation of the Russia-Ukraine conflict, which led to economic sanctions on Russia^{xxix} and restrictions on various cross-border flows. This resulted in a wide range of new supply chain shocks, price hikes and disruptions.^{xxx} Sea cargo ports had to now deal with a new wave of complications due to the propagating restrictions and delays, further exacerbating port congestion, higher freight fees and longer transit times.^{xxxi, xxxii} Other geopolitical tensions like the ongoing trade conflict between the U.S. and China also negatively affected the supply chain crisis.

To cope with some of these new challenges, 3M used cross-border trucking to mitigate high air freight costs from China to selective countries in Southeast Asia. The company also tried to get more allocation on constrained transport lines, and advance vessel booking of up to two months to minimise supply gaps.

The Right Strategy?

McGuigan remained convinced that the short-term strategies to cope with the crisis, and the long-term strategies to create value, such as the investments in digitalisation and the expansion of supplier pools, were good risk mitigation measures for future resilience. The approach taken, however, does beget further questions for deeper examination. For instance, it remains to be seen how the firm's regionalisation strategy has to adapt to remain relevant for the next few years as well as for the longer run. And while it is a given that digitalisation and further technology enablement can help with these adaptations, the possibilities for how to harness such technology-based capabilities are so vast that the choices of where and how to focus such efforts are not obvious.

What remained clear was that the aim of the most recent wave of corporate transformation was to energise and drive long-term value creation. 3M's approach to strategy and supporting investments seemed to be motivated by a broader mindset to make the organisation more adaptable and agile to uncertainties and market changes while still being attenuated to financial market realities.

This was in contrast to the traditional approach undertaken by most corporations which is to view financial investment approaches, including supply chain investments, primarily through the lens of the theory of efficient markets and closely related principles of maximising shareholder value and stock prices. This approach is predicated on assumptions of decision makers being able to logically and rationally optimise choices to maximize profits in a world where the nature of uncertainty could be assumed to be understood. Given how uncertain and unpredictable the global business environment had become in recent times, perhaps 3M had broadened the conventional notion of value optimisation to include investments for adaptability and resilience as a hedge against the unforeseeable as well as for efficiently generating profits under more stable and predictable conditions.

ABOUT THIS CASE STUDY

This abridged case study was jointly developed by the Singapore Economic Development Board (EDB), in partnership with the Singapore Management University and 3M.

ABOUT THE AUTHORS

Professor Steven Miller

Dr Steven Miller is Professor Emeritus of Information Systems at Singapore Management University. He served as Founding Dean of SMU's School of Computing and Information Systems for over 13 years. He also served as SMU's Vice Provost for Research for eight years. He continues to do advisory work for several companies and government agencies in Singapore related to digital transformation, AI applications and deployments, and organizational learning and capability building. He recently co-authored the book "Working With AI: Real Stories of Human-Machine Collaboration" with acclaimed writer Thomas H. Davenport, which was published by MIT Press in September 2022.

Lipika Bhattacharya

Lipika Bhattacharya is the Assistant Director with the Centre for Management Practice, Singapore Management University and is an award-winning case author who has written over 40 business case studies. Prior to her stint in academia, she worked in the technology sector, as a Regional Director, Southeast Asia, with IBM Singapore and as a Project Manager with Keane Inc., in Nashville, U.S. for over 15 years.

ABOUT THE EDB

The Singapore Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry, is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. We undertake investment promotion and industry development, and work with international businesses, both foreign and local, by providing information, connection to partners and access to government incentives for their investments. Our mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore. grow their top line through establishing and deepening strategic activities in Singapore to drive their business, innovation, and talent objectives in Asia and globally.

For more information on EDB, please visit www.edb.gov.sg.

Discover how EDB can facilitate your business expansion into Singapore and Southeast Asia, please visit: <https://www.edb.gov.sg/en/our-industries/headquarters.html>

References

- ⁱ In May 2022, Kevin McGuigan took on a new role in 3M as the Global Vice President Bonding & Converter Solutions.
- ⁱⁱ Thomas Knudsen, "Shaping Southeast Asia's Supply Chains in 2022", Business Times, April 11, 2022, <https://www.businesstimes.com.sg/asean-business/shaping-southeast-asia%E2%80%99s-supply-chains-in-2022>, accessed May 2022.
- ⁱⁱⁱ 3M, Annual Report 2018, <https://investors.3m.com/financials/annual-reports-and-proxy-statements/default.aspx>, p. 13, accessed May 2022.
- ^{iv} 3M, "3M Factsheet (about Singapore)", <https://multimedia.3m.com/mws/media/18399370/3m-factsheet.pdf>, viewed 16 June 2022.
- ^v Economic Development Board of Singapore, "3M", <https://www.edb.gov.sg/en/our-industries/company-highlights/3m.html>, viewed 16 June 2022.
- ^{vi} 3M, "3M Factsheet (about Singapore)", <https://multimedia.3m.com/mws/media/18399370/3m-factsheet.pdf>, viewed 16 June 2022.
- ^{vii} US Department of Commerce, International Trade Administration, "Singapore - Country Commercial Guide: Protecting Intellectual Property Rights," updated August 13 2021, <https://www.trade.gov/country-commercial-guides/singapore-protecting-intellectual-property>, viewed 13 June 2022.
- ^{viii} Reuters, "WTO Report Says 80 Countries Limiting Exports of Face Masks, Other Goods", June 13 2020, <https://www.reuters.com/article/us-health-coronavirus-trade-wto-idUSKCN2253IX>, viewed 13 June 2022.

-
- ^{ix} OECD, "The Face Mask Global Value Chain in the COVID-19 Outbreak: Evidence and Policy Lessons", May 04 2020, <https://www.oecd.org/coronavirus/policy-responses/the-face-mask-global-value-chain-in-the-COVID-19-outbreak-evidence-and-policy-lessons-a4df866d/>, viewed 13 June 2022.
- ^x Dominic Low, "10-Year Plan to Boost Singapore's Position as Hub for Intangible Assets and Intellectual Property", The Straits Times, Apr 26, 2021, <https://www.straitstimes.com/singapore/10-year-plan-to-boost-singapores-position-as-hub-for-intangible-assets-and-intellectual>, accessed May 2022.
- ^{xi} Premier Global Hub Port, Maritime and Port Authority of Singapore, 2022, <https://www.mpa.gov.sg/web/portal/home/maritime-singapore/introduction-to-maritime-singapore/premier-hub-port>, accessed May 2022.
- ^{xii} Carl Surran, "3M Stuck with Supply Chain Problems for the Foreseeable Future", Seeking Alpha, Apr 26, 2022, <https://seekingalpha.com/news/3827127-3m-stuck-with-supply-chain-problems-for-the-foreseeable-future-ceo-says>, accessed May 2022.
- ^{xiii} 3M, "3M Accelerates Pace of Transformation Journey", 28 January 2020, <https://investors.3m.com/news/news-details/2020/3M-Accelerates-Pace-of-Transformation-Journey/default.aspx>, viewed 23 June 2022.
- ^{xiv} 3M, "3M to Advance Operating Model, Improve Cost Structure, and Accelerate Innovation", December 3 2020, <https://investors.3m.com/news/news-details/2020/3M-to-Advance-Operating-Model-Improve-Cost-Structure-and-Accelerate-Innovation/default.aspx>, viewed 23 June 2022.
- ^{xv} Business Wire, "3M Selects AWS as Its Preferred Cloud Provider for Enterprise IT", <https://www.businesswire.com/news/home/20200217005043/en/3M-Selects-AWS-as-Its-Preferred-Cloud-Provider-for-Enterprise-IT>, February 17 2020, viewed 23 June 2022.
- ^{xvi} Stuart Lauchlan, Diginomica, "Beyond PostIt Notes and Scotch Tape - 3M Transforms into a Digital Product Company with AWS", <https://diginomica.com/beyond-postit-notes-and-scotch-tape-3m-transforms-digital-product-company-aws>, December 15 2021, viewed 23 June 2022.
- ^{xvii} Steve Banker, "Digitization and the 3M Supply Chain", May 3, 2017, <https://www.forbes.com/sites/stevebanker/2017/05/03/digitization-and-the-3m-supply-chain/?sh=51fb940a41c1>, accessed May 2022.
- ^{xviii} Ibid.
- ^{xix} "Why Earthworm Exists", Earthworm, <https://www.earthworm.org/>, accessed May 2022.
- ^{xx} SupplyShift, "Know Your Supply Chain, Know Your Risk", <https://www.supplyshift.net/>, accessed May 2022.
- ^{xxi} Ireland Department of Trade, Enterprise and Employment, "New 3M Digital Science Community Established in Dublin Creating 100 New Jobs", June 24 2021, <https://enterprise.gov.ie/en/News-And-Events/Department-News/2021/June/20210624.html>, viewed 23 June 2022.
- ^{xxii} C3.ai, "3M Selects C3.ai As Strategic AI Software Platform", April 4, 2018, <https://c3.ai/3m-selects-c3-ai-as-strategic-ai-software-platform/>, viewed June 23, 2022.
- ^{xxiii} Palantir, "Palantir and 3M Expand Relationship to Build Dynamic Supply Chain", February 2021, <https://www.palantir.com/newsroom/press-releases/palantir-and-3m-expand-relationship-to-build-dynamic-supply-chain/>, viewed June 23 2022.
- ^{xxiv} Andrew W. Lo, "The Adaptive Markets Hypothesis", The Journal of Portfolio Management, Issue 30, 2004, <https://jpm.pm-research.com/content/30/5/15>, accessed May 2022.
- ^{xxv} Katherine Brock, "Motivating, Momentous, Masterful: What Businesses Can Learn from 3M in Light of the COVID-19 Pandemic", Journal of Business & Intellectual Property Law, April 5, 2021, <http://ipjournal.law.wfu.edu/2021/04/motivating-momentous-masterful-what-businesses-can-learn-from-3m-in-light-of-the-covid-19-pandemic/>, accessed May 2022.
- ^{xxvi} Ovais Subhani, "Surviving Supply Chain Shocks Caused by Covid-19 Pandemic", Enterprise Singapore, 15 June, 2020, <https://www.enterprisesg.gov.sg/media-centre/news/2020/june/surviving-supply-chain-shocks-caused-by-covid-19-pandemic>, accessed May 2022.
- ^{xxvii} Aqil Haziq Mahmud, "Singapore Port to Help Ease Global Supply Chain Crisis, but It Comes at a 'Cost'", ChannelNewsAsia, Oct 21, 2021, <https://www.channelnewsasia.com/singapore/singapore-ease-global-supply-chain-crisis-cost-chee-hong-tat-2257852>, accessed May 2022.
- ^{xxviii} Bindiya Vakil and Tom Linton, "Why We're in the Midst of a Global Semiconductor Shortage", Harvard Business Review, Feb 26, 2021, <https://hbr.org/2021/02/why-were-in-the-midst-of-a-global-semiconductor-shortage>, accessed June 2022.
- ^{xxix} BBC News, "What Sanctions are Being Imposed on Russia over Ukraine Invasion?", May 31, 2022, <https://www.bbc.com/news/world-europe-60125659>, viewed 24 June 2022.
- ^{xxx} Ram Ganeshan and Tonya Boone, "How the War in Ukraine Impacts Global Supply Chains", International Politics and Society (IPS) magazine, April 26 2022, <https://www.ips-journal.eu/topics/economy-and-ecology/how-the-war-in-ukraine-impacts-global-supply-chains-5894/>, viewed 24 June 2022; Jim Kilpatrick, Deloitte Insights, "Supply Chain Implications of the Russia-Ukraine Conflict", March 25 2022, <https://www2.deloitte.com/xe/en/insights/focus/supply-chain/supply-chain-war-russia-ukraine.html>, viewed 24 June 2022.
- ^{xxxi} Catalina Russu, Development Aid, "How Does the Russian Invasion of Ukraine Change Shipping and Freight Rates? | Experts' Opinions", May 13 2022, <https://www.developmentaid.org/news-stream/post/142729/how-does-the-russian-invasion-of-ukraine-change-shipping-and-freight-rates>, viewed 24 June 2024.
- ^{xxxii} IATA, "War in Ukraine and Omicron Weighs on Air Cargo", May 3, 2022, <https://www.iata.org/en/pressroom/2022-releases/2022-05-03-01/#>, viewed 24 June 2022.

Legal Disclaimer

Thank you for reading **3M: Rethinking regionalisation to adapt to supply chain disruptions** case study.

The Contents of this case study are provided on an “as is” basis without warranties of any kind. To the fullest extent permitted by law, EDB does not warrant and hereby disclaims any warranty:

as to the accuracy, correctness, reliability, currentness, timeliness, non-infringement, title, merchantability or fitness for any particular purpose of the Contents of this case study;

that the Contents available through this case study or any functions associated therewith will be uninterrupted or error-free, or that defects will be corrected or that this case study and the server is and will be free of all viruses and/or other harmful elements.

EDB shall also not be liable for any damage or loss of any kind, howsoever caused as a result (direct or indirect) of the use of the case study, including but not limited to any damage or loss suffered as a result of reliance on the Contents contained in or available from this case study.

The Contents on this case study do not constitute financial or other professional advice. If financial or other professional advice is required, services of a competent professional should be sought.

EDB reserves the right to update or modify this case study from time to time. EDB further reserves all rights to deny or restrict access to this case study to any particular person, or to block access from a particular Internet address to this case study at any time, without ascribing any reasons whatsoever.

EDB is not responsible for the contents of any linked site or any link contained in a linked site. The hypertext links provided herein are provided only for convenience and the inclusion of any link does not imply endorsement by EDB of the referenced site.

© 2023 Economic Development Board. All rights reserved.

This document or parts thereof shall not be reproduced in any form whatsoever without the prior written consent of EDB.



Contact Us

Singapore Economic Development Board

250 North Bridge Road
#28-00 Raffles City Tower
Singapore 179101



You may submit questions or comments via client_services@edb.gov.sg,
or sign up [here](#) to receive the latest updates on the Southeast Asian
business landscape.

All information is accurate as of March 2023.