

Best Strategies

**for Ensuring SME Business Continuity
in Advanced APO Economies**



The Asian Productivity Organization (APO) is an intergovernmental organization that promotes productivity as a key enabler for socioeconomic development and organizational and enterprise growth. It promotes productivity improvement tools, techniques, and methodologies; supports the National Productivity Organizations of its members; conducts research on productivity trends; and disseminates productivity information, analyses, and data. The APO was established in 1961 and comprises 21 members.

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BEST STRATEGIES FOR ENSURING SME BUSINESS CONTINUITY IN ADVANCED APO ECONOMIES

Best Strategies for Ensuring SME Business Continuity in Advanced APO Economies

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FOREWORD

The 2020 COVID-19 outbreak had a devastating impact on the world, halting or slowing almost all economic activity. The measures taken by many governments in response, such as social distancing and movement controls, severely impacted global supply chains. The past three years of the pandemic have reminded government officials and business leaders how closely interconnected the world's economies have become. The role of the state has become more critical than ever, and governments have offered financial support measures and policies enabling SMEs to survive.

Even during the pandemic, some enterprises managed to overcome adversity and not only survive but thrive, setting an example for others. This APO study of four developed members' emerging needs examines how resilience and innovation can serve as drivers for overcoming major crises, especially through digital transformation, efforts to retain existing customers, exploring new customers and markets, and introducing new business models. It also analyzes the differences and commonalities between developed and developing economies and the diversity of approaches adopted.

The APO extends sincere gratitude to Chief Expert Kyu Hwang Yeon, Investment Director, Apple Adventure, Seoul, Republic of Korea, and the national experts from the Republic of China, Japan, the Republic of Korea, and Singapore who conducted the research and wrote this publication. The APO hopes that *Best Strategies for Ensuring SME Business Continuity in Advanced APO Economies* will assist policymakers, entrepreneurs, and other stakeholders in building resilient, innovative, thriving economies capable of weathering any storm in an inclusive, sustainable future.

Dr. Indra Pradana Singawinata
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Tokyo

EXECUTIVE SUMMARY

Since the outbreak of COVID-19 in early 2020, 95% of countries worldwide have witnessed a decline in their Gross Domestic Product (GDP). While companies with substantial resources and steady demand could navigate the challenges and even grow their businesses, most struggled to adapt to the changing business environment swiftly. A sudden drop in demand or challenges in purchasing raw materials could mean the difference between survival and failure.

During times of extreme uncertainty, such as the Coronavirus pandemic, some companies managed to thrive and expand, while others faltered, shrinking or even going bankrupt. Business experts and observers have sought answers to the presence and extent of resilience. But what is resilience, and what does it entail? Simply defined, resilience is the ability to bounce back from adversity, accept and adapt to internal and external changes, and continue to develop. This concept extends beyond safeguarding existing value; it involves recognizing fresh opportunities and generating additional value. As the business landscape evolves, adaptability becomes paramount, with agility standing out as a key principle of adaptability.

Of the nine case companies from four countries that participated, two cases each were selected from the Republic of China (ROC), Japan, and the Republic of Korea (ROK), and three cases were studied for Singapore. The results of the APO member nations' emerging needs case study were surprising: successful SMEs in all four countries were most likely to adopt and apply the management initiatives of an agile organization. Almost all of them have adopted the management practices of agile organization, with hybrid and remote working emerging as the second most common form of management practice.

Investing in and expanding the use of digitization and digital transformation ranks as the third most common best practice to deal with COVID-19, at par with the adoption of new business models. On the other hand, the strategy of leveraging the extensive financial support and relief policies offered by governments showed the least adoption, necessitating a revision of the hypothesis set at the beginning of this case study. The representative SMEs that succeeded in cost efficiency by anticipating the scarcity of financial resources also demonstrated low adoption.

Meanwhile, the case studies reveal aspects beyond the scope of the management practices research framework: top management engagement and clear strategic direction play a key role in driving process improvement, motivating employees, and guiding decision-making. SMEs that emphasized a human-centered corporate culture and trust-based leadership could restore and exceed pre-pandemic levels of morale and productivity.

Case firms prioritizing product development, building strong technical expertise, and leveraging technology were successful in increasing their competitiveness and exploring new market opportunities. These successful firms also prioritized continuous learning and knowledge management to cultivate a flexible and capable workforce, minimizing risk and uncertainty during the crisis. Strategies such as enhancing online sales, establishing local manufacturing capabilities, and maintaining effective communication with suppliers contributed to a stable supply chain during the pandemic.

Active collaborations and partnerships with research institutions and experts played a crucial role in fostering innovation and sustaining growth. Even before the pandemic, SMEs that focused on preparing for future crises, effectively managed raw material costs, and adjusted their business strategies based on market trends and customer feedback demonstrated strong resilience. They were also adept in realizing and scaling economies of scale through the strategic utilization of digital assets, multimedia marketing, and a customer-centric approach to enhance satisfaction and trust in their brands.

To recap, companies that anticipated potential risks and took proactive steps to address them successfully managed the impact of the pandemic. This study, once again, highlights a common truth: preparing for and adapting to the unexpected could have helped SMEs mitigate disruption and effectively navigate difficult times.

INTRODUCTION

Overview

Background and Significance of the Study

The COVID-19 outbreak stalled socio-economic development across several sectors. However, the disruption brought about by the pandemic offered valuable lessons on how to sustain progress in the years ahead. The question of why certain firms not only survive but also thrive during challenging times can only be explored through successful examples. The factors that determine the resilience of firms in navigating turbulence could help in shaping their future success and inspire other companies to avoid downturns.

Ensuring that productivity enhancement remains relevant for socioeconomic progress requires identifying the challenges and needs of productivity. The global pandemic disrupted almost all aspects of life, causing a shift in the approaches and focus areas of productivity enhancement. For instance, digitalization has the potential to boost the productivity of a firm, but only under certain conditions. The pandemic also influenced the distribution of labor and capital across firms and sectors, with uncertain effects on productivity. Digitalization can also lead to wider gaps in skills that can result in job losses and a decrease in the productivity of the firms. These issues require in-depth analysis for firms to understand the measures required to ensure success in the post-pandemic era.

The research initially focused on identifying and examining the factors contributing to the success of high-growth private-sector firms in developed APO member economies. These factors were then summarized into methods that can be applied by other enterprises or member economies, enabling them to achieve similar success and support productivity enhancement. The research also assessed developed APO members' business resilience and innovation capacity and explored ways to strengthen them.

To document successful business models and practices, the project provides recommendations on approaches and techniques for efficacious business operations. This practical knowledge, drawn from real-world examples can be replicated and expanded upon, tailored to the specific business context in each APO member economy. This approach allows for the success to be spread across the region.

Objective and Scope of Research

This research aims to explore and draw insights from real-world examples of approaches and methods that could assist in overcoming large-scale challenges such as the COVID-19 pandemic. The following objectives were established for the research:

- a. Identifying the emerging needs for productivity enhancement by analyzing the success factors of firms from selected developed APO member economies in navigating the COVID-19 pandemic.
- b. Examining how the implementation of best business practices could impact productivity for participating members.

- c. Providing guidelines on successful business practices in private-sector firms for widespread adoption in APO member economies.

The scopes for achieving these objectives include:

- a. Business resilience and innovation.
- b. Best practices to enhance resilience in private-sector firms.
- c. Sustainable recovery in developed APO member economies.
- d. Current and future productivity enhancement needs.

Required Research Methodology

The research was commissioned under two components: In-country research and coordination meetings of experts, which are as follows:

In-country research: Each national expert will collect and analyze data, and then write a preliminary report based on the research framework circulated before the coordination meeting.

Coordination meeting of experts: A coordination meeting to finalize the research methodology and framework will be organized. The preliminary reports detailing country-specific situations will be presented in this meeting to receive feedback from the other experts.

Research Methodology Adopted

Although an initial research plan had been established to initiate the overall research process, adjustments were necessary due to limited resources, allowing for only 2~3 interviews with each case firm in this study. Instead of investigating all the essential factors that could help case firms in achieving sustainable recovery excelling further in their exceptional performance, certain adjustments were made. Therefore, the following approaches were used to design the research.

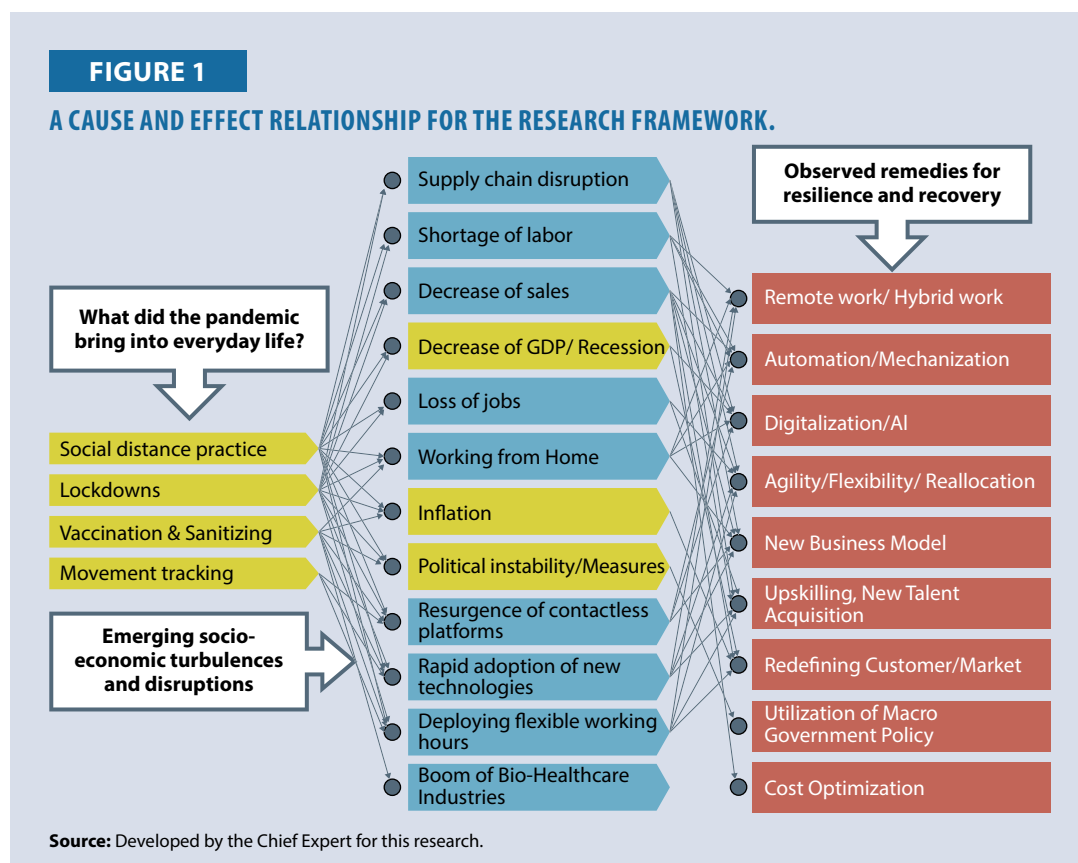
- a. Four developed member economies of APO identified two cases respectively.
- b. Based on the two cases, researchers from each member economy screened and selected companies that overcame the COVID-19 crisis and achieved breakthrough results during 2020–22.
- c. At least five candidate cases were identified before the final selection of the two cases from each participating member economy. The case companies with increased revenues, operating income, and number of employees were selected.
- d. To secure the five candidates, priority was given to companies that had won awards from productivity organizations in their respective nations.

To design this case study, significant events that occurred during the COVID-19 pandemic were first identified from literature and news reports, enabling the researchers to arrive at a causal hypothesis. In early 2020, many countries were taken aback by the rapid spread of coronavirus and implemented social isolation, movement control, and various prevention measures and policies. To

ensure that these regulations are strictly adhered to, some countries with capabilities, started monitoring the movement of individuals using IT technology [1].

The restriction of personal activities and lockdown eventually began to affect everyday life, which in turn had a massive impact on the economic environment of companies [4, 6, 8]. As in-person contact became difficult, many businesses that provided face-to-face services hit major roadblocks. To address these challenges, particularly since employees were unable to go out for work, organizations had to come up with ways to enable remote and Work-from-Home (WFH) facilities [14, 17].

These measures, coupled with difficulties in in-person services and employees transitioning to remote work, disrupted the supply chain and had widespread economic implications. This took a heavy toll on the national and business economies, causing unemployment and inflation, and over a year or two, countries lost their growth engine, leading to a decline in their GDP and a decrease in productivity [16, 17, 18, 20, 22, 23]. By identifying and connecting these chain-reactionary phenomena, the ripple effect of COVID-19 on the national economy was discerned. Various efforts made by Small and Medium-sized Enterprises (SMEs) to overcome these challenges were researched through literature and news articles [4, 6, 7, 9, 11]. Figure 1 illustrates how these cause-effect relationships drove a research framework with various remedies for recovering from the worst economic disruption.



To trace this chain reaction, a literature review of the various efforts and solutions, used by companies in response to the impact of COVID-19 was conducted. It examined how these efforts were linked to business resilience and innovation and how they could be integrated with other methods in the selected case companies of each member economy. The companies selected here are primarily those that successfully navigated the COVID-19 crisis in the past three years and achieved

remarkable results. It is believed that identifying patterns in the efforts and solutions prioritized and executed by these companies will provide valuable lessons for other companies in APO member economies. While the sample size and selection of two companies may not constitute a rigorous study representing SMEs with different economic and industrial characteristics, as well as the different situations of the selected economies, discovering common patterns in the successful case companies in each country can offer meaningful learning points.

The remedies or solutions in Figure 1 are conceptualized as a metaphor in which the SMEs impacted by COVID-19 are likened to patients urgently in need of medicine to cure the disease. In this context, remedies refer to management initiatives or best practices. A management initiative refers to a specific action or project undertaken by an organization's leadership or management team to drive change, improvement, or innovation within the organization. These initiatives are usually designed to address specific challenges, seize opportunities, enhance operational efficiency, or foster organizational growth.

Management initiatives can cover a wide range of areas, including strategic planning, process optimization, employee engagement, technology adoption, and more. These initiatives are often characterized by their goal-oriented nature and the allocation of resources, such as time, budget, and personnel, to achieve the desired outcomes. Meanwhile, best practice for management refers to a proven and generally accepted method or approach that has consistently delivered superior results in a particular area of management. These practices have been refined over time through experimentation, experience, and observation.

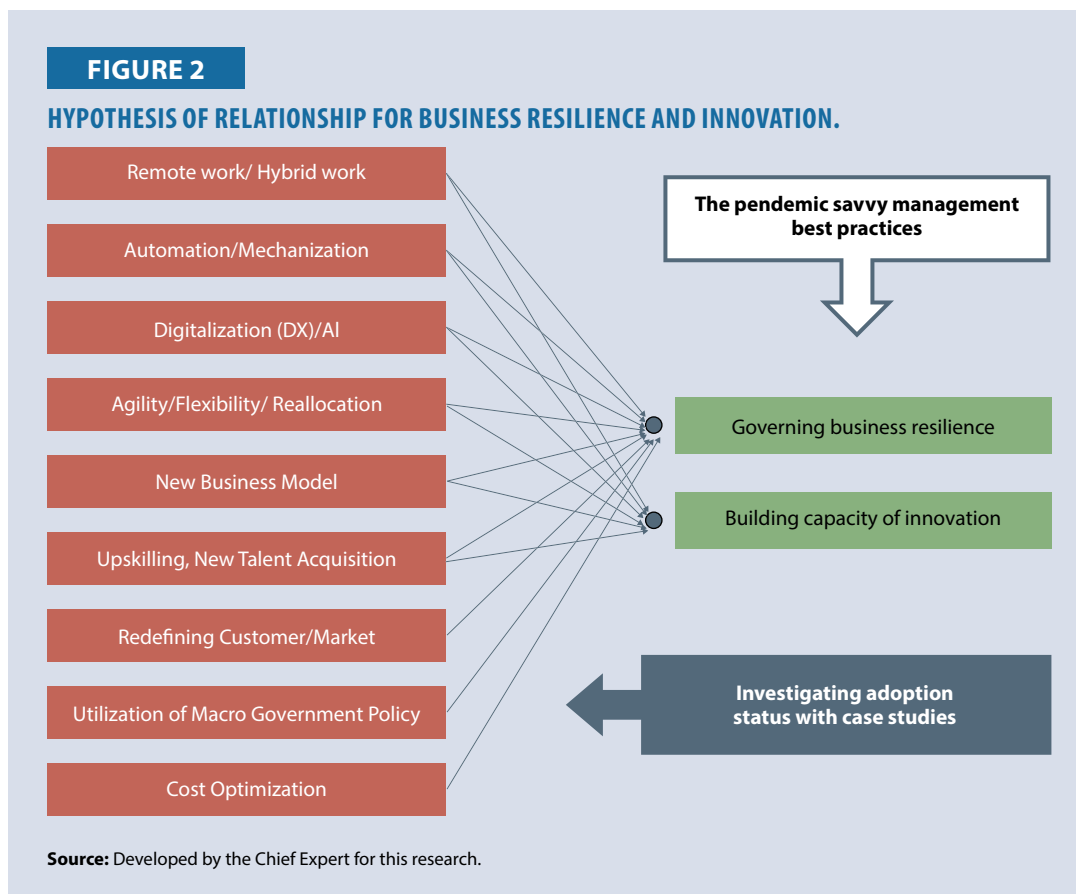
Best practices are considered benchmarks that the organizations can strive to adapt to achieve desired outcomes. However, in these case studies, management initiatives and best practices are used interchangeably, overlapping at times to reflect the real business environments' everyday lives. The term 'best practices for management' is used to describe a broader concept that includes various specific management initiatives to describe various paths of implementing business, whether related to resilience or innovation.

Another aspect explored in the case studies outlined in Figure 2 is the assessment of whether the identified prescriptions, rooted in cause-effect relationships, ultimately resulted in recovery from the impact of the pandemic. These prescriptions can be categorized into two main groups: those seemingly enhancing resilience and those employing innovative technologies such as digital transformation and automation. The study focused on SMEs from four of the developed economies that are members of the APO, aiming to understand how these two categories of prescriptions ultimately helped them overcome the impact of COVID-19 [4, 7]. Table 2 illustrates these two categories of management best practices and explains the hypothetical relationships of initiatives adopted by these companies to overcome the impact of COVID-19.

Utilization of Net Promoter Score

The Net Promoter Score (NPS) approach was applied to scrutinize the management initiatives of four developed APO member economies and analyze the initiatives aligning with best practices in business resilience and innovation.

NPS, a marketing methodology developed by Bain & Company Consulting, has gained widespread adoption, employed by startups and established firms alike to determine a customer's willingness to purchase or recommend a product or service. Known for its simplicity and transparent



methodology, NPS employs a scale of 1 to 10 to measure the willingness to buy or recommend a product or service to others. Respondents are categorized as ‘promoters’ who provide ratings of 9 or 10, ‘passives’ who give ratings of 7 or 8, and ‘detractors’ who give ratings of 6 or lower. The NPS is calculated by subtracting the percentage of detractors from the percentage of promoters gathered through the survey item [24, 25].

This method assumes a significant divergence between what people say and what they do when it comes to product development or product purchase. It posits that people are unlikely to purchase or recommend a product unless they express it on a scale of 9 to 10. In cases requiring swift investigation and analysis by experts, like this research, this method involves identifying and evaluating management initiatives based solely on each national expert’s insights and assessments. The purpose of applying this method is to pinpoint the most impactful initiatives to drive emerging patterns among the myriad of management initiatives found in the case study and ascertain their relationship to other cases.

Therefore, each country expert was tasked with listing several management initiatives evident in the case study. They were then prompted to indicate in a single table which management initiatives had the most significant impact on the company’s performance and efforts, assessed holistically by the expert. For each case firm, management initiatives scoring a 9 or 10 on the scale were extracted separately for comparative analysis across case studies. This approach represents a swift and efficient method that transforms qualitative information into quantitative data for comparison. While this approach may attract controversy and criticism, it is considered a sufficiently robust approach to extract clear emerging patterns from the case studies.

Literature Review

Pre-Pandemic Economic Landscape Among the Developed APO Economies

In 2019, the ROC, Japan, the ROK, and Singapore encountered diverse economic landscapes, each marked by distinct strengths and challenges.

Japan, being the world's third-largest economy, established its economic prominence through advanced manufacturing, technological innovation, and export-oriented industries. The automotive and electronics sectors played a critical role in its economic expansion. However, Japan grappled with persistent challenges due to an aging population and a declining birth rate, raising concerns about the continuity of sustained economic vitality.

The ROK, known for its technology-centric economic model, hosted global conglomerates like Hyundai, LG, Samsung, and SK Hynix. The nation's economic prosperity was intrinsically linked to its export-oriented ethos, spanning electronics, automotive manufacturing, and shipbuilding. This focus on exports helped build resilience and added dynamism to the Korean economy.

Singapore's strategic positioning as a global financial and trade hub facilitated its ascension as a burgeoning economic entity. The city-state's economic vibrancy stemmed from a robust financial services sector, strategic geographical advantage, and vibrant trade activities. However, Singapore's economic ecosystem exhibited vulnerability due to its high dependence on international trade, financial activities, and tourism, making the nation susceptible to the repercussions of global disturbances.

The ROC, which is heralded as a technological hub, gained recognition for its expertise in electronics and semiconductor production. Its reputation as an innovator and formidable manufacturing player, especially in semiconductors, distinguished the ROC's economic narrative. This export-oriented economic framework was notably influenced by the dynamics of global market demand, highlighting the interplay between its economic trajectory and global forces.

The Initial Shock in 2020

The year 2020 marked an unprecedented shock as the COVID-19 pandemic wreaked havoc on these economies. The onset of the pandemic led to a significant contraction of -4.3% in Japan's GDP, its most substantial decline since the global financial crisis [26]. This downturn resulted from reduced consumer spending due to stringent lockdown measures, complicated supply chain disruptions, and a rapid decline in tourist activity. Of particular consequence was the pronounced impact on the SME segment, a substantial component of Japan's economic fabric. These SMEs grappled with a twofold challenge: reduced demand and the complex logistical intricacies arising from supply chain disruptions. Adapting to the needs of remote work and digitalization further compounded these challenges as they navigated the complexities inherent in their conventional operational paradigms.

During the year the Korean economy also witnessed a contraction of 0.7%, primarily due to the waning global demand for key exports such as automobiles and consumer electronics [26]. Notably, the technology sector emerged as a beacon of resilience amid this economic adversity. Enterprises such as Samsung, fortified by their robust digital infrastructure, exhibited remarkable business continuity despite prevailing disruptions. Paradoxically, SMEs, particularly those that did not have robust digital capacities, faced challenges while adopting remote work and online operations, thereby grappling with multifaceted productivity challenges.

The universal impact of the pandemic reverberated significantly in Singapore, inducing a substantial contraction to -3.9% in its GDP, marking its most severe recession [26]. This distressing economic downturn was predicated on Singapore's pronounced dependence on international trade, the tourism sector, and air travel. Strict travel restrictions and global economic retrenchment further led to reduced trade flows and a contraction in tourism-related activities. Notably, the SME segment, a pivotal contributor to the nation's economic landscape, faced arduous hurdles in adapting to the digital paradigm and recalibrating its operations to meet the diminished consumer demand. To alleviate the predicament faced by SMEs during this period, the government responded swiftly by providing financial support packages and other initiatives.

In 2020, the ROC demonstrated commendable economic resilience, evidenced by a modest GDP growth of 3.11% [27]. This achievement was supported by effective pandemic control measures, coupled with robust demand for technology-centric products such as semiconductors. These products, pivotal to the ROC's exports, played a crucial role in attenuating the adverse economic impact. Despite initial challenges faced by SMEs in the ROC at the onset of the pandemic, those with technological and export-oriented focus were better equipped to navigate the uncontrolled environment. The adept integration of technology and export-focused strategies strengthened these SMEs against the prevailing economic headwinds.

Recovery and Resilience

In 2021, noticeable signs of recovery and resilience emerged, as each economy charted distinct trajectories. During the year Japan's GDP registered a growth of 2.1% [26], indicating a cautious resurgence. This rebound was propelled by heightened exports, resurgent domestic demand, and strategic governmental stimulus efforts. Despite these promising developments, apprehensions regarding the nation's protracted economic growth endured due to the challenges posed by its aging population and the imperative for structural reforms. SMEs in Japan, particularly those deeply rooted in traditional sectors, grappled with persistent challenges in adopting digital transformation and navigating the complexities arising from global supply chain disruptions.

The economy of the ROK showcased a noteworthy recovery in 2021, recording a growth rate of 4.1% [26], thereby exemplifying its resilience. Technology exports, especially semiconductor chips and consumer electronics, played a crucial role in this resurgence and exerted a pivotal influence in steering this revitalization. The nation's adept management of the pandemic, coupled with sustained global demand for technology products, significantly contributed to its resurgence. It is noteworthy that the SMEs in Korea skillfully adapted to digital platforms and embraced e-commerce, underscoring the seminal importance of technology adoption and adaptability.

The year 2021 witnessed Singapore's impressive resurgence, with the nation achieving impressive GDP growth of 8.9% [26]. This visible rebound was driven by a revival in manufacturing and trade activities. Central to this swift recovery were Singapore's strategic efforts to diversify its economic landscape and implement flexible economic policies. However, the pandemic accentuated the need to mitigate vulnerabilities arising from excessive dependence on tourism-related activities and bolster the digital resilience of SMEs. Instances of SMEs in Singapore swiftly pivoting to online platforms were evident, indicating their ability to adeptly respond to evolving consumer behaviors, thereby manifesting resilience amid adversarial circumstances.

The economy in the ROC continued its trajectory of prosperity in 2021, registering a robust growth of 6.53% [28]. The formidable semiconductor industry maintained its dominant influence on this

growth, effectively meeting global demand for technological components. The nation's effective management of the pandemic and its adept utilization of technological trends underscored its resilience. SMEs in the ROC equipped with technological proficiency were advantageously positioned, while those in more conventional sectors faced long-term challenges in aligning themselves with the demands of the digital economy.

Research Findings and Further Research

Initial Findings

1. Asahi Tekko Company Limited, a primary supplier to Toyota Motor Corporation in Japan, overcame the challenges of COVID-19 through their existing digital transformation practices. They implemented machine operation monitors, digital signboards, and cycle time monitoring to improve productivity. Line-stop meetings were conducted daily to address operational issues promptly. The company utilized Slack for remote meetings and problem-sharing, enabling faster actions by employees.

It also introduced machine image inspection, reducing inspection labor hours. These digital transformation initiatives resulted in a significant average productivity improvement of 43% across 100 production lines.

Overall, the company's top management played a crucial role in driving the digital transformation, leading by example and motivating employees. Despite not implementing specific measures for COVID-19, Asahi Tekko's ongoing digital transformation efforts proved instrumental in helping the company recover and surpass its pre-pandemic productivity levels.

2. Higuchi Manufacturing Company Limited successfully overcame the challenges of COVID-19 through proactive digital transformation initiatives. Before the pandemic, the company implemented an operational monitoring system, a unified system platform, and a remote monitoring application. It also introduced the 'Checkmaster' system for operational feasibility and improved product traceability.

Further, the company established the position of 'Bridge Engineer' to bridge the gap between the manufacturing floor and the system development department. They developed over 200 learning contents for metal processing and initiated a technology knowledge transfer system for Artificial Intelligence (AI). Higuchi Manufacturing's strong leadership and early adoption of digital technologies contributed to its ability to maintain and improve productivity during the pandemic. The focus on continuous improvement and innovation positioned it well to overcome the challenges posed by the pandemic.

3. RS Tech in Cheongju, the ROK, effectively tackled the COVID-19 pandemic's challenges through a multi-pronged approach. First, they empowered the workforce by fostering transparent dialogue, allowing employees to voluntarily defer a portion of their salaries, and providing hygiene materials, resulting in higher loyalty and job satisfaction.

Next, the company adeptly seized emerging business prospects, proactively adapting to changing customer and partner needs. They prioritized maintaining value to customers and devised strategies to manage value as a social enterprise, exemplified by initiatives addressing fine dust-related health concerns. It also demonstrated agility, leveraging the

pandemic as an opportunity for expanding its global market and product enhancement. Robust investment in research and development facilitated the creation of superior products, enabling sales growth across multiple countries.

Lastly, the company's commitment to talent acquisition and retention emerged as a key differentiator. Transparent communication, familial support measures, and significantly augmented salaries for skilled employees underscored RS Tech's dedication to employee well-being. This comprehensive approach enabled RS Tech to weather the impact of the pandemic and foster continued growth. The company's emphasis on employee empowerment, strategic agility, and nurturing a positive work environment showcase a commendable model for organizations navigating unprecedented challenges.

4. Megagen Implant in Daegu, the ROK's response to the COVID-19 pandemic, is underscored by a multifaceted strategic approach. First, they harnessed technological innovation and automation, boosting their competitiveness and productivity. Then, they strategically expanded their workforce, particularly in R&D and production, strengthening their foundation for sustained growth.

The company's global marketing endeavors gained traction, facilitated by expanding overseas branches and distributors. Their dominance in the European and American implant markets solidified Megagen's status as a top exporter. In a climate where face-to-face interactions were challenging, the company pivoted to emphasize online sales channels, bolstering its digital presence and effectively reaching customers.

Megagen's active pursuit of Mergers and Acquisitions (M&A) fortified its international market footprint. This strategic foresight provided them with a robust market position even in turbulent times. The company's commitment extended beyond financial growth, as evident in its dedication to corporate culture and Environmental, Social, and Governance (ESG) practices.

By designing implant ampoules for reuse and participating in medical support initiatives, Megagen showcased its societal responsibility. Despite pandemic-related constraints, Megagen's proactive measures resulted in remarkable growth. The management's focus on innovation, combined with astute workforce expansion, global outreach, digitalization, and strategic acquisitions, positioned them to weather challenges while maintaining a trajectory of success.

Furthermore, their corporate culture and ESG efforts underscored a commitment to holistic growth that resonated both within and beyond the organization, contributing to their ability to thrive amid uncertainty.

5. Phoon Huat Pte. Ltd., a Singapore-based food supplier specializing in baking ingredients, successfully navigated the challenges of the COVID-19 pandemic through various strategies. The company collaborated with suppliers to address packaging issues for retail customers and maintained effective communication. Employee training and cooperation facilitated the adaptation to digitalization and remote work arrangements.

The company intensified its e-commerce efforts, leveraging the increased demand for baking products. The company utilized its on-site studio for online demonstrations and classes, driving online sales. Digitalization was accelerated with integrated systems and

electronic shelf labels. Business excellence practices and risk management ensured resilience. Strategic partnerships, including acquiring a majority stake in Le Petit Depot, expanded product offerings, and optimized supply chain costs. These initiatives early digital adoption and dedicated employees enabled Phoon Huat to sustain revenue growth and expand its business overseas.

6. Omni-Plus System Pte. Ltd. (OPS), a Singapore-based SME, implemented various strategies to overcome the impact of COVID-19. They adopted an agile organizational approach, enabling two-way communication and a caring leadership style. OPS implemented a WFH policy and provided support to ensure minimal disruption. The company also accelerated digital transformation, investing in infrastructure and knowledge management systems.

Reskilling and upskilling programs were established to enhance employee capabilities. OPS leveraged its international footprint to offer diverse earning sources and assist multinational corporations with supply chain management. Collaborations and partnerships drove innovation, while participation in the Scale-up SG program facilitated growth strategies. Despite the pandemic, OPS achieved significant revenue growth. These initiatives showcased OPS's agility, investment in digital infrastructure and human capital, international diversification, and collaboration, enabling them to overcome challenges and seize new opportunities.

7. Memiontec Pte. Ltd., a water treatment company, overcame COVID-19 challenges by implementing strategic initiatives. The company continued critical services for water treatment plants and selectively worked on important infrastructure projects. Compliance with anti-contagion measures included regular testing and relocation of foreign workers. Collaboration and remote work were enhanced, and digital tools were adopted for design and engineering.

The company also diversified to expand its revenue streams by venturing into Build-Own-Operate-Transfer (BOOT) and Transfer-Own-Operate-Transfer (TOOT) projects, ensuring recurring income. Government assistance and collaboration helped replenish working capital. These initiatives enabled Memiontec to ensure business continuity, meet delivery requirements, and sustain revenue growth.

8. FY Furniture (FY), a Taiwanese SME, implemented strategic initiatives to overcome the impact of COVID-19. It opened a new branch in Kaohsiung, implemented digitalization, and integrated the Enterprise Resource Planning (ERP) system for improved operations. Its digital marketing strategy attracted over two million individuals and increased online and in-store sales.

Further, FY invested in marketing and digitalization and also maintained strong customer relationships. Employee training and work-life balance strategies improved service standards and employee satisfaction. The company complied with government policies, managed internal transactions effectively, and analyzed market trends. These initiatives helped FY sustain sales despite rising costs.

Overall, FY's actions included expansion, digitalization, employee training, compliance, and data-based decision-making. These strategies enabled the company to navigate the pandemic's challenges and maintain financial growth.

9. Pregetic Medical Health Co. Ltd. (PMH) successfully tackled the challenges of the COVID-19 pandemic through strategic management initiatives. The company upgraded its operating procedures, implemented epidemic prevention measures, and provided training to ensure employee and customer safety.

PMH employed a flexible consultation method to accommodate fluctuating demand, diversified their businesses, and focused on innovation and digitalization. It also integrated technology systems, offered at-home testing options, and adopted contactless payment methods. Government support and subsidies helped mitigate financial losses during the shutdown period.

The company optimized costs by integrating procurement and effectively managing inventory. Besides, it prioritized talent training and education, maintained a customer-centric approach, and added in-house meal services to generate additional income. Overall, PMH's agility, adaptability, and customer focus allowed them to navigate the pandemic successfully and position themselves for future growth.

Case Analysis of Management Initiatives

1. Arguably, the most interesting question to explore in this case research is the management initiatives adopted by high-performing SMEs in different countries during the pandemic. Reflecting on the various international political and economic impacts in the early stages of the pandemic, the question is what management initiatives these high-performing companies employ to successfully overcome these enormous challenges, and can similar patterns be observed in other countries?

Overall, nine SMEs from the four participating countries (the ROC, Japan, the ROK, and Singapore) were studied in this case analysis, which was conducted by dedicated experts from each country. The experts observed nine management initiatives under two main pillars of innovation and business resilience as a part of the overall research approach. They also evaluated which initiatives had a higher impact from an expert perspective.

The results showed that the management initiative mostly adopted and given the highest effort during the pandemic was the Agile Organization management initiative, evaluated by researchers in each country as being adopted by seven companies (77.8%). Hybrid and remote work closely followed the agile organization initiative, with six companies (66.7%) adopting it, while digitalization and initiatives to build new business models ranked as the third most popular management initiative with five companies (55.6%) adopting it.

On the other hand, the use of various financial support packages and policy support for SMEs and hard-hit industries by governments during the pandemic was low (22.2%). The assumption that SMEs would consider adopting various cost optimization and rationalization measures to address the financial challenges they faced during the pandemic was also low (22.2%) for the case companies.

2. Table 1 illustrates the management initiatives adopted by the case of SMEs. In the instances of Japan, automation, mechanization, and digitalization emerged as the most adopted management initiatives during the pandemic to overcome the challenging business environments. Japan with its strong historical ties with the manufacturing industry,

particularly with small and medium-sized manufacturers, was represented by two manufacturing companies in this case study. Asahi Tekko Company Limited, a manufacturing company founded in 1941, and Higuchi Manufacturing Company Limited, founded in 1960, both faced significant challenges during the initial coronavirus outbreak due to strict social quarantine measures and control. In response, they actively introduced automation and digital transformation to overcome adverse events such as a decline in productivity and suspension of operations.

Furthermore, in the case of Asahi Tekko, it can be inferred that the company introduced hybrid work and remote work management initiatives to prepare for disruptions in both office and factory, anticipating a sharp decline in productivity.

3. In the case of the ROC and the ROK, all the case study firms were predominately in the manufacturing industries, but their pattern of management initiative adoption differed from that of Japan. Table 1 shows that most companies implemented more than five management initiatives, suggesting that the companies in the ROC and the ROK took comprehensive measures to prepare for the rapidly unfolding pandemic.

Megagen Implant, for instance, did everything it could do during this difficult period by not only investing in large-scale automated manufacturing facilities but also taking on the difficult challenges of recruiting employees and expanding overseas markets. The company also consistently promoted its “Human-Centered” management philosophy and operating policies.

4. Among the case study firms in Singapore, fewer management initiatives were implemented compared to those in Japan. Notably, all three participating companies implemented agile management initiatives to prepare for rapid changes and diversity in the external environment, adding an interesting dimension to their strategic approach.

TABLE 1

BEST PRACTICES ADOPTED BY CASE STUDY FIRMS (NPS SCORE: 9~10).

Management's Response to COVID-19 Pandemic	Japan		ROK		Singapore			ROC		Total Number of Marking	% of Total Cases
	AT	HC	MG	RS	PH	OPS	ME	FY	PMH		
1. Agile Organization BP during COVID-19			X	X	X	X	X	X	X	7	77.78
2. Automation and mechanization during COVID-19	X	X	X						X	4	44.44
3. Digitalization and digital transformation during COVID-19	X	X	X					X	X	5	55.56
4. Building a new business model			X	X	X			X	X	5	55.56
5. Hybrid and remote work during COVID-19	X		X	X		X		X	X	6	66.67
6. Talent acquisition during COVID-19			X	X				X		3	33.33

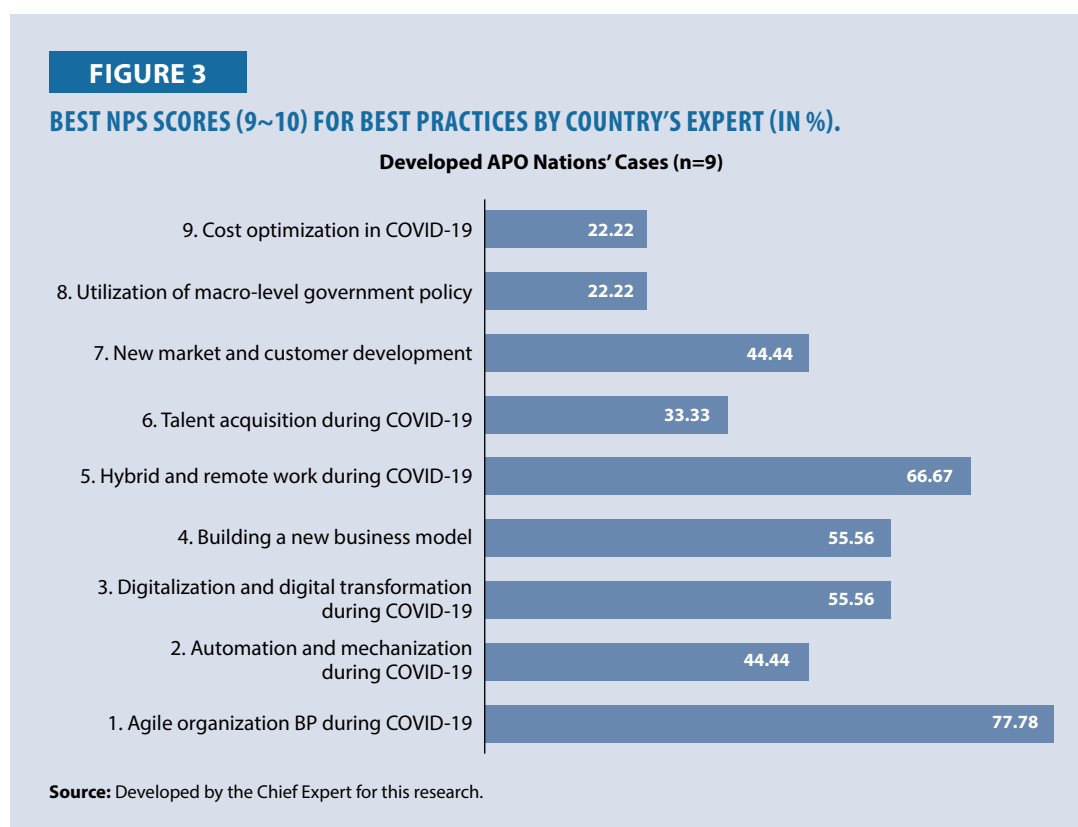
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Management's Response to COVID-19 Pandemic	Japan		ROK		Singapore			ROC		Total Number of Marking	% of Total Cases
	AT	HC	MG	RS	PH	OPS	ME	FY	PMH		
7. New market and customer development			X	X				X	X	4	44.44
8. Utilization of macro-level government policies								X	X	2	22.22
9. Cost optimization during COVID-19							X		X	2	22.22
10. Others	X		X	X	X	X	X	X	X		

Note: AT, Asahi Tekko Co., Ltd.; HC, Higuchi Manufacturing Co.; MG, Megagen Implant; RS, RS Tech; PH, Phoon Huat Pte. Ltd.; OPS, (Omni-Plus System Pte. Ltd.; ME, Memiontec Pte. Ltd.; FY, FY Furniture; PMH, Pregetic Medical Health Co. Ltd.

Source: Prepared by the Chief Expert based on the assessment of each country by the national experts.



- The analysis of nine case studies indicates certain similarities in initiatives adopted by the companies. These reflect a pattern followed by the best-performing SMEs during the COVID-19 crisis.

Digital transformation: Companies across all four economies recognized the importance of digital transformation. They adopted various digital tools, platforms, and solutions to enhance operations, communication, and customer engagement. This commonality highlights the role of technology in enabling business continuity during the pandemic.

Leadership involvement: Strong leadership played a crucial role in the success of these companies. Whether in the ROC, Japan, the ROK, or Singapore, the top management demonstrated a commitment to driving digital transformation initiatives, setting examples, and motivating employees to adapt to changing circumstances.

Agility and adaptability: The companies displayed remarkable agility in adapting to changing circumstances. They adjusted their strategies, introduced new products or services, and explored emerging opportunities. This flexibility allowed them to pivot swiftly and continue serving customers effectively.

Hybrid work and remote working: During the period of social distancing and strict movement control, all companies were greatly affected in their daily operation. To overcome this, various forms of non-face-to-face work were introduced and operated in companies, such as hybrid working with telecommuting with various tools like Zoom, Google Meet, Team, etc. In particular, the basic concepts of agile organizational management, including the rapid adoption of digitalization and flexible and rapid decision-making, made this type of work possible.

Employee engagement and support: Employee well-being was a shared priority. Companies across the countries implemented measures to engage and support their workforce. From remote work arrangements to transparent communication and training programs, these efforts fostered employee loyalty and satisfaction.

Diversification and innovation: The companies sought diversification through expanding product offerings, exploring new markets, and embracing innovative approaches. This diversification helped mitigate risks and capitalize on evolving consumer needs.

6. The case study helped identify some unique initiatives across the firms.

Industry specifics: The strategies varied based on the industries in which the companies operated. For example, Japanese manufacturing companies (Asahi Tekko and Higuchi Manufacturing) focused on operational improvements and maintaining production efficiency. In contrast, healthcare-related companies in the ROK (RS Tech and PMH) prioritized safety measures, technological innovation, and diversified services.

Geographical expansion: While all countries emphasized global expansion, the methods differed. Megagen Implant (the ROK) expanded its international market footprint through acquisitions, while Phoon Huat (Singapore) leveraged e-commerce for overseas growth. The ROC's FY and PMH prioritized strengthening domestic operations while expanding digitally.

Supportive ecosystems: The nature of government support and ecosystem readiness also varied across the countries. In Singapore, companies like Phoon Huat capitalized on government assistance and strategic partnerships. In the ROK, companies benefited from a blend of government support and a proactive approach to growth programs.

Service diversity: Companies in Singapore (Phoon Huat, Omni-Plus System, and Memiontec) and the ROC (FY and PMH) showcased diversification of services as a resilience strategy. This involved entering new sectors or offering supplementary services to mitigate the impacts of the pandemic.

7. In summary, the management initiatives employed by companies in the ROC, Japan, the ROK, and Singapore share commonalities, focusing on aspects such as digital transformation, leadership involvement, employee empowerment, and innovation. However, differences arise due to industry-specific requirements, approaches to geographical expansion, levels of government support, and the diversification of services. These management initiatives collectively underscore the need for adaptability, proactive leadership, and a holistic approach to overcoming the challenges posed by the COVID-19 pandemic.

Further Research

1. This case study was conducted under time and resource constraints, limiting the application of a more sophisticated research methodology.
2. It was particularly challenging to identify companies in the participating countries that not just survived but outperformed during the pandemic. While one of the fundamental objectives of the study was to establish a link between outstanding corporate performance and productivity, the nature of companies' objective during the global pandemic was primarily survival, making it difficult to establish the hypothesis that high productivity could increase business resilience and survivability.

Therefore, companies with high growth and productivity during the period were inductively identified to find the management initiatives that they implemented. In addition, during this process, it was difficult to share detailed internal information beyond existing announcements or data provided by the company, creating a limitation in establishing an objective quantitative judgment of performance.

3. In designing the research methodology, rather than heavily relying on extensive academic literature, priority was given to investigating the contents centered on the two pillars of business: resilience, and innovation. The focus was on understanding the management initiatives companies implemented as the pandemic ended.
4. In addition, numerous guiding questions were formulated to assess whether the participating companies had properly implemented the management initiatives they claimed to have introduced. However, it was not possible to grasp the detailed contents of the management initiatives with only two or three interviews, which is an inevitable limitation of this study.
5. Finally, the analysis of the most prominent management initiatives based on the findings of each country's experts, lacks further interpretation by the experts regarding why or how they arrived at their conclusions.

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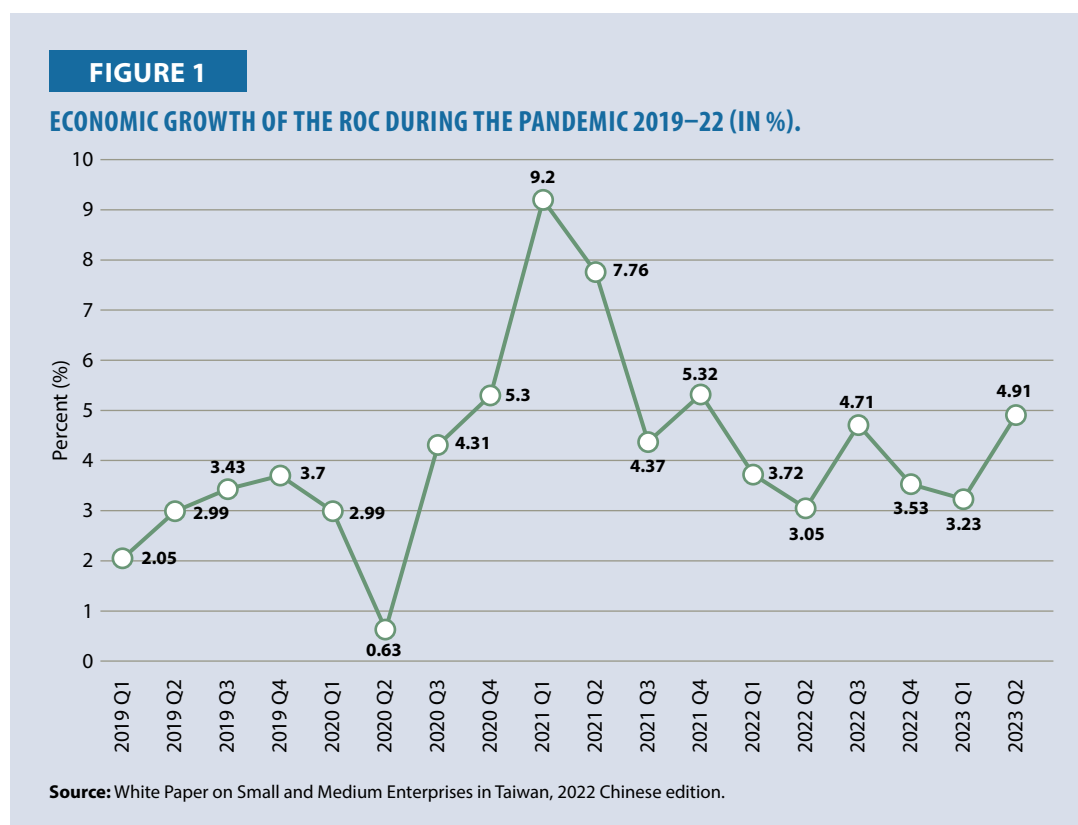
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REPUBLIC OF CHINA

Economic Overview

In the first quarter of 2021, the ROC experienced significant economic growth, with a rate of 9.20%. This growth was attributed to effective pandemic control measures, the continuation of various stimulus programs such as the ‘Revitalization triple vouchers’, ‘Arts and Culture vouchers’, ‘Sport vouchers’, and ‘Travel vouchers’, as well as the positive impact of related policies. Additionally, investments and commodity exports played a significant role in driving this growth. This rate marked a new high since the fourth quarter of 2010. However, in the second quarter, the growth rate decreased slightly to 7.76%. In the first half of the year, the overall economic growth rate reached 8.48% as reflected in Figure 1. The robust economic recovery could be attributed to better-than-expected exports and private investment growth. The economic growth rate for the second half of the year was 4.91%.

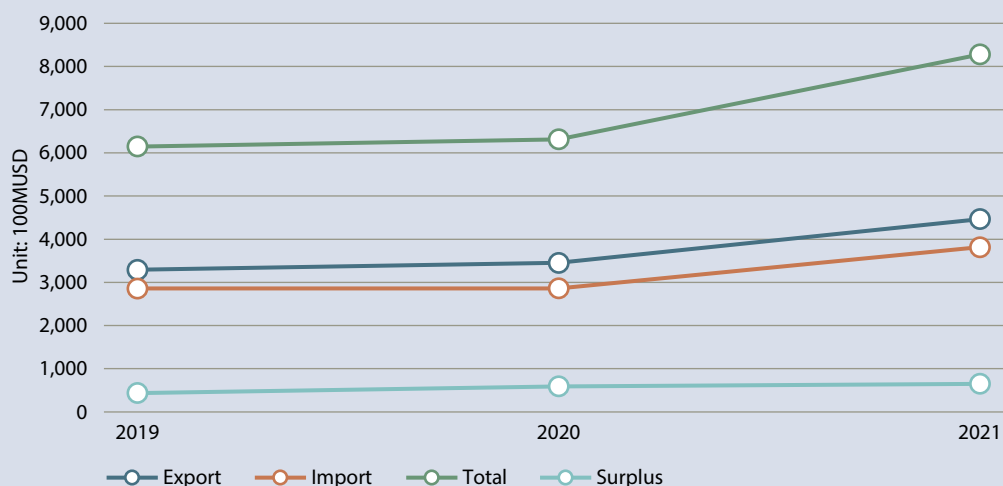


Export and Import Trends of the SMEs

In 2021, the COVID-19 pandemic continued its global spread, severely impacting economic activities worldwide. However, the ROC experienced a relatively mild impact from the pandemic, leading to the return of Taiwanese businesses from China. After accounting for exports and imports, the ROC’s trade surplus in 2021 was projected to surpass USD64.885 billion, marking a 10.02% annual increase. Notably, the ROC achieved record-high levels in exports, imports, and outbound trade during the same year, indicating the resilience of its external merchandise trade, as illustrated in Figure 2.

FIGURE 2

SME SECTOR EXPORT AND IMPORT TRENDS IN THE ROC DURING THE PANDEMIC (2019–22).



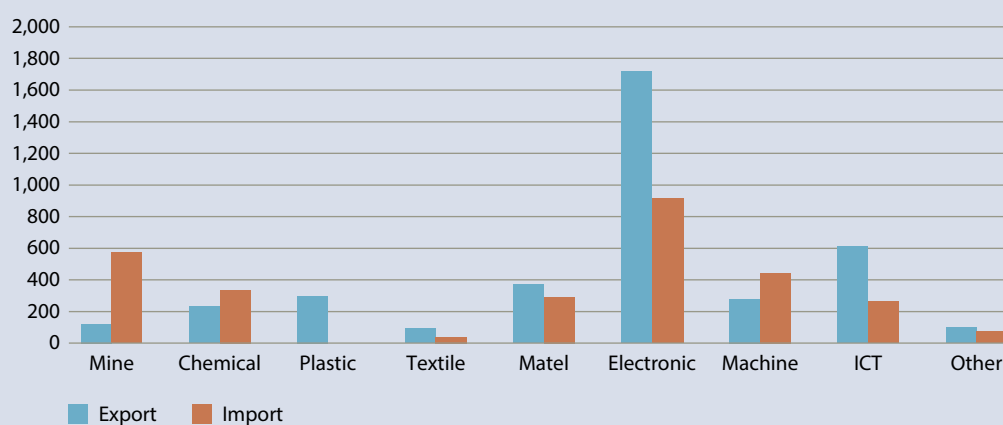
Source: White Paper on Small and Medium Enterprises in Taiwan, 2020, 2021, 2022 Chinese edition.

Major Commodities of SMEs in the ROC

In terms of major export commodities (categories), electronic parts and components continued to be the largest exported items in 2021, comprising 38.53% of the total export value, which stood at USD171.994 billion. The category experienced remarkable growth at an impressive annual rate of 26.92%. The second largest export category was “information, communication, and audio-visual products,” accounting for USD61.325 billion, or 13.74% of the total export value, with an annual growth rate of 24.78%. The manufacturers of the ROC have been expanding their domestic manufacturing capacity, with the semiconductor industry leading the way in advanced processes. This expansion has led to order-shifting effects, contributing to improved growth performance, as depicted in Figure 3.

FIGURE 3

SME SECTOR EXPORT AND IMPORT BY CATEGORY IN THE ROC 2021 (IN USD MILLION).



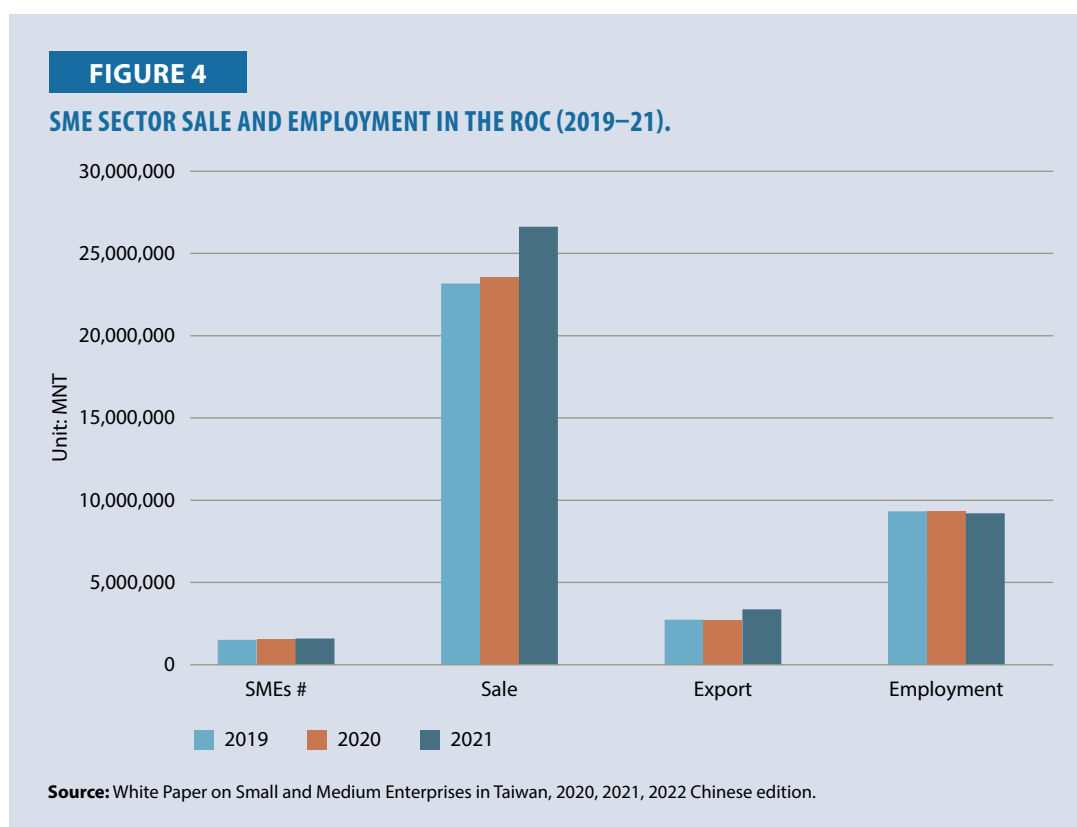
Source: White Paper on Small and Medium Enterprises in Taiwan, 2022 Chinese edition.

Contributions of SMEs in the ROC

In 2021, the number of SMEs in the ROC reached 1,595,828, accounting for 98.92% of the total enterprises, marking an increase of 46,993 compared to 2020. This represents a growth rate of 3.03%, as reflected in Figure 4. Overall, SMEs in the ROC employed a total of 6,923,000 workers in 2021, comprising 75.50% of the workforce.

In terms of the sectors, services accounted for 1.282 million SMEs, representing 80.37% of the total SMEs. Meanwhile, the industrial sector had 301,953 SMEs, constituting 18.92% of the SME landscape. In terms of operational duration, 7.34% of SMEs operated for less than one year in 2021, while 30.01% operated for five years or less. Besides, 48.52% of SMEs had been in operation for ten years or less.

Geographically, the northern region of the ROC had the highest number of registered SMEs, accounting for nearly 739,600, or 46.34% of the total SMEs in 2021. The central and southern regions followed closely, with 392,400 (24.59%) and 397,000 (24.87%) SMEs, respectively. The eastern and outlying islands collectively accounted for 4.19% of the SMEs.



Importance of SMEs

According to the Government of the ROC, an SME is defined as an enterprise with a capital of less than NTD100 million or fewer than 200 employees¹. SMEs constitute over 98% of all companies

¹ Note: For the years 2020 and 2021, the relevant statistics are defined in accordance with the SME Recognition Standards as amended on 24 June, 2020: manufacturing, construction, mining, and earth-moving industries with a paid-in capital of less than NTD100 million, or with less than 200 employees in regular employment. For the year 2019, the following industries are defined according to the "Small and Medium Enterprise Recognition Standards" amended on 30 March, 2015: manufacturing, construction, mining, and earth-moving industries with a paid-in capital of less than NTD80 million or employing less than 200 employees on a regular basis; other industries with a turnover of less than NTD100 million or employing less than 100 employees on a regular basis in the previous year.

in the ROC and contribute over half of the GDP. They play a significant role in the economy and contribute to the government tax revenue at levels comparable to large corporations. Many SMEs have emerged as successful examples, growing into large enterprises, including well-known companies such as Acer, TSMC, UMC, Vanguard, and more. It can be said that SMEs serve as the foundation for the growth and success of numerous businesses.

Best Practices in the ROC

Impacts and Paradigms of SMEs in the Pandemic

In the White Paper on SMEs in the ROC in 2022, Minister of Economic Affairs M.H. Wang stated: “In 2021, the number of SMEs in the ROC surpassed 1.59 million, representing over 98% of all enterprises, which is a historical high. Furthermore, SMEs employed over 9.2 million individuals, accounting for over 80% of the total employed workforce in the ROC. These SMEs generated sales volume exceeding NTD26 trillion, which accounted for over 50% of the total sales volume. Notably, the ROC experienced remarkable growth in international trade and domestic investment in 2021, leading to an impressive performance in both domestic sales and exports for SMEs. The annual growth rate of exports reached 25%, highlighting the significant role played by SMEs in stimulating the ROC’s economy and job market. They serve as a cornerstone for ensuring steady economic development.”

This indicates a strong performance by SMEs in the ROC during the pandemic. However, the impact varied across different industries.

Various industries, such as the food, beverage, and real estate sectors, were significantly affected by the pandemic. Lockdown measures and stay-at-home orders reduced consumer mobility, leading to decreased spending and a decline in business revenue. On the other hand, the delivery, online shopping, and entertainment industries experienced growth and success due to the pandemic.

The extent of the impact on SMEs differed based on their respective industries. Sectors heavily reliant on consumer demand, such as travel, restaurants, entertainment, and retail, faced greater challenges during the pandemic. Conversely, SMEs operating in internet-related, telework, e-commerce, and similar sectors experienced a lesser impact, as the demand for their services increased during the pandemic.

In the manufacturing sector, certain industries like semiconductors and tools defied the odds and contributed to the GDP growth. Trade controls, chip shortages, and geopolitical tensions related to the Ukraine-Russia war further increased the demand for tools and drones. Moreover, the ROC took proactive steps by issuing alerts and implementing control measures against the pandemic, especially concerning China. These steps enabled industries in the ROC to respond swiftly. The early measures resulted in many innovative practices that deserve further exploration due to their successful outcomes.

Definition of Resilience

According to the Cambridge Dictionary, resilience is defined as ‘the ability of substance to return to its usual shape after being bent, stretched, or pressed.’ McKinsey’s definition, on the other hand, expands on this, stating that resilience is ‘the ability to not only recover quickly from a crisis but to bounce back better—and even thrive.’ Harvard Business Review notes that the ability to bounce back from setbacks is often described as the difference between successful and unsuccessful people. Resilience has been proven to have a positive impact on work satisfaction and engagement, as well as overall well-being, and can even lower depression levels.

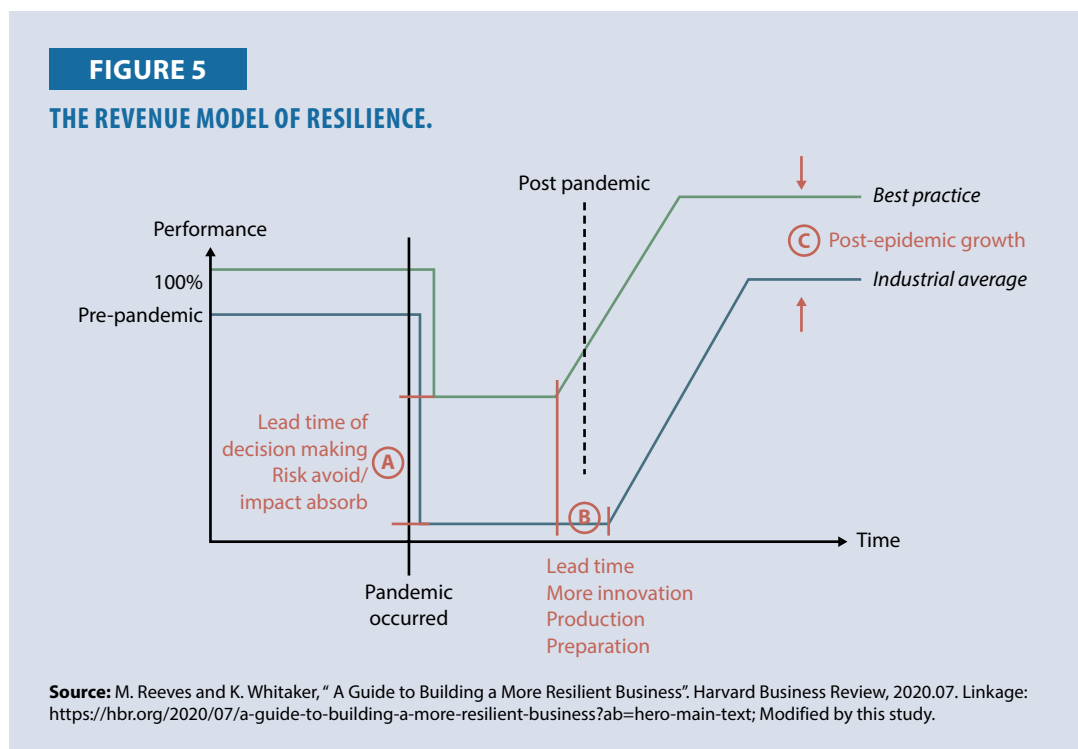
Models for Measuring Resilience

The report proposes two models to explain the good performance of SMEs during the pandemic: The Revenue Model and the Cost Model.

Model 1: The Revenue Model

In the first model, it is hypothesized that resilient SMEs are capricious due to several reasons. Firstly, they were well prepared for the pandemic, having adopted new technologies, invested in plant expansion, and prepared for new customers, beforehand. Secondly, these companies had robust contingency plans in place, including capital preparation, and response processes, which minimized the impact of the pandemic on their business compared to their peers.

Thirdly, as the pandemic waned, these companies were able to quickly seize the opportunity of market recovery or economic growth, securing orders, increasing production, and generating higher revenue earlier than their counterparts. This agility may have been a result of their effective transformation efforts during the pandemic, such as digital transformation and business model restructuring, including the introduction of new technologies like AI and Artificial Intelligence of Things (AIoT). Post-pandemic, they were able to capitalize on education and training, imported equipment, and process innovation to generate more revenue than before, as depicted in Figure 5.

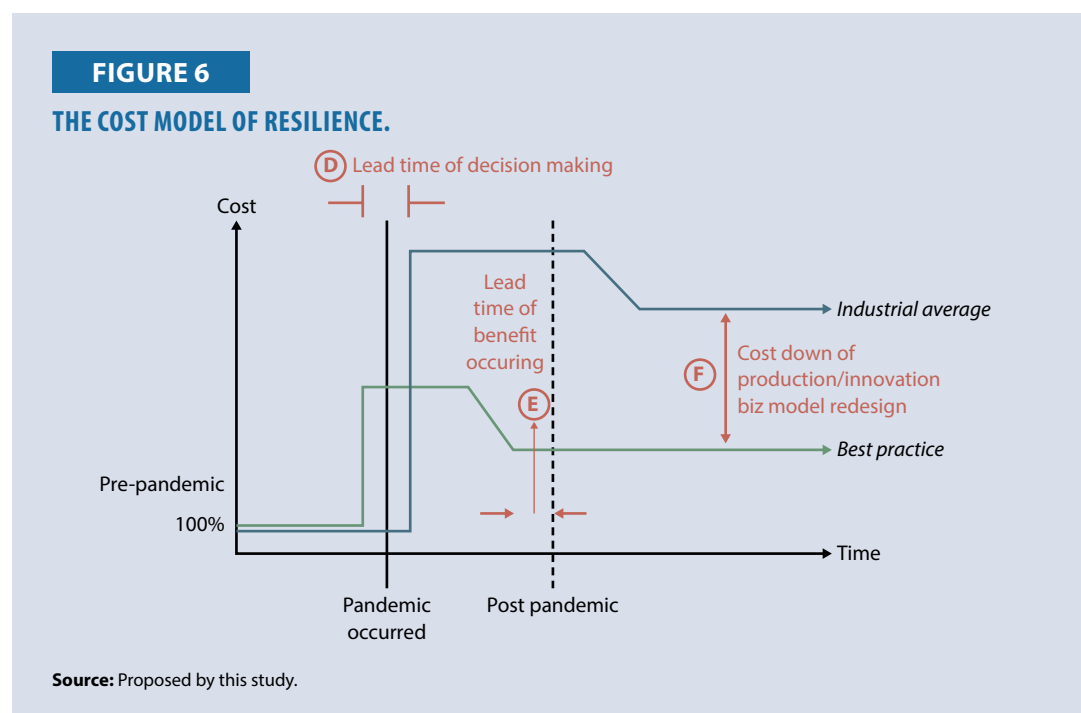


To understand the Revenue Model, three questions A, B, and C, as listed in Table 1, were included in the questionnaire.

Model 2: The Cost Model

The second model indicates that cost increases during the pandemic due to stringent restrictions and lockdowns reduced outdoor activities, and tightened consumption. It is also affected by changes in geopolitical situations, such as wars. But, the resilient SMEs are more prepared. Before the outbreak, they had already purchased raw materials, expanded factories and equipment, and

continued to increase employees. Therefore, after the outbreak, these pre-investment costs will be relatively higher than those during the epidemic. After arriving, it became even lower. Another possibility is that these resilient companies experienced operational benefits after the pandemic, stemming from investments made during the crisis, including new equipment, increased education and training, and more effective inventory planning. Consequently, their costs post-pandemic might be lower than they were before the outbreak, as depicted in Figure 6.



To understand the Cost Model, three questions D, E, and F were included. Other general questions, G and H, were also added, as listed in Table 1.

TABLE 1
THE QUESTIONNAIRE.

A.	Before the outbreak of COVID-19, did the company plan management measures to prevent or absorb risks?
B.	After the outbreak, did the company continue to introduce innovations (products, services, production processes, etc.), take preventive measures to generate operational benefits early, or create post-epidemic revenue growth?
C.	After the outbreak, what were the key success factors for the company's continued revenue?
D.	After the outbreak, how long did it take for the company to make responsible decisions?
E.	How long does the company estimate it will take to return to normal or even lower operating costs? Can the benefits of innovation be generated earlier?
F.	After the epidemic, is it possible for the company to reduce production costs or create profit growth in the future?
G.	How did the company improve its resilience (continuous operation) during the epidemic?
i.	Hybrid bricks-and-mortar/work-from-home.

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ii. Agile/flexible work redistribution.
iii. New (contactless) business models
iv. Arrangements for training and recruitment.
v. Redefinition of customers/market.
vi. Leveraging the government's subsidy policy tools.
H. How is the company leveraging new technologies to drive innovation?
i. Automation/Mechanization
ii. Digitization, AI, AIoT, or Metaverse
iii. Other

Selection of SMEs for Benchmarking

Industries mentioned above were excluded from this study if they did not exemplify innovative leadership in business operations or good business model design and management. This study focuses on companies that have achieved growth despite declining turnover and gross margins in the general manufacturing industry from 2019 to 2022, primarily due to innovation and robust operational design. Such companies have been included in this study as a reference list of exemplary businesses. Considering these factors, the following selection criteria were established, and the companies listed in Figure 7 were selected.

Selection Criteria

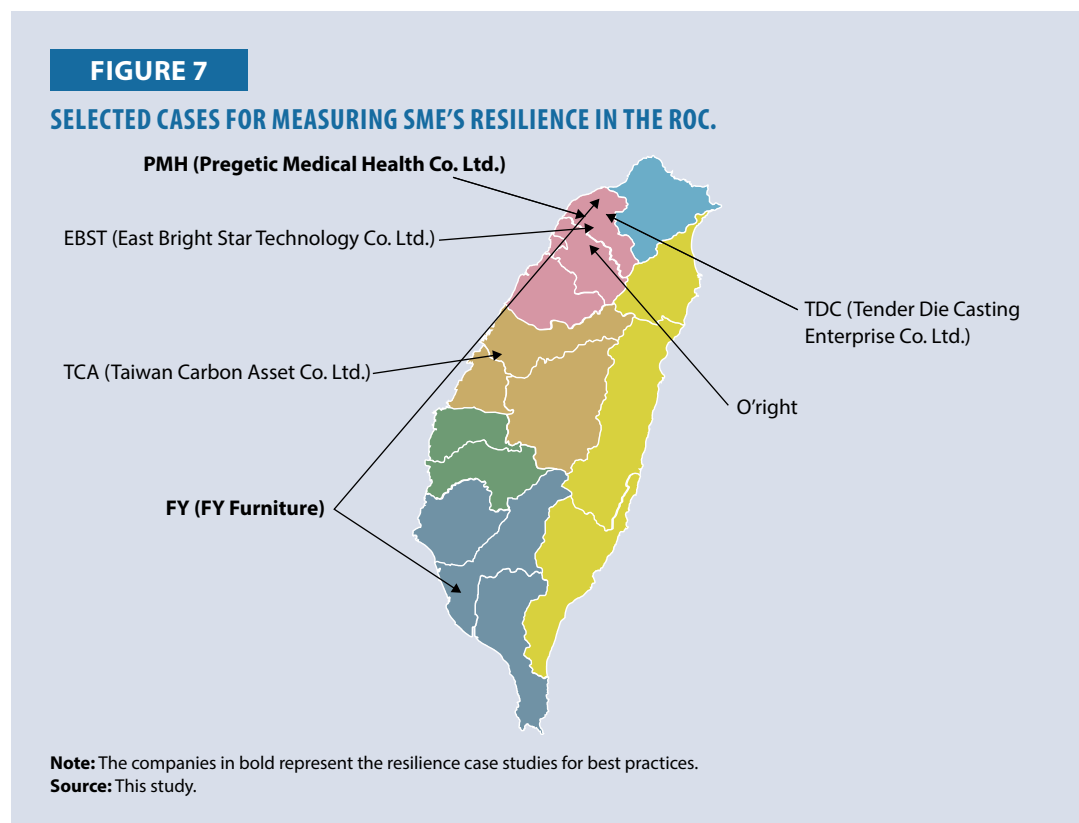
1. Companies experiencing lower sales decreased than the industry average due to the pandemic were considered.
2. Companies demonstrating higher revenue growth rates than the industry average in the Pandemic.
3. Companies demonstrating higher revenue growth rates than the industry average after the Pandemic.
4. Companies that meet the definition of SMEs as defined by the Government of the ROC.

List of Firms Interviewed for Benchmarking

1. East Bright Star Technology Co. Ltd. (EBST): Defense, aviation, and semiconductor parts manufacturing
2. FY Furniture: Furniture and online service
3. O'right: Green products like shampoo, revitalizer (hair growth agent), and green services
4. Tender Die Casting Enterprise Co. Ltd. (TDC): Metal machining and manufacturing
5. Pregetic Medical Health Co. Ltd. (PMH): Premium health check services
6. Taiwan Carbon Asset Co. Ltd. (TCA): Green service

Industrial Category of the Selected Cases

Semiconductor	EBST
Service	FY <=Best Practices
Machining	TDC
Health	PMH <=Best Practices
Green Services	O'right and TCA



Case Study 1: FY Furniture

FY Furniture (FY) is a prominent furniture company in Northern Taiwan. Its Chief Executive Officer (CEO) Huang emphasizes the highly competitive nature of the furniture industry, where only the top two companies can survive in the market for a long period, while the remaining 90% struggle to stay afloat. To ensure long-term viability, FY has pursued mergers, acquisitions, and branch expansions, increasing the number of branches from four to seven in recent years. This strategic approach has established FY as a leading furniture brand in Northern Taiwan. Notably, FY set up its seventh branch in 2018, a year before the onset of the pandemic.

Impact of the Pandemic

During the pandemic, the furniture business experienced a slight increase in average sales, rising from 100% (based on 2019) to 105% in 2020. However, in the subsequent years, 2021 and 2022, sales declined to 90% and then further to 80%, respectively, as estimated by T.H. Liu, Head of Taoyuan Wood Industry Association, representing the upstream sector of the furniture industry.

Initiatives Taken Before the Pandemic

FY implemented a robust risk management mechanism across all branches, conducting regular weekly managerial meetings. These sessions involved a thorough review of real-time data,

enabling the swift identification and resolution of risks and issues. CEO Huang attributes the revenue growth during the pandemic to the additional income generated by the new branch established in 2018. Moreover, the development of talent in each branch was facilitated by the training program and implementation of digitalization systems initiated before the epidemic as explained in Table 3.

Key Success Factors

Despite the ongoing pandemic, FY launched an online purchase platform that received an outstanding response, attracting the attention of over two million individuals and resulting in increased in-store sales. CEO Huang emphasized that the company's digital marketing strategy had been highly effective in generating more online traffic and reaching new consumers from different generations and various lifestyles.

He also emphasized several factors that contributed to the success of the company. Firstly, the expansion of both online and offline channels played a crucial role. This includes the establishment of stores that cover the entire country, from north to south, as well as the launch of online purchasing platforms. Secondly, data-based management enabled the business to analyze and forecast market trends, allowing them to timely execute effective strategies.

The third success factor was the company's increased investment in marketing and digitalization. This investment facilitated the maintenance of relationships with existing and potential customers. Lastly, the company's focus on maintaining and enhancing its image and goodwill resulted in higher customer satisfaction and increased trust in the brand. For example, price transparency allows direct and sincere communication with customers.

Huang discussed the cost aspect since the onset of the pandemic, highlighting the rise in material, manpower, and transportation costs. Longer delivery times were a result of the lockdown policies in the countries of origin for the suppliers. However, despite these challenges, FY's financial numbers are on an upward trend. One key success factor has been the effective management of internal transactions, particularly in inventory management. Throughout the pandemic, the company was able to maintain sales by ensuring product availability and innovating new products to meet customer demands.

He also indicated that the company plans to open a new branch to cater to the customers in a newly targeted location. This expansion aims to enhance the company's bargaining power with suppliers and maintain the advantages derived from economies of scale, a cornerstone of the company's competitive edge.

Initiatives Taken During the Pandemic

FY refrained from implementing a WFH and online strategy because the SME furniture business at the headquarters in Taoyuan relied heavily on in-person interactions and negotiations. CEO Huang emphasized that, during the current stage, the experiential aspect of sales remains the most important factor for ensuring a successful purchase [1].

FY pursued a new business model as part of its growth strategy by establishing a new branch in Kaohsiung, a city in Southern Taiwan. Additionally, the company diversified its business scope by adopting multi-media marketing. It also implemented new management systems, including an ERP system. The digitalization and integration of the ERP system with AI for data analysis, tracking

customer travel routes and items, and managing service transitions between staff, contributed to the company's thriving business.

The headquarters assumed the responsibility for decision-making concerning materials procurement and pricing for general products, whereas individual branches formulated their customized local service strategies. The investment in the new branch in Kaohsiung, together with the collective efforts of other branches, enabled FY to create economies of scale benefits and gain cost competitiveness. This advantage arose from the aggregation of purchases, leading to reduced fixed costs for general materials as outlined in long-term contracts. Furthermore, the company received orders from all branches across the country.

The company also adopted a digital marketing and innovation strategy, specifically targeting its client groups (B2B strategy). Utilizing online platforms such as Facebook and Google, FY strategically used keywords like 'Home Furnishing', to attract a larger customer base (B2C strategy) [3, 5].

"We never want to compete with big names, such as IKEA. But we want to create something that customers want and have never experienced before," Huang said.

During the pandemic, FY did not lay off any staff. Instead, the company attracted additional talent to join the workforce. They utilized the available time effectively by conducting training courses in crucial business areas, including customization service processes and free 3D layout design for customers. FY maintained high service standards by organizing regular oral exams to enhance employees' Q&A handling skills. Moreover, the CEO emphasized the pivotal role of human resources in the furniture business. By implementing a work-life balance strategy involving two shifts totaling 12 working hours, weekend holidays, and a sales-linked commission system, the company was able to ensure employee satisfaction. This approach significantly contributed to the company's overall success, with the revenue per capita experiencing a remarkable increase of around 50% even during the epidemic, which was much higher than the competitors [4].

FY diligently adhered to government policies during the pandemic, following vaccination and disinfection protocols. The company also implemented flexible working shifts and days off, especially when there were fewer visiting customers [6].

Adoption of Existing Digital Technologies

To gain more attention and ensure customer retention, FY adopted a digital marketing and innovation model, creating digital assets such as videos, podcasts, and articles for knowledge-sharing. These materials, emphasizing the company's online attributes such as product variety, customized services, affordability, price transparency, and trustworthiness, were actively promoted to enhance the company's online presence. CEO Huang reported that the company gained a significant customer base, with nearly two million new customers acquired through the digitalization strategy and multimedia channels. He emphasized the importance of staff engaging with online customers, and seeking their feedback and responses.

While discussing the focus on digitization, CEO Huang noted that Metaverse was too early for the company to implement, as it was not yet a primary concern for most customers. He expressed a willingness to monitor future developments in this area. Lastly, Huang outlined plans for future growth and expansion, including establishing a new headquarters and opening the eighth branch of FY.

TABLE 2

FINANCIAL SCORECARD OF FY FURNITURE (IN %).

	2019	2020	2021	2022	GAGR
Revenue	100	124	149	167	19
Cost	100	108	137	168	20
EBITA	100	195	156	96	-3
Employment	105	107	139	145	12

Source: The numbers are calculated by this study based on interviews and the company's financial report.

Summary

The furniture industry in the ROC operates primarily on domestic demand and most of the raw materials are imported. Hence, the prices within the industry are influenced by the international market, particularly materials such as wood and fabric. Survival in this competitive industry typically requires companies to secure a position within the top two performers.

In terms of raw materials, imports saw a rise in 2020, but the trend reversed in 2021 and 2022 due to the pandemic, leading to a decrease in imports during these years. Consequently, costs increased in these three years.

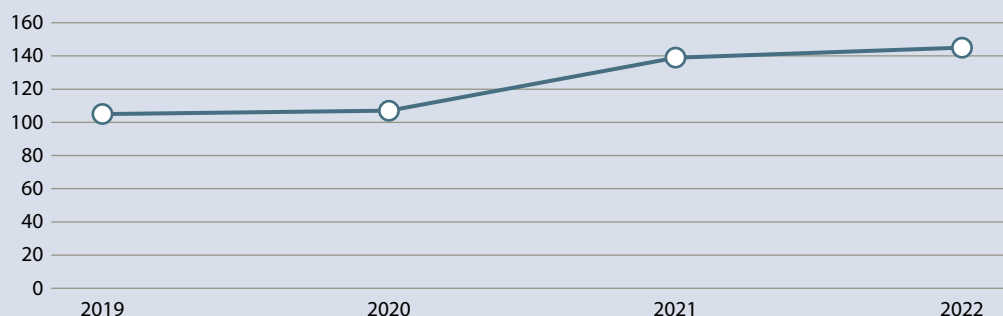
The furniture industry has embraced digital technologies to manage its operations. Leveraging multimedia marketing, the industry has reached out to young customers, employing targeted marketing strategies. By categorizing customers for lean marketing initiatives and utilizing customized services along with 3D CAD/CAM technology (and potentially exploring the Metaverse shortly), the industry can engage extensively with customers to offer customized products.

The adoption of multimedia marketing and digital management techniques has significantly changed the way the furniture industry manages its business. Traditional promotional methods such as sending out flyers and emails or making phone calls have given way to online interactions that allow quick responses to customer queries and ensure transparency in pricing by service level, including customized products that are more expensive.

Presently, the furniture industry has not yet integrated AI and the Metaverse with blockchain services. However, companies like to ones in the case study have prepared for a future with higher automation and digital services. They have made advancements in 3D drawing, customization of experimental services, and big data analysis.

During the interview process, it became evident that government policies including pandemic counseling and subsidies, have helped the manufacturers to a certain extent. However, the manufacturers' management capabilities are considered more important. The case company had been ready with investments for expansion and digital transformation before the pandemic. In 2019, they released a variety of videos in different multimedia marketing channels and digitized their customers' data for management.

Despite challenges such as increased shipping costs and mounting inflationary pressures during the pandemic, which led to a 30% rise in costs, the revenue saw a significant increase. This growth was attributed to new revenue streams generated by multimedia marketing efforts and the revenue from the newly established branch, allowing the company to maintain a revenue level above the industry standard.

FIGURE 8**NUMBER OF EMPLOYEES AT FY FURNITURE (2019–22).**

Source: The numbers are calculated by this study based on interviews and the company's financial report.

TABLE 3**MANAGEMENT PRACTICES ADOPTED BY FY FURNITURE DURING THE PANDEMIC.**

Practices in Management	Adopted (Yes/No)	Most Distinguished Practices (1 to 10)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	No	0
3. Digitalization and digital transformation during COVID-19	Yes	10
4. Building a new business model	Yes	10
5. Hybrid and remote work during COVID-19	Yes	9
6. Talent acquisition during COVID-19	Yes	10
7. New market and customer development	Yes	10
8. Utilization of macro-level government policies	Yes	10
9. Cost optimization during COVID-19	Yes	8
Total Score	8 out of 9	

Source: The numbers are calculated by this study based on interviews and the company's financial report.

Case Study 2: Pregetic Medical Health

Pregetic Medical Health (PMH) Co. Ltd., a subsidiary of Minsheng Medical Group, offers a comprehensive range of integrated medical services, including preventive medicine, health checks, disease treatment, long-term care, and community health promotion, among others. Within Minsheng Medical Group, there are several affiliates, such as Precision Medicine Health Clinic and Harvard Health Clinic, which provide specialized medical services and prioritize customer-oriented care. Notably, the Harvard Health Clinic in the ROC has achieved distinction as the first clinic in the country to receive Joint Commission International certification, showcasing its commitment to delivering high-quality healthcare services.

PMH also offers genetic testing services utilizing Illumine, a leading brand in genetic testing. This enables the exploration of genetic variants, such as single nucleotide polymorphisms and large

structural changes in DNA. To ensure the accuracy and reliability of their testing results, PMH's genetic testing laboratory has obtained TAF and ISO: 15189 certifications. The company employs the Asian Screening Array for gene scanning, specifically designed for Eastern populations, thereby ensuring more precise and comparable results.

In addition to its advanced medical services, PMH strives to provide patients with a comfortable environment, specialized medical team consultations, and exclusive customer service, further enhancing the overall patient experience.

Initiatives Taken Before the Pandemic

Emma Lin, Executive Vice President of PMH, highlighted PMH's successful anticipation of the epidemic in early 2020, which was evident from the significant increase in patients at the hospital located near Taoyuan International Airport. In response, PMH promptly upgraded its standard operating procedures (SOP) from level 0 (normal condition) to level C (initial warning), and eventually reached level A by the end of 2020.

The proactive measures taken by PMH in addressing the pandemic proved to be advantageous. Lin emphasized that the Min Sheng Hospital group had already implemented their epidemic prevention measures in February 2020, even during the Chinese New Year festivities, underscoring their dedication to ensuring the safety of their employees and customers. Furthermore, she stressed the importance of education and training regarding the proper use of protective clothing, with mandatory annual training for epidemic prevention measures for all employees. The clinic also established its own set of SOPs for the staff to adhere to, further illustrating their commitment to maintaining a safe environment.

Key Success Factors

Lin also shared her experience regarding the way PMH managed its services during the pandemic. She explained that the pandemic had led to a significant fluctuation in the demand for medical services, necessitating effective management strategies to ensure the optimal allocation of resources. One such strategy involved implementing a flexible consultation method that accommodated customers' schedules, offering afternoon consultations, and allowing clients to eat beforehand. This approach increased convenience for clients and improved overall satisfaction. Furthermore, she emphasized the importance of businesses remaining agile and quickly adapting to changing circumstances to survive during such challenging times.

Despite the impact of the pandemic on hospital operations, several business units and companies within the Min Sheng Medical Group continued to generate revenue, resulting in a positive overall outcome. Emma Lin discussed the group's research and development efforts in IoT technology for smart medical care, which would enable customers or patients to complete consultations through their mobile phones, highlighting the company's commitment to innovation. However, she also acknowledged the need for improvement in information technology to further enhance customer satisfaction. Through diversification of their businesses, the medical group was able to generate earnings and maintain working capital for their operations.

Lin discussed the impact of the pandemic on the health industry, highlighting that many companies scaled back their operations since 2020. Consequently, the market became volatile and unpredictable. This uncertainty is likely to persist for three or more years. However, she expressed cautious optimism that the market could gradually return to a more normal state shortly, even though the

current environment remains highly uncertain. Lin specifically focused on PMH's services, primarily health check-ups, and underscored the challenges faced by the clinic in ensuring non-infectious tests and maintaining acceptable costs.

Regarding the recovery and future projections for the healthcare industry, Lin acknowledged that 2020 had been a challenging year due to the pandemic. However, she noted a slight improvement towards the end of the year, with expectations of further recovery in 2021. She also mentioned that 2022 brought increased vigilance, with intermittent periods of improvement, and highlighted a particular period of raised vigilance from March to May, indicating some disruptions during that time. Looking ahead to 2023, Emma Lin believed that the situation would continue to recover, although there might be temporary dips to around 80%. However, she also acknowledged the global uncertainty and the absence of a clear end to the pandemic, while noting that the ROC may be better positioned than other regions.

Lin emphasized the cost implications of the pandemic on a medical group's operations. The pandemic led to increased costs, due to a reduction in employees and a surge in demand. Additionally, the medical group incurred extra expenses for protective measures and crisis management during the pandemic. To address these challenges, she suggested that the medical group might need to invest more in employee training and protective equipment, considering the difficulties faced by frontline staff and the challenges of serving a large customer base, which could impact costs. However, she pointed out that Minsheng Medical Group had managed inventory effectively, which helped in controlling costs. Furthermore, PMH did not incur additional costs since the number of daily services provided did not significantly contribute to cost increases as indicated in Table 4.

Overall, Lin emphasized the need for additional resources, such as personnel and protective equipment, to maintain operations and provide quality care during the pandemic. She acknowledged that investments in additional employees and equipment contributed to costs, underscoring the importance of effective expense management.

Initiatives Taken During the Pandemic

Lin discussed the potential benefits of digitalization and technology adoption in the clinic to reduce costs and drive profit growth. While acknowledging the challenges associated with integrating new technologies, she stressed the importance of keeping up with technological advancements to remain competitive in the industry. She revealed that the CEO was interested in exploring digitalization in the clinic to assess its suitability. However, they also acknowledged the difficulties involved in implementing a digital transformation. Lin shared that PMH had undertaken the project of integrating the health diagnosis system with the hospital system at the backend, with plans of importing the system first and focusing on learning by doing. Additionally, she emphasized the importance of customer satisfaction and the need for efficient and secure methods to share reports and data with clients.

To enhance patient satisfaction and reduce the workload of the frontline staff, the clinic could leverage technology and online resources. Lin suggested utilizing technology to address the issue of dealing with rude customers and the legal implications of such behavior. She proposed implementing screening measures and developing online information platforms to educate patients on proper behavior and etiquette. These measures would not only improve the patient experience but also streamline the staff's workload.

Regarding the impact of the pandemic, Lin highlighted the significant challenges faced by the medical industry, particularly the stringent regulations imposed on medical institutions. She explained that the clinic experienced a considerable impact, resulting in a three-month closure in the middle of 2020. During this period, PMH swiftly implemented epidemic prevention measures and adjusted their work processes. Lin pointed out that the clinic refrained from implementing a layoff policy or salary cuts during this challenging phase. Instead, the clinic prioritized team training and education, utilizing online courses to provide professional development opportunities for its team.

Lin also discussed the changes made to the clinic's business model, including introducing an in-house catering service to retain clients and providing PCR testing services at governmental testing stations and airports to generate additional income during the pandemic. She highlighted that the healthcare industry was facing a significant talent shortage due to significant time and financial investments required for working in the field. The demanding and high-risk nature of the work also deterred many from pursuing careers in healthcare. Lin acknowledged that, although front-line staff typically experiences relatively high turnover, PMH maintained a low turnover rate because employees found the work more accommodating, as it involved a normal commute and did not require working in shifts. She also emphasized the importance of fostering a positive work environment and providing positive energy to the employees. Overall, Lin underscored the need for businesses to quickly adapt their models and make necessary adjustments to survive during the pandemic, underscoring the importance of training and education to help employees navigate these changes [3, 4].

Lin recounted the supportive government policy during the pandemic, which provided a subsidy of at least 70% of the income lost during the lockdown in 2020. She emphasized that this subsidy only applied to the income lost during the three-month lockdown, and the hospital's ability to receive the subsidy depended on its relationship with the government and the overall situation. She said that the hospital's services were disrupted during the lockdown, and the clinic had to mobilize all staff to help with adjustments and repositioning once the hospital reopened. Fortunately, the revenue has since recovered to the levels of 2019 [4].

Lin shared her insights regarding PMH's customer base. She stated that the clinic serves both individual clients (B2C) and group customers (B2B), with the majority being B2B customers at 65%, and the remainder being B2C. The clinic's support for hospitals suggests its presence in the healthcare industry, and its emphasis on delivering exceptional service to VIP clients indicates there exists a demand for premium services, even during the pandemic. The reservation market, comprising personal and corporate customers requiring high-end health check-up services annually or biennially, was considered a unique market with high demand. In addition, individual customers requesting services outside of the regular schedule were also a part of the market. Lin emphasized that safety and privacy are of utmost importance in this market, requiring all necessary protective measures to be taken during the service (5).

Adoption of Existing Digital Technologies

Lin shared that PMH initiated a digital transformation plan in 2018, before the pandemic. It implemented a Customer Relationship Management (CRM) system in 2018 to enhance data analysis and report generation, bolstering the clinic's competitive advantage. While acknowledging the potential for AI and IoT technologies in addressing the challenges faced by the healthcare industry in the future, she pointed out that the healthcare sector was still in a state of transition and

not yet fully prepared to incorporate these technologies. Lin highlighted some of the changes the clinic made in response to the pandemic, including transitioning to contactless payment methods and the introduction of genetic testing products and other online health testing content. These changes encouraged at-home testing and reduced the need for hospital visits.

Looking ahead, she stated that the use of these new technologies would continue to increase at PMH.

TABLE 4

FINANCIAL SCORECARD OF PMH (IN %).

	2020	2021	2022	GAGR
Revenue	100	95	120	19.6
Cost	100	89	79	-21.2
EBITA	100	44	300	200.1
Employment	119	89	137	15.1

Source: The numbers are calculated by this study based on interviews and the company's financial report.

Summary

The ROC is transitioning into an aging society, with the elderly having relatively higher savings income compared to others. In addition, government regulations mandate SMEs to conduct annual health checks for their employees, creating business opportunities in the healthcare industry.

As pointed out by Lin, the majority, or 65% of PMH's revenues come from "B to B" services while the rest comes from "B to C" services. Furthermore, due to the hospital's proximity to the international airport, it experienced a sudden surge in cases at the beginning of the pandemic. These early cases alerted them to the possibility of the pandemic, allowing them to respond swiftly to minimize its impact.

Throughout the pandemic, PMH actively participated in the government's prevention program, providing support to the airport and PCR testing sites. This helped increase the hospital's revenue.

In addition, before the outbreak of the pandemic, PMH implemented the CRM system in 2018, digitizing surveillance data and automating the health check reports. This helped streamline the process and significantly reduced the time taken from the collection of samples to customers receiving the report.

During the pandemic, all procurement was integrated with the hospital, particularly in the purchase of protective clothing. This consolidation of procurement created economic scale, leading to significant cost reductions. Consequently, the increase in revenue coupled with a decrease in expenses resulted in a substantial rise in profits.

During the pandemic, there were no significant changes in talent at PMH. However, at the beginning of the epidemic, it initiated intensive training due to escalating alert levels. This proactive approach enabled their healthcare workers to join the government's testing program in a very short time.

Lin mentioned that PMH is starting the process of digitizing old data and integrating it with new databases. The new process has contributed to the increase in the EBITA in recent years. Looking

ahead, PMH plans to introduce big data analysis and AI technologies to provide accurate services to both corporate and individual customers.

TABLE 5

MANAGEMENT PRACTICES ADOPTED BY PREGETIC MEDICAL HEALTH DURING THE PANDEMIC.

Practices in Management	Adopted (Yes/No)	Most Distinguished Practices (1 to 10)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	Yes	10
3. Digitalization and digital transformation during COVID-19	Yes	10
4. Building a new business model	Yes	10
5. Hybrid and remote work during COVID-19	Yes	9
6. Talent acquisition during COVID-19	No	0
7. New markets and customer development	Yes	10
8. Utilization of macro-level government policies	Yes	10
9. Cost optimization during COVID-19	Yes	10
Total Score	8 out of 9	

Conclusion

FY's CEO, Huang, stressed the advantages of embracing data management technologies and digital marketing innovation to enhance resilience and promote sustained growth. The company's financial performance supported the findings of the case study. FY's strategic moves, such as mergers, acquisitions, and branch expansion in 2018, a year before the pandemic, positioned it as a leading furniture company in Northern Taiwan.

Pregetic Medical Health Co. Ltd. demonstrated remarkable resilience during the COVID-19 pandemic. Despite a three-month closure, the clinic successfully adapted its business model, implemented a CRM system for enhanced data analysis, and prioritized training and education for employees. Its Executive Vice President Lin attributed PMH's success to their swift adaptability to changing circumstances and the implementation of steps to make necessary adjustments.

The common denominator for success in both cases revolved around consistent revenue increase and cost reduction, resulting in higher profits or EBITA compared to the industry average. These achievements can be summarized as follows:

1. Quick decision-making, early digital transformation, strategic business expansion, and adequate financial preparedness, including having sufficient cash reserves or well-thought-out capital increase plans before the pandemic.
2. Active participation in government programs to generate additional revenue. Internally, a focus on education and training prepared these companies to efficiently handle increased revenue post-pandemic.

3. Meticulous cost management during the pandemic, resulting in increased turnover and net profit. These companies kept their costs within reasonable limits, ensuring financial stability.
4. Even after the epidemic was over, these companies experienced continued revenue growth while maintaining lower costs than their peers, leading to sustained net profit growth.

In summary, the success of these SMEs stemmed from their ability to swiftly respond to the pandemic, meticulous planning, and financial preparedness. They also leveraged new technologies to communicate with young customers, creating new revenue streams and participating in government initiatives to generate additional revenues.

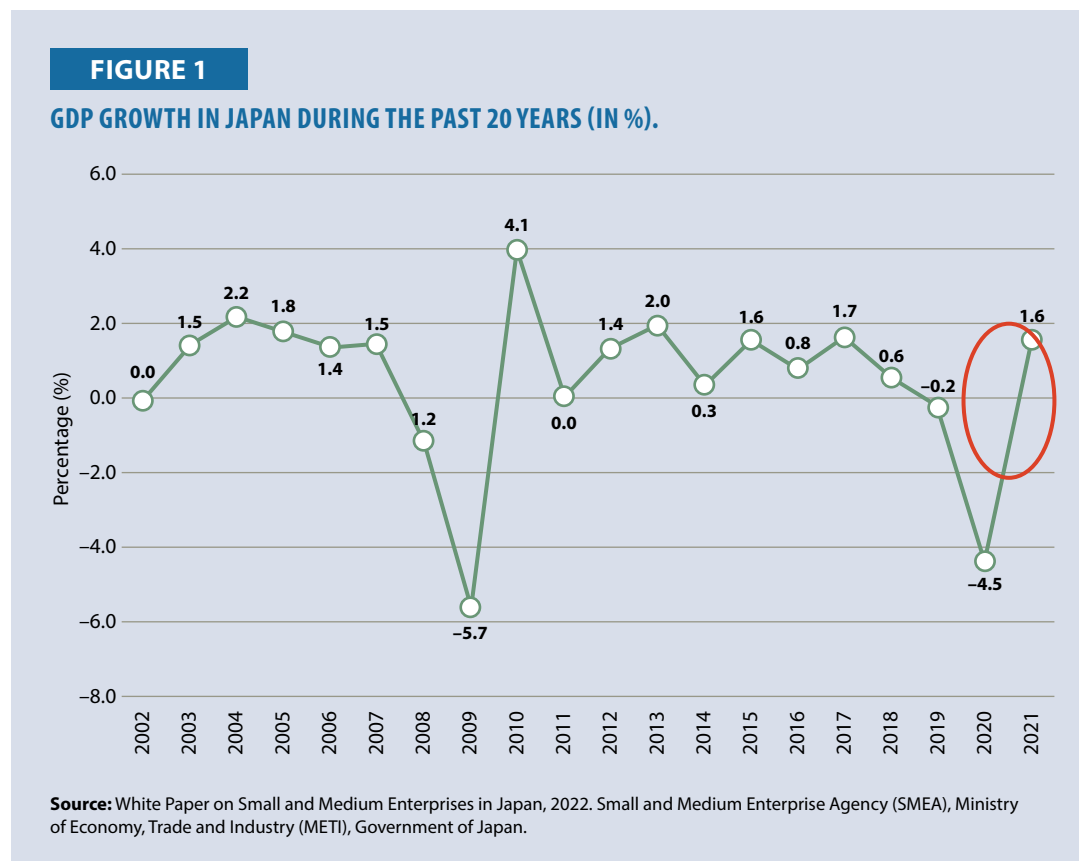
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JAPAN

Economic Overview

Over the past two decades, Japan's economy has seen an average GDP growth rate of 0.5%. However, the economy experienced a sharp decline in 2019 and 2020 due to the significant impact of COVID-19. Nevertheless, there have been notable signs of recovery in the year 2021.



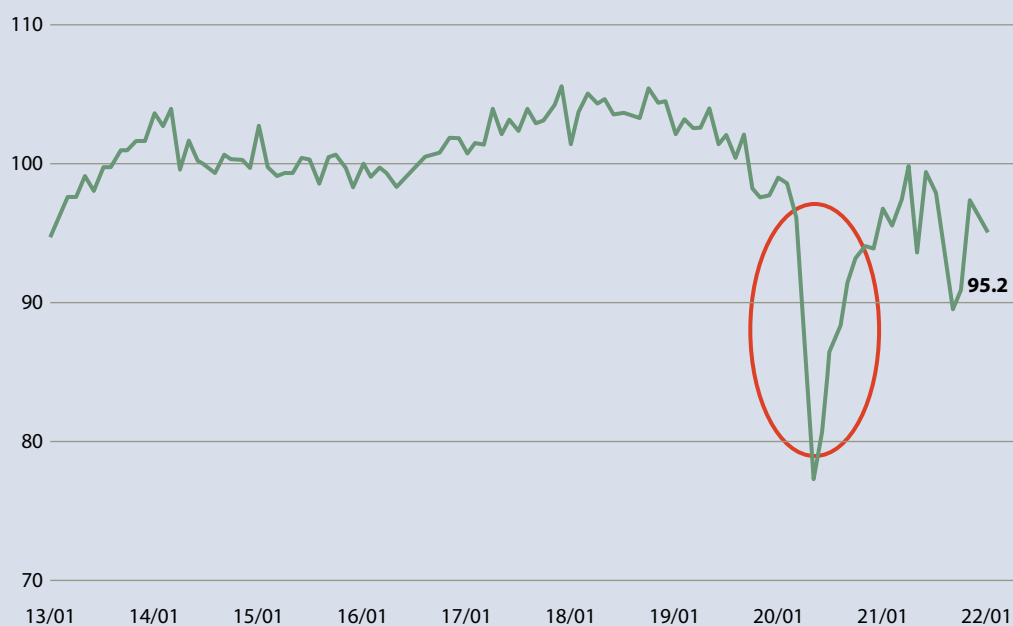
In 2020 and the first half of 2021, Japan's economy faced severe challenges, as illustrated in Figure 2. However, recent data suggest a substantial improvement in the current situation.

The pandemic caused a 0.9% increase in the unemployment rate of Japan in 2020, hitting an overall 3.1%. While the number is not historically high, especially when compared to the 5% or higher unemployment rates observed after the 2008 Financial Crisis of 2008, it can still be considered a matter of concern. However, the rate is now decreasing, indicating a positive trajectory in employment figures.

Figure 4 indicates a decline of approximately 3% in productivity in 2020 compared to 2019. This downward trend began in 2018 due to weak GDP growth. While it is challenging to completely segregate the impact of COVID-19 from the general decline, it is believed that the pandemic played a major role in exacerbating the situation.

FIGURE 2

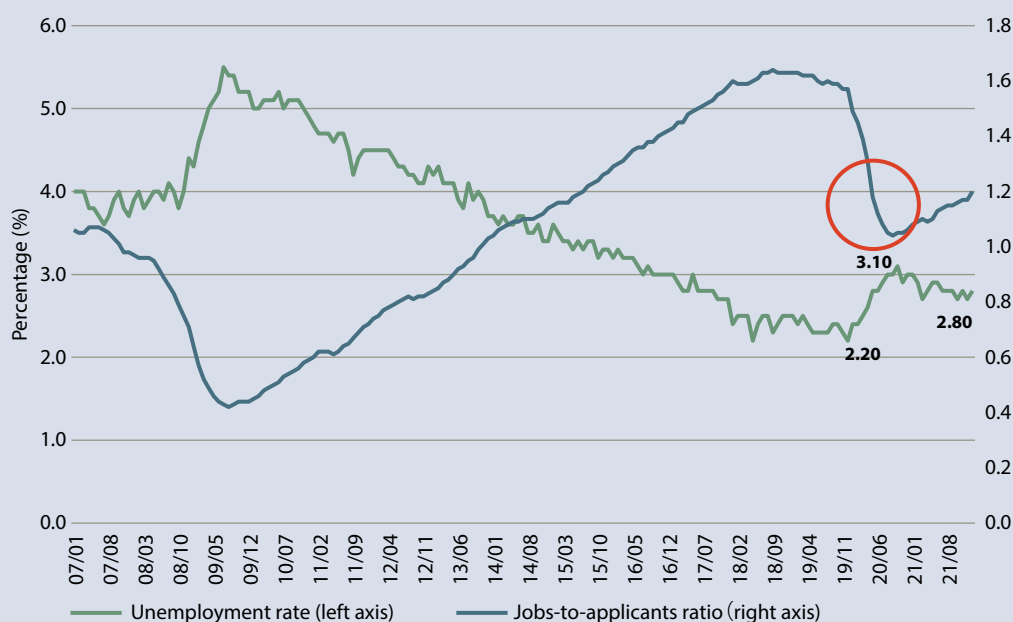
INDUSTRIAL PRODUCTION INDEX (Y2015=100).



Source: White Paper on Small and Medium Enterprises in Japan, 2022. Small and Medium Enterprise Agency (SMEA), Ministry of Economy, Trade and Industry (METI), Government of Japan.

FIGURE 3

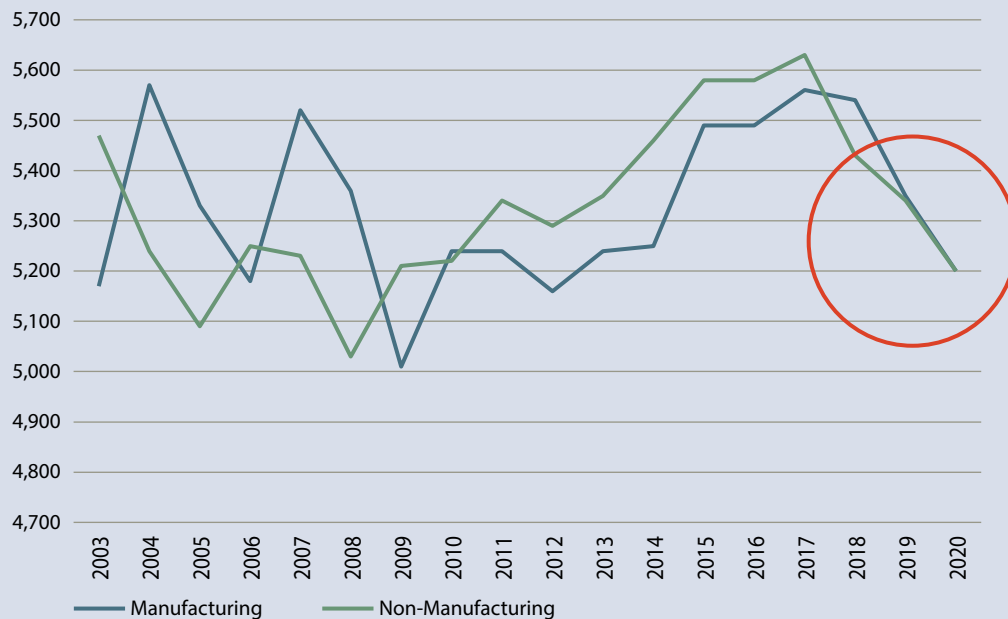
UNEMPLOYMENT RATE AND JOB-TO-APPLICANT RATIO.



Source: White Paper on Small and Medium Enterprises in Japan, 2022. Small and Medium Enterprise Agency (SMEA), Ministry of Economy, Trade and Industry (METI), Government of Japan.

FIGURE 4

SME PRODUCTIVITY TREND (IN '000 JPY PER HC).



Source: White Paper on Small and Medium Enterprises in Japan, 2022. Small and Medium Enterprise Agency (SMEA), Ministry of Economy, Trade and Industry (METI), Government of Japan.

SMEs in Japan

In Japan, SMEs are categorized based on the size of their capital and the number of employees, as outlined in Table 1. Among these SMEs, those with an exceptionally small number of employees are specifically referred to as micro-sized companies.

TABLE 1

CATEGORY AND DEFINITION OF SMEs.

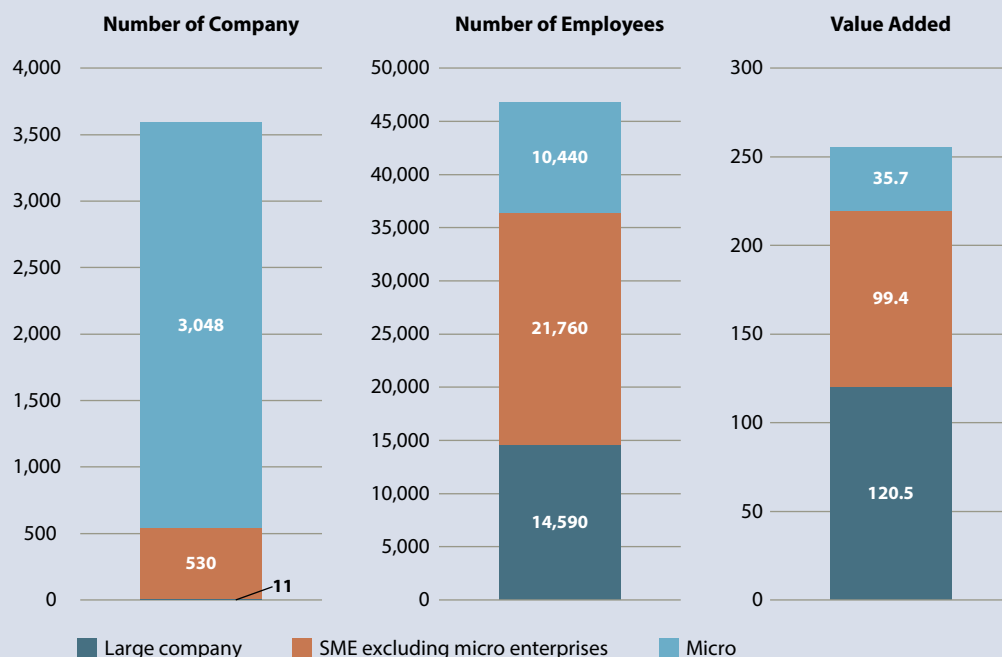
	SMEs		Micro
	Legal Capital Less Than	No. of Employee Less Than	No. of Employee Less Than
Manufacturing	300M JPY USD 2.3M	300	20
Wholesale	100M JPY USD 0.8M	100	5
Service	50M JPY USD 0.4M	100	5
Retail	50M JPY USD 0.4M	50	5

Source: Small and Medium Enterprise Basic Act. Small and Medium Enterprise Agency (SMEA), Ministry of Economy, Trade and Industry (METI), Government of Japan.

SMEs play a pivotal role in the Japanese economy, constituting approximately 99.7% of all businesses (SMEs excluding Micro 14.8%, Micro 84.9%). When categorized by the number of employees, SMEs employ about 70% of the labor force (SMEs excluding Micro 46.5%, Micro 22.3%). In terms of the value added to the country, SMEs contribute significantly, accounting for approximately 53% of the country's total earnings (SMEs excluding Micro 39.9%, Micro 14.0%).

FIGURE 5

NUMBER OF COMPANY, EMPLOYEES, AND VALUE ADDED.



Source: White Paper on Small and Medium Enterprises in Japan, 2022. Small and Medium Enterprise Agency (SMEA), Ministry of Economy, Trade and Industry (METI), Government of Japan.

The SMEs constitute a significant portion of the economy in Japan. However, as highlighted in Table 2, SMEs have consistently lagged behind larger companies in terms of productivity. Therefore, improving the productivity of SMEs is crucial for unlocking Japan's future economic growth potential.

TABLE 2

PRODUCTIVITY IN JAPAN (IN '000 JPY).

Unit: K JPY

	Small	Medium	Large
Median	5,400	8,000	10,990
Upper 10%	13,670	21,250	38,860
Lower 10%	1,350	2,230	3,780

Small: Capital amount <100M JPY

Medium: Capital amount 100M ~ 1,000 M

Large: Capital amount 1,000M

Source: Financial Statements Statistics of Corporations by Industry, 2020. Ministry of Finance. Government of Japan.

The Government of Japan has enacted several laws for the revitalization of SMEs in the country. The government also recognizes SMEs, that engage in distinct business activities in diverse fields, as crucial contributors to the foundation of Japan's national economy. This encompasses providing employment opportunities and empowering individuals with a chance to demonstrate their capabilities while conducting business. The government has implemented policies to support the formulation of growth strategies that leverage the agility of decision-making and the adaptive capacity inherent in the swift decision-making and flexible organizational structures of SMEs.

Government Support to Mitigate COVID-19 Impact

The Government of Japan implemented several supportive measures to help SMEs adversely affected by the COVID-19 pandemic.

- **Sustainability subsidy:** SMEs received a maximum subsidy of JPY2 million (JPY1 million for self-employed individuals)
- **Rent support subsidy:** SMEs were eligible for a subsidy of up to JPY6 million (JPY3 million for self-employed individuals) to alleviate the financial burden of rent.
- **Temporary lay-off subsidy:** Companies received a subsidy equivalent to 90% of the salary for employees who were still hired but unable to work due to job reduction caused by COVID-19.
- **Interest-free, collateral-free financing:** Both governmental and commercial financial institutions provided interest-free loans without requiring collateral.
- **Special debt restructuring:** SMEs were offered special debt restructuring options, allowing for the rescheduling of debt repayment.
- **Municipal subsidies:** Various municipal subsidies were available to compensate for temporary business closure and provide essential financial relief.
- **Travel expense subsidy:** The government supported individuals who purchased travel products from designated travel agencies or booked accommodation through Internet hotel reservation sites. They received a subsidy covering half of the travel fee, up to JPY20,000 per person per night.

These comprehensive measures were instrumental in providing financial stability and relief to SMEs during these challenging times.

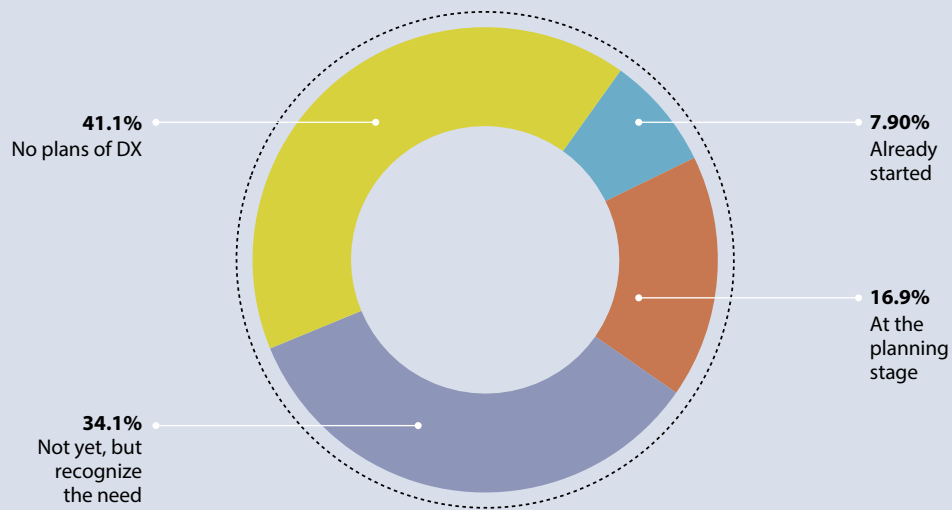
Digital Transformation Among SMEs

In the year 2022, various government organizations surveyed 1,000 randomly selected SMEs. The data depicted in Figure 6 indicates that only 7.9% of companies have embarked on their digital transformation (DX) journey, while half of the companies, or approximately 50% of these businesses acknowledge the necessity of DX but have yet to take specific actions.

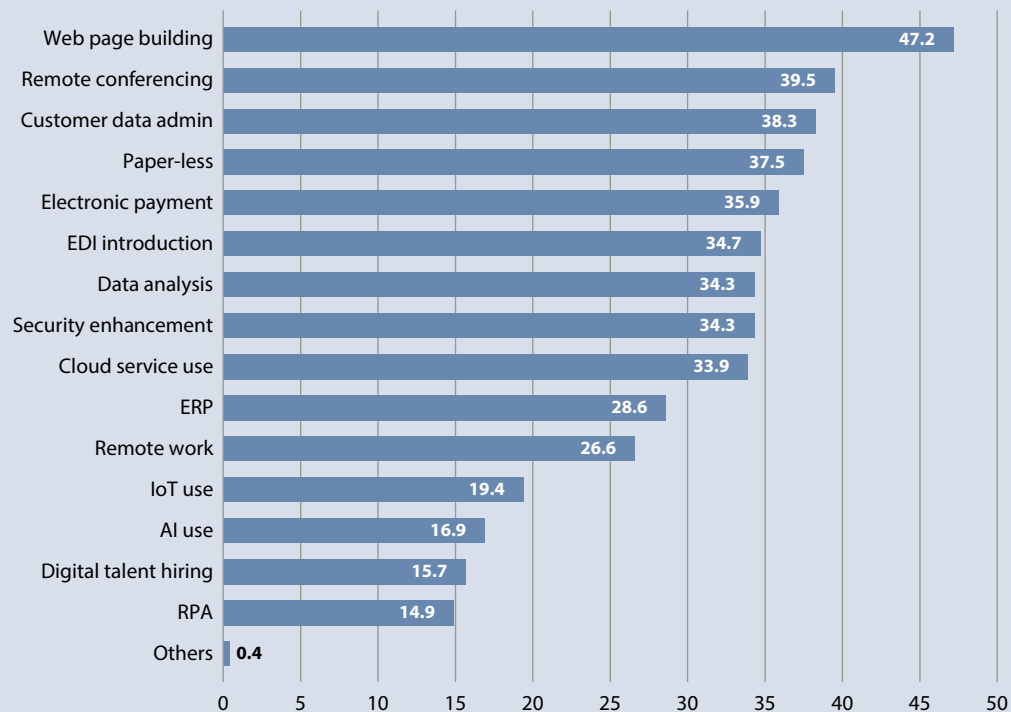
Even more concerning is the fact that over 40% of companies do not recognize the need for DX at all. These findings underscore the sluggish pace of digital transformation within SMEs in Japan.

For the companies classified as “already started” and “at the planning stage” at 7.9% and 16.9%, respectively (a combined total of 24.8%), Figure 7 illustrates the type of DX initiatives they have either introduced or are planning to introduce.

The data highlights that only a minimal fraction of SMEs have embraced genuine DX, entailing fundamental change in business models or the creation of new businesses through the utilization of digital technologies, such as IoT and AI. Although various measures have been introduced, the majority of these initiatives are nothing more than digitization, which replaces analog data or

FIGURE 6**SME DIGITAL TRANSFORMATION JOURNEY.**

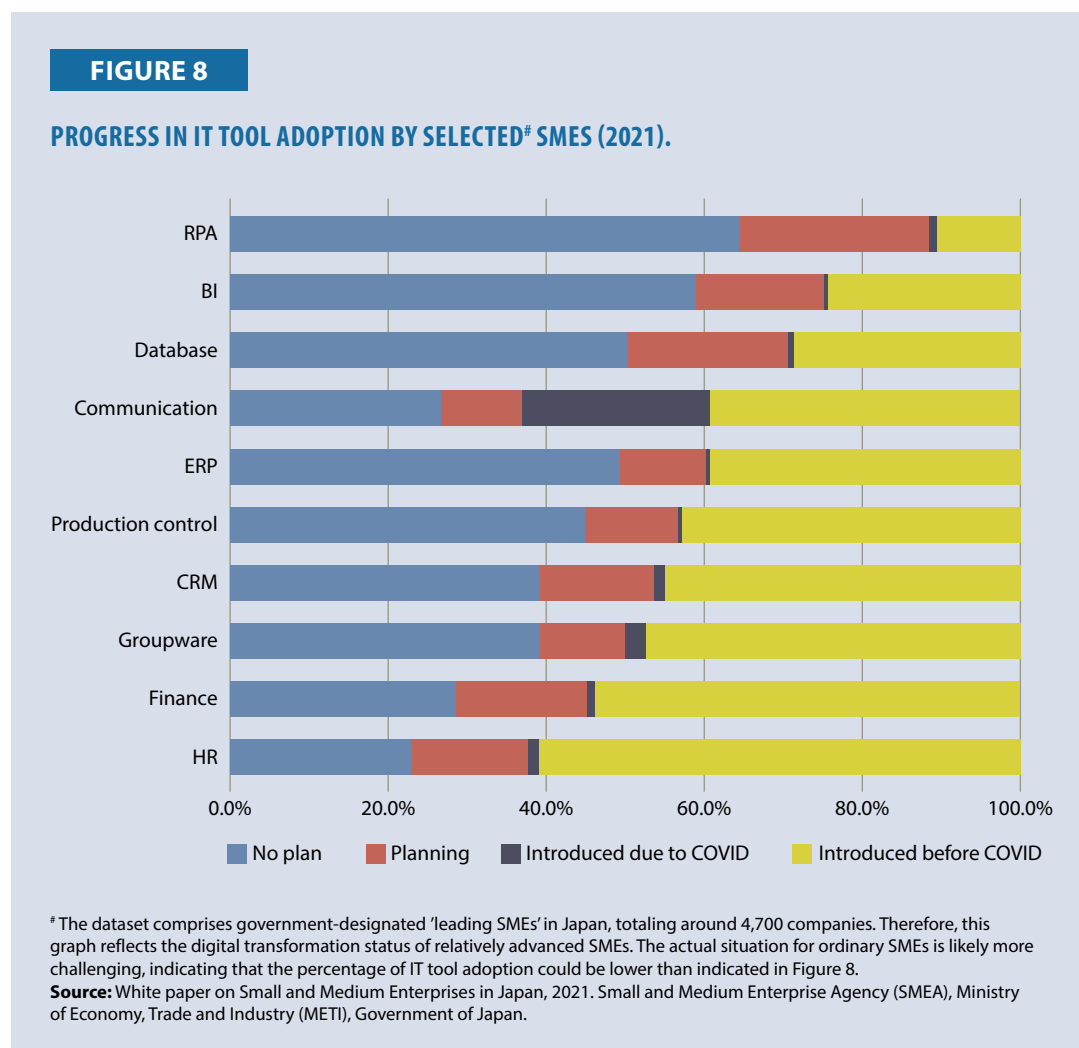
Source: Survey on DX Progress of SME, 2022. SME Support Japan, Ministry of Economy, Trade and Industry (METI), Government of Japan.

FIGURE 7**INTRODUCED AND PLANNED DIGITAL TRANSFORMATION INITIATIVES (IN %).**

Source: Survey on DX progress of SME, 2022. SME Support Japan, Ministry of Economy, Trade and Industry (METI), Government of Japan.

practices with digital data or digital practices. While this initial step is significant, it is crucial to recognize that the pursuit of high efficiency and productivity through DX is a long-term objective.

Digital Transformation and COVID-19

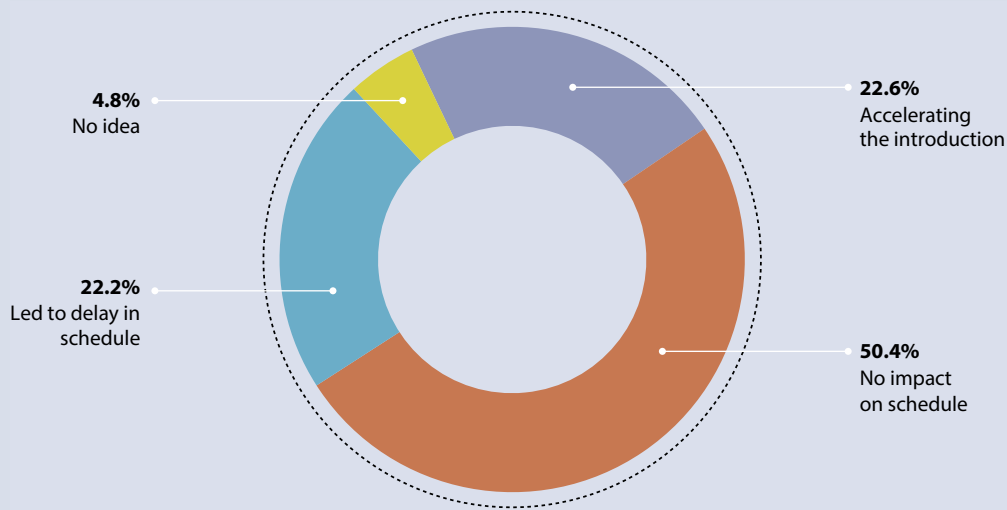


The data indicates that the primary IT tool implemented to cope with COVID-19 was communication solutions, mainly web conferencing platforms. In other words, no other specific tools were introduced to meet the challenges and the impact of the pandemic.

The subsequent survey sheds light on how the pandemic affected the digital transformation schedule of SMEs. This survey focused on businesses that had either initiated or were planning to start digital transformation efforts, accounting for 24.8% of the total, which is the sum of the blue and orange sections in Figure 6. The result indicates that COVID-19 had a relatively minor impact on the overall progress of digital transformation among these SMEs.

Key Takeaways

The pandemic has had a significant negative impact on GDP and productivity in Japan. Analysis of secondary data reveals, that SMEs strengthened their use of communication tools to adapt to the COVID-19 situation.

FIGURE 9**IMPACT OF COVID-19 ON DX SCHEDULE (2021).**

Source: Survey on DX progress of SME, 2022. SME Support Japan, Ministry of Economy, Trade and Industry (METI), Government of Japan.

It can be inferred that this enhanced utilization and facilitated smoother communication both within and outside the companies, and it is conceivable that this smooth communication had a positive impact on business continuity.

On the other hand, COVID-19 had little influence on expediting the adoption of other DX and IT tools such as IoT and AI. In fact, despite the considerable delay in DX progress among SMEs, very few companies took the pandemic as an opportunity to accelerate DX, and the number of companies even considering acceleration was minimal, as indicated by the data.

Therefore, it can be concluded that, apart from communication tools, the progress of DX among Japanese SMEs was largely unaffected by the pandemic. Companies that managed to navigate the pandemic's impact expanded their productivity and achieved favorable business performance through preparations for future uncertainties. This was done by making effective use of existing tools such as CRM and MA. This hypothesis has been examined further through analysis of case studies featuring companies that increased productivity even during the pandemic.

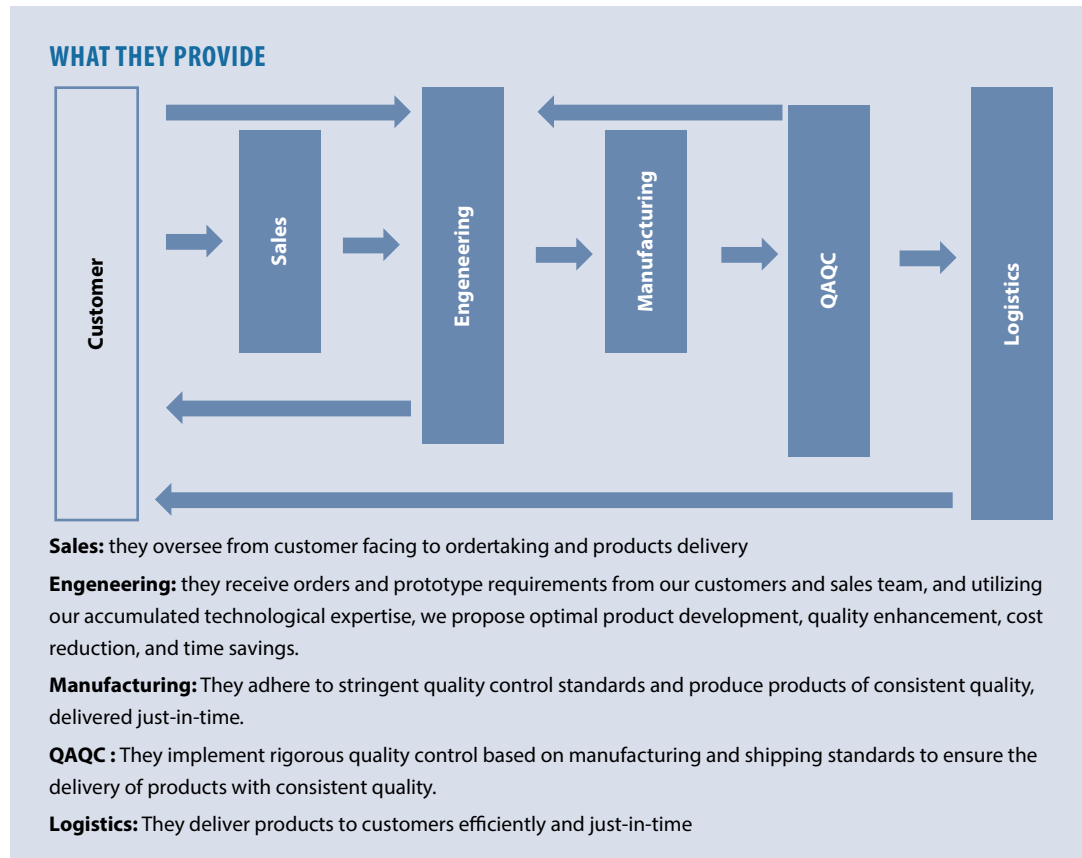
Case Study: Asahi Tekko

Company Overview

Established in 1941, Asahi Tekko Co. Ltd. serves as a primary supplier to Toyota Motor Corporation. The company is located in Hekinan City of Aichi Prefecture in Japan. With a capital of JPY27 million (around USD200,000), the company has an annual sale of approximately JPY15,000 million (around USD111 million) and employs about 400 people. It uses advanced technologies to manufacture engine parts and transmission components that are critical for Toyota vehicles. They have received numerous awards, including the recognition as a best practice DX case by the Information-technology Promotion Agency, Japan in 2022.

Asahi Tekko has a comprehensive production management system that enables them to offer solutions ranging from prototype production to full-scale manufacturing. To deliver better products, the company promises product design based on the knowledge and skills of its technical staff starting from the initial product planning stage.

Products and Services



HOT FORGING



It is a plastic forming method in which metal is heated to high temperatures and shaped. By striking and applying pressure to the heated metal using hammers or presses, the internal voids are eliminated, resulting in a product with higher strength. Simultaneously, this process allows for obtaining a shape closer to the final product, minimizing the need for machining and other processes. Furthermore, the technique of obtaining multiple formed products from a single mold, known as 'multi-

cavity,' contributes to reducing product manufacturing costs. The hammer forging method is a highly rare technique with few companies possessing it, even among the primary suppliers of Toyota Motor Corporation. This method allows for the visualization of the plastic deformation process of metals

ALUMINUM DIE CASTING



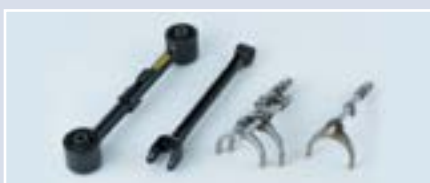
It is a manufacturing method where molten aluminum alloy is poured into a mold and shaped under high pressure. The company specializes in providing high-strength and wear-resistant aluminum die-cast products.

COMPOSITE PROCESSING



This method is used to manufacture highly wear-resistant products through advanced composite technology, combining two pieces into one. This approach allows the production of products with essential functions that cannot be achieved using a single metal.

WELDING TECHNOLOGY



It is a technique used to fuse and integrate two or more components. Through the development of high-precision welding machines, the company provides reliable products for critical safety components.

MACHINING



It is a process that involves cutting and shaping products using cutting tools such as drills, lathe tools, and milling cutters. The company has achieved mass production through fully automated machining technology and significant cost reduction through its small-batch component processing system.

Background of Digital Transformation

In 2013, Asahi Tekko's main business area, the automotive parts manufacturing sector, underwent a dramatic transformation. This shift was driven by CASE or Connected, Autonomous, Shared, Electric trends. Even at the early stage, experts projected that the domestic market would shrink in the long term due to the impact of CASE, setting the stage for intense competition among parts manufacturers.

Recognizing these challenges, President Tetsuya Kimura, who assumed office at the time, felt a sense of urgency. He foresaw an industry landscape marked by intense price-cutting competition, leading to numerous companies struggling with poor performance. Additionally, he identified inefficiencies in Asahi Tekko's production system, where digital technology was not being utilized. In response, the company started setting up an IoT system and its utilization framework in 2014. This initiative led to a significant enhancement in productivity within a few years. Furthermore,

aiming to share this expertise with other companies, Asahi Tekko established a consulting firm, iSTC, in 2016. The purpose was to set up a new business line that could generate higher profits than the traditional manufacturing industry.

Impact of the Pandemic

As shown in Table 3, the pandemic had a substantial impact on productivity in the year 2020. However, by 2021, productivity recovered to surpass the levels recorded in 2019. To understand the reasons behind this rapid recovery, researchers asked whether the company had developed and implemented specific management strategies to counter COVID-19. The findings revealed that no particular measures had been implemented. While a Business Continuity Plan (BCP) existed, it was not specifically used during this period.

TABLE 3

KEY GROWTH NUMBERS OF ASAHI TEKKO*.

	2019	2020	2021
Sales	100.0%	79.1%	96.9%
Number of Employee	417	399	394
Productivity	100.0%	86.1%	116.1%
Productivity in the same industry	100.0%	86.4%	86.8%

Note: * Assuming the year 2019 as 100%.

Source: Asahi Tekko and Financial Statements Statistics of Corporations by Industry, 2021. Ministry of Finance. Government of Japan.

Asahi Tekko's DX Practices

The company initiated its digital transformation journey by utilizing IT technology to record the daily operational status of the production line. A preliminary study indicated that erroneous analog and outdated machines were the root cause of operational inefficiencies. To address this, the company purchased off-the-shelf radio modules and Raspberry Pi devices. Their in-house staff developed custom machine operation monitors suitable for their specific machines. This enabled the company to obtain the day's operational logs even from older machines in a cost-effective manner.

To investigate the causes of line stoppages and address the issues, they introduced a kaizen activity called Line Stop Meeting at the production site. The approach focused on the data obtained from the monitors. The meeting focused on the following key points:

- Daily frequency:** The meeting must be conducted daily basis. Conducting the meeting once a week or less frequently may often result in employees' memories of past incidents becoming hazy.
- Up-to-date data:** Recognizing the importance of fresh information for relevance and accuracy, it was decided that Line Stop Meetings should use data not more than three days old.
- Prompt issue resolution:** To dispel the belief among employees that reporting a problem may not lead to any action, it was decided that every reported problem must be addressed. This approach ensures that problems are promptly resolved and helps prevent a situation where problems go unreported.

- d. **On-site meetings:** Meetings should take place at the production site. Being physically present at the site while examining the issues facilitates problem-solving.

Digital signboards, displaying real-time operational status, were also installed throughout the factory (LCD monitors). These signboards, developed using the same technology as the machine operation monitors, were crucial for providing real-time insights. This was deemed necessary as options available in the market were expensive and did not adapt properly to their specific production site.

Furthermore, they evolved the machine operation monitor to include cycle time tracking. This was achieved by installing generic sensors on the machines to record pulse signals every time a product was completed. By using this cycle time monitor to improve operational rate and shorten cycle time, they achieved an average productivity improvement of 43% across 100 production lines. The most improved line achieved an average productivity improvement of 280%. In 2021, they reduced annual working hours by 40,000 compared to 2015.

Additionally, the implementation of Slack played a pivotal role in their digital transformation efforts. In addition to facilitating remote meetings, Slack became a platform for sharing improvement knowledge within the manufacturing site. It replaced paper-based internal reports, allowing employees to report and share problems and issues swiftly for faster action. For example, there was a case reported where the pathways within the factory were damaged. In the past, someone would have to contact the road maintenance department, the maintenance personnel would write a report, it would go through their supervisor for approval, and finally, the repairs would be carried out. However, an employee post on Slack reporting the damage, including the photographs and comments, prompts the responsible department to initiate repairs and respond faster.

Furthermore, the introduction of machine image inspection, replacing manual visual quality inspection, significantly reduced inspection labor hours. Initially, the introduction of image inspection was postponed since the machine image inspection report was not 100% reliable and there were instances of oversight. The concerns led to a hybrid approach, that allowed 60% of the inspected components to pass stringent image inspection criteria while the remaining 40% underwent visual inspection. This strategy resulted in a significant reduction in personnel requirements from 17 to 10. Currently, the inspection criteria are set at 80%.

Summary

The following are the answers to specific questions that were asked of Asahi Tekko.

TABLE 4

MANAGEMENT PRACTICES ADOPTED BY ASAHI TEKKO DURING THE PANDEMIC.

Management Practices	Adopted (Yes / No)	Most distinguished practices (1–10score)
1. Hybrid working and WFH	Yes	10
2. Agility, flexibility, and reallocation of resources	No	
3. Explore new business model	Yes	8
4. New skilling and talent acquisition	No	

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(Continued from the previous page)

Management Practices	Adopted (Yes / No)	Most distinguished practices (1–10score)
5. Redefine customer market	No	
6. Utilize macro-level government policies	No	
7. Optimize working and operating cost	No	
8. Adopt automation and mechanization	Yes	10
9. Switch to digitization and AI tools	Yes	10
Total score	4 out of 9	

Source: Based on inputs from Asahi Tokko.

The following comments were made by the management while responding to the questionnaire.

- **Remote work and online communication:** Slack was being used even before the pandemic, but the frequency of online meetings and negotiations using the platform has increased post-pandemic.
- **Responsibilities and tasks:** There were no changes or reallocations of responsibilities or tasks to accommodate a decrease in the number of employees coming to the office.
- **New business models:** iSTC, a new business, was started before the pandemic and not as a result of COVID-19.
- **Employee training, education, and recruitment:** For digital technologies, the company mainly relies on on-the-job training within project teams consisting of employees in the field. In any case, it was not triggered by COVID-19.
- **Utilization of government measures:** No use of various government initiatives.
- **Automation and mechanization:** Technologies such as IoT have been in use by the company since before COVID-19 and there was no significant acceleration due to the pandemic.
- **Introduction of new digitalization:** Technologies such as RPA, ERP, AI, and other aspects of information technology have been progressing before COVID-19 and there was no significant acceleration due to the pandemic.

These process improvements require the active involvement of top management. The idea for the machine operation monitor was given by the president, who actively participated in its prototyping. This “lead by example” approach motivated employees to start studying on their own despite the absence of any DX expert.

The president also attended the daily Line Stop Meetings to inspire employees. In addition, the president’s award was given to employees who undertook new challenges or contributed to productivity improvement, further motivating the staff. Overall, the efforts of top management were pivotal in promoting DX in Asahi.

Case Study: Higuchi Manufacturing

Company Overview

Established in 1937, Higuchi Manufacturing Co. Ltd. is a metal product design and manufacturing company located in Kakamigahara City of Gifu Prefecture in Japan. With a capital of JPY27 million (around USD 200,000) and annual sales of approximately JPY4,500 million (around USD33 million) on a standalone basis, it employs about 250 people.

It started as a small business, installing machine tools such as lathes in residential areas. The company gradually expanded its customer base, achieved continuous growth, and ventured into metal press processing in 1967. The experience gained from this expansion became the foundation of their core strength in deep drawing technology.

Since 2000, the company has been focusing on international expansion, setting up manufacturing bases in China and the United States. Currently, they operate three factories in Japan and one factory each in China, Mexico, and the United States.

They have received numerous awards, including the recognition as an excellent case in the “DX Selection 2022” by the Ministry of Economy, Trade and Industry in 2022. The company also received the Chairman’s Award in 2023 at the National Federation of Small Business Associations for the National Small Business Cloud Practice Award.

The company specializes in manufacturing industrial product components, which include a wide range of metal press products, mold design and manufacturing, plastic molding products, welding products, and cutting and assembly products.

They excel in the “deep drawing” processing technology, particularly for materials such as ultra-high tensile steel plates that are difficult to process. Notably, the company’s strength lies in its ability to internally produce everything from mold design to jigs and production equipment. Their customers primarily come from the energy and infrastructure-related industries, as well as the automotive industry.

The company not only manufactures products ordered by the customers, but it also actively engages with them to understand their needs, including discussions starting from the development and prototyping stages. This enables them to understand the problems and suggest improvements for mass production, facilitating rapid setup of product manufacturing lines. This approach is particularly effective when dealing with mass production orders that involve mold design.

Products and Services

60X DEEP DRAWING



The product showcases their expertise in deep drawing. Through the application of their advanced deep drawing technology, they have achieved a processing ratio (L/D ratio) of 60 times in terms of length-to-diameter ratio, starting from a single blank sheet. Replacing pipe components with this deep-drawn product also helps in the reduction of cost.

SHEET FORGING



The company has successfully transitioned from a manufacturing process involving both forging and machining to a 'forging-only' process for production. This shift has resulted in a cost saving of approximately 30% compared to the previous method.

PART INTEGRATION



Previously, two components created through press forming were joined using the welding technique. However, the company has improved the process to achieve complete integration through press forming. This eliminates the welding process resulting in an overall 62.9% reduction in CO2 emissions.

PRESS FORMING OF 980 AND 1180 MATERIALS



By utilizing process and mold design innovations, the company has successfully achieved cold press forming of ultra-high strength materials, which are prone to fracture without the use of hot forming. This breakthrough has enabled them to achieve both weight reduction and cost savings.

DEVELOPMENT OF ALUMINUM ALLOY PROCESSING TECHNOLOGY



Often direct plastic deformation at room temperature causes cracking, making it difficult to process aluminum alloys. However, by focusing on the age-hardening characteristics of the aluminum alloy, the company has developed a processing method that improves formability without compromising material strength. This breakthrough has enabled it to successfully manufacture products using this aluminum alloy. By substituting components originally made from high-tensile strength 590 steel with high-strength aluminum alloys, it achieved a

60% reduction in weight compared to high-tensile steel counterparts.

Background of Digital Transformation

In the metal processing industry, businesses found themselves navigating significant changes, such as the globalization of major players and the imperative to adapt to carbon neutrality. To stay competitive, companies need to continuously improve quality, bring in cost efficiency, and ensure

timely delivery. Recognizing this, the company president discerned that the survival of the company required more than just enhancing metal processing capabilities, such as in deep drawing, but also creating unique value to strengthen the core business.

During this period, a system integrator proposed collaborative research on IoT utilization, which piqued their interest. However, the system integrator lacked any concrete plan and instead asked, “What should we do?” This prompted the realization that the company needed to take the initiative internally rather than relying on external sources. As a result, in 2018, they established an in-house DX team, embarking on their digital transformation journey.

Impact of the Pandemic

TABLE 5

KEY GROWTH NUMBERS OF HIGUCHI MANUFACTURING*.

	2019	2020	2021
Sales	100.0%	120.4%	116.9%
Number of Employee	242	258	258
Productivity	100.0%	122.6%	122.2%
Productivity in the same industry	100.0%	86.4%	86.8%

Note: * Assuming the year 2019 as 100%.

Source: Higuchi Manufacturing and Financial Statements Statistics of Corporations by Industry, 2021. Ministry of Finance. Government of Japan.

As shown in Table 5, COVID-19 has had no impact on productivity. Instead, productivity has continued to improve since 2019. The respondents indicated that no special actions were taken nor any specific management strategies, such as formulating special management policies or crisis management measures, were employed to mitigate the COVID-19 challenges.

Higuchi Manufacturing's DX Practices

The first initiative undertaken by the digital transformation team was the implementation of an operational monitoring system using single-board computers. This system involved reading the operating and downtime status of equipment and storing the data on a server. However, this system only visualized the manufacturing status and did not lead to problem-solving.

To address significant complaints from the production floor, the team worked on enabling real-time capture of equipment operating data for sharing across internal systems beyond production-related functions. This helped significantly reduce the time required for data analysis to resolve manufacturing issues. They also created dashboards that could track production status, get quality information, and map individual skills. Rather than simply collecting and storing information, the company digitized the process to a point where it could contribute to operational improvements on the production floor.

In January 2020, a year after implementing the operational monitoring system and the digitization of manufacturing data, the company implemented a unified system platform that was developed internally. This platform integrated previously independent IT systems across departments, enabling each department to independently extract the required data and utilize it for their specific operations.

For example, in the past, maintenance of molds was performed only after defective products were produced. However, with the introduction of the platform, the mold maintenance department began

constantly monitoring the dimensional data of products and implemented a practice of conducting preventive maintenance whenever dimensions deviated from the pre-defined threshold median value.

The implementation of digital processes led to several notable achievements, such as the reduction in resolution time for machine troubles through the digitization and sharing of manufacturing-related data. Additionally, a reduction in man-hours was achieved by centralizing data collection and aggregation. Previously, these tasks were conducted separately by each department.

The company also developed a smartphone application for remote monitoring of operational status. This application not only provided monitoring capabilities but also allowed for instructions to stop and resume operations. In the event of a malfunction, responsible personnel could temporarily halt operations remotely and issue instructions for resumption after confirming recovery.

Furthermore, in January 2021, the company introduced the 'Checkmaster' system for large-scale press equipment. The system automatically determines the operational feasibility by cross-referencing six types of information, including production instructions, materials, mold maintenance history, operator skills, equipment inspection status, and inspection results. This ensured that the equipment would operate only if all of these criteria were met. This prevents situations where processing is performed without checking the maintenance history due to urgent tasks, leading to a reduction in defects and manufacturing costs.

Strengthening product traceability through DX has also contributed to improved quality. An in-house machine capable of printing 2D barcodes on products was developed and unique IDs were assigned to all products, eliminating the need for batch identification. This data is stored on the internal server and can be managed in conjunction with other production history data. In the event of a defect, information such as the material batch used, material characteristics, and press production history can be immediately identified, enabling prompt implementation of countermeasures and improvement activities.

The company established the role of 'Bridge Engineer' at the outset of the project in 2018 to bridge the gap between the manufacturing floor, which may have limited familiarity with digital technology, and the system development department with limited knowledge of the manufacturing floor. Currently, six Bridge Engineers are leading DX initiatives, fostering a culture where internal issues can be resolved through in-house development to accelerate DX.

In terms of education, over 200 learning materials related to metal processing were prepared and made available through E-learning. These contents have been sold to external companies since 2021. Leveraging their expertise in learning content creation, the company also started selling customized instructional videos in over 10 languages.

Furthermore, the company established an AI technology knowledge transfer system that incorporates the know-how of skilled engineers. Young engineers can easily access and benefit from these techniques, and the entire company, including overseas factories, can share unified, high-quality knowledge and skills.

As a result of these efforts, the company has achieved a 40% reduction in losses due to defects over the past three years. Despite an increase in sales, manpower has been reduced by 20% over the same period.

Summary

The following are the answers to specific questions that were asked to Higuchi Manufacturing.

TABLE 6

MANAGEMENT PRACTICES ADOPTED BY HIGUCHI MANUFACTURING DURING THE PANDEMIC.

Management Practices	Adopted (Yes / No)	Most distinguished practices (1–10score)
1. Hybrid working and WFH	Yes	8
2. Agility, flexibility, and reallocation of resources	No	
3. Explore new business model	Yes	8
4. New skilling and talent acquisition	No	
5. Redefine customer market	No	
6. Utilize macro-level government policies	No	
7. Optimize working and operating cost	No	
8. Adopt automation and mechanization	Yes	10
9. Switch to digitization and AI tools	Yes	10
Total score	4 out of 9	

Source: Based on inputs from Higuchi Manufacturing.

The following comments were made by the management while responding to the questionnaires.

- **Use and utilization of remote work and telework:** The company has been using Zoom before the pandemic. There was no significant enhancement or introduction of remote work.
- **Changes in on-site personnel:** No flexible changes or reallocation of responsibilities and tasks were made in response to the decrease in on-site personnel.
- **New business models:** The company introduced an enhanced e-learning platform to deal with the challenges of conducting in-person training during the pandemic. However, it also started selling the platform to external companies. The sales are relatively small compared to the main business, but the company is making efforts to nurture it as a revenue stream, with a target set around 2025.
- **Employee training, education, and recruitment:** The formation of the bridge engineer (as mentioned in the next section) team began in 2018. An AI technology inheritance project, formalizing tacit knowledge using AI, started in 2019 before COVID-19, and the beta version was released in 2020. These initiatives were not triggered by COVID-19.
- **Utilization of government measures:** No use of various government policies.
- **Automation and mechanization:** Technologies such as IoT have been implemented before COVID-19, and there was no significant acceleration due to the pandemic.

- **Introduction of new digitalization:** Technologies such as RPA, ERP, AI, and information-related aspects have been progressing before COVID-19 and there was no significant acceleration due to the pandemic.

Higuchi Manufacturing has been actively implementing a customized approach to digital transformation since 2018, much before the pandemic. During the three years, the company undertook initiatives that significantly transformed the production site. Starting with the monitoring of the production line, the company proceeded to build a unified digital platform for data sharing, enabling departments to utilize it for their specific purposes. This has helped improve the overall efficiency of the company.

They have also developed a system where machines autonomously determine whether to operate or not, shifting the decision-making from humans to machines. Due to these pre-existing defense systems against the pandemic, Higuchi Manufacturing was able to consistently achieve improved productivity. The key to this success was the direct involvement of top management in all projects, demonstrating strong leadership.

Conclusion

The case studies confirmed the hypothesis that companies which achieved improved productivity during the pandemic had actively pursued digital transformation for several years much before the pandemic. They did not simply react to the pandemic by implementing countermeasures. Asahi Tekko embarked on its digital transformation journey in 2014, while Higuchi Manufacturing initiated a full-scale DX effort in 2018. By the time the pandemic escalated in 2020, these companies were already reaping the benefits of their DX initiatives.

In the manufacturing industry, tangible productivity improvements take time, even with effective measures. This study underscores the importance of early implementation of measures to ensure future resilience. Introducing these measures as early as possible allows for sufficient lead time, crucial for mitigating risks effectively.

Another common factor in these two cases was strong top-level leadership. Despite not being an IT specialist, the presidents of both companies recognized the urgency and led the DX initiatives. Notably, neither company relied on dedicated DX experts or departments. This highlights the importance of strong leadership. Even without the specialized personnel or departments, the two business leaders were able to take the initiative to lead the project and swiftly transform their production sites. These cases also highlight how SMEs, with their streamlined structures and agile decision-making capabilities, can effectively leverage strong leadership for successful transformation.

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REPUBLIC OF KOREA

Economic Overview

The COVID-19 pandemic has presented an unprecedented threat to the global socio-economic structure. What initially emerged as a health crisis transformed into a prolonged socio-economic upheaval. The inherent risks associated with physical interactions compelled governments to enforce stringent measures. Many OECD nations implemented stay-at-home mandates, mobility restrictions, and sanitary protocols, resulting in significant declines in GDP. Nevertheless, the global economy is gradually recovering.

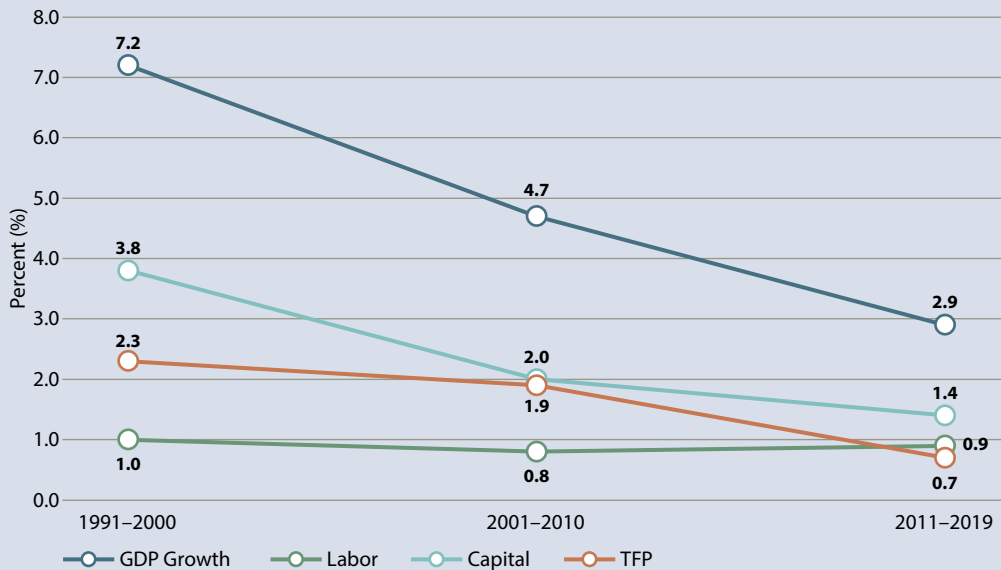
In 2010, the ROK's GDP growth rate experienced a continuous decline following the global financial crisis, primarily due to a decrease in productivity growth. The key factor contributing to the economic slowdown during the period was sluggish productivity growth, rather than a slowdown in capital supply growth observed in the 2000s. In contrast, the contribution of labor supply remained relatively stable during the 2000s. Several studies have also indicated a decline in total factor productivity (TFP) growth in many countries since the global financial crisis.

The growth potential of the Korean economy has expanded significantly over the years, from KRW450.7 trillion in 1990 to KRW901.3 trillion in 2000, KRW1417.8 trillion in 2010, and peaking at KRW1974.8 trillion in 2022. However, the growth rate of the potential, commonly known as the potential growth rate, has witnessed a decline. It averaged 7.3% between 1990 and 1999, decreased to 4.7% between 2000 and 2009, and weakened to 2.8% between 2010 and 2022.

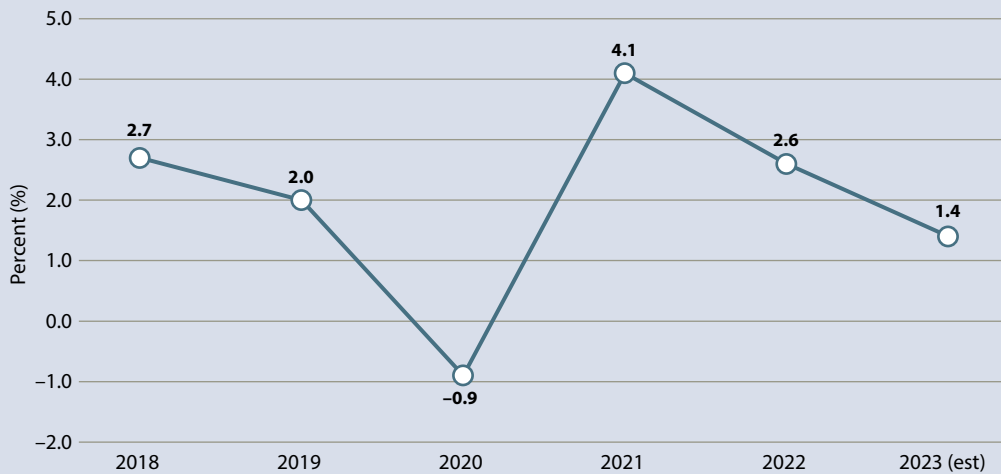
The Korean economy faced another downturn in growth as the COVID-19 crisis began in early 2020. Despite the impact of the pandemic, during the global economic recovery, the resumption of economic activities, and the implementation of expansionary economic policies, the domestic GDP recorded a notable 4.3% increase in 2021 and 2.7% increase in 2022 [3], with exports and consumption serving as the primary driving forces.

When the Korean government announced its economic policy direction in December 2022, it set a 1.6% GDP growth rate target for 2023. However, recent adjustments by major institutions to their growth forecasts have led to the expectation that the government will revise its projection downward. Following the Bank of Korea's revised forecast from 1.6% to 1.4%, the Korea Development Institute (KDI) adjusted its forecast from 1.8% to 1.5%, and the IMF modified its forecast from 1.7% to 1.5%. The average forecast from these three institutions stands at 1.46%, approximately 0.1 to 0.2 percentage points below the government's original projection [2].

The Government of the ROK will likely adjust its growth rate this year to 1.4–1.5%. Several variables contributed to this adjustment, including a slowdown in both the semiconductor and information technology sectors, sluggish performance in the Chinese market, and escalating trends in energy prices along with inadequate business responses. These factors are also closely linked to external variables, international finance, and shifts in the economic environment. Therefore, the Government of the ROK has promised to closely and comprehensively monitor these factors in the future.

FIGURE 1
DYNAMICS OF GDP GROWTH AND CONTRIBUTION OF PRODUCTION FACTORS (IN %).


Source: Based on the data compiled from Long-term Economic Growth and Projection and Implications by Jiyeon K., et al. Korea Development Institute; 3 November 2022.

FIGURE 2
GDP GROWTH RATES IN THE ROK (IN %).


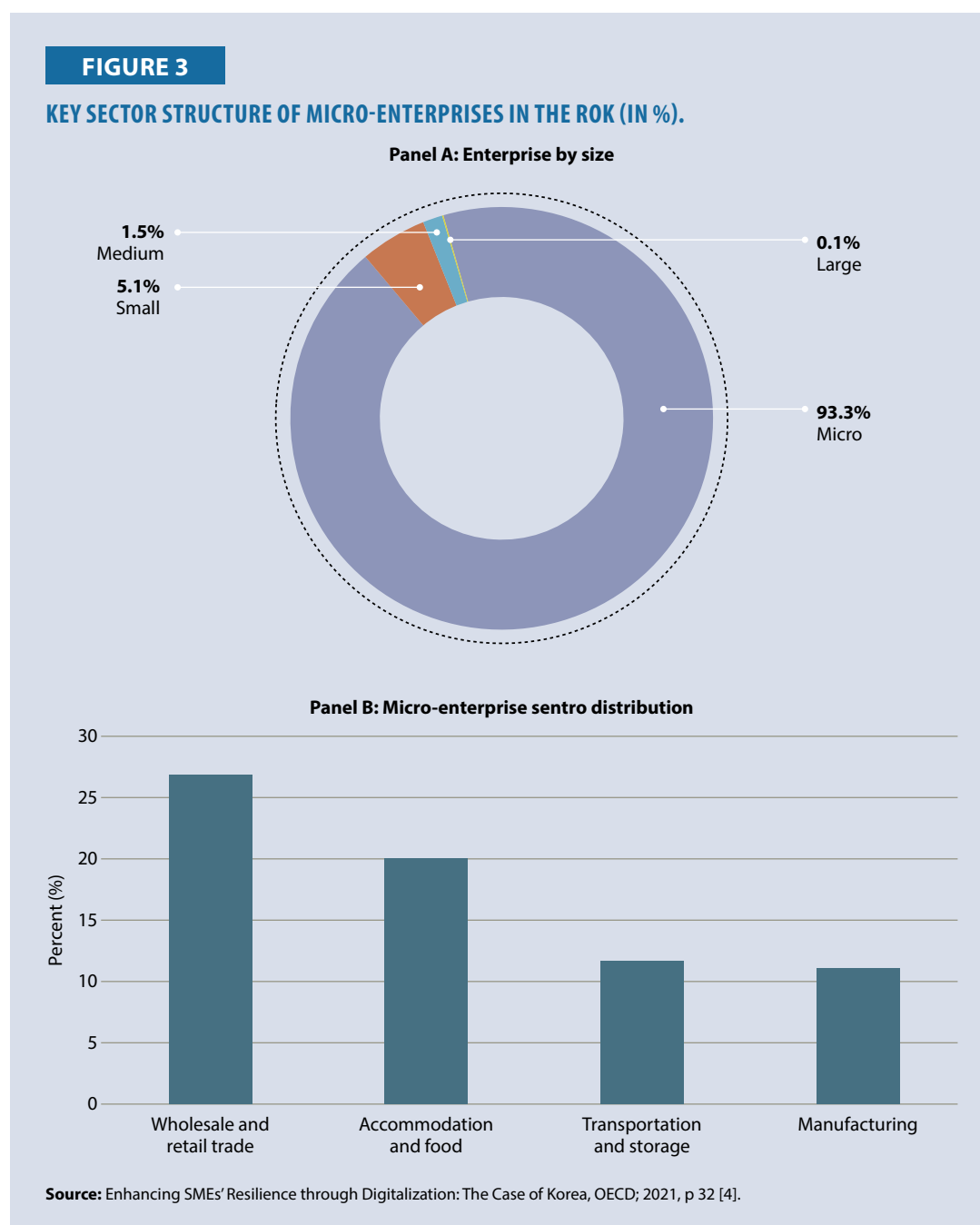
Source: Based on the data compiled from Economic Outlook (2019–2023). Bank of Korea.

Government Measures for SMEs Post COVID-19

The business landscape in the ROK has been significantly impacted by the COVID-19 pandemic, particularly for smaller and medium-sized enterprises. In response to the challenges posed by the pandemic on Korean SMEs, the government formulated several policies and strategies. Notably, the digital transformation of SMEs stands as a crucial component within the country's digital economy framework, spearheaded by the Ministry of SMEs and Startups (MSS) and its affiliated organizations.

In the ROK, there are about 7.28 million SMEs, constituting almost 99.9% of the total number of firms and contributing to 47.2% of the overall sales turnover for Korean companies. Korean SMEs employ around 17.5 million individuals, constituting nearly 81.3% of the workforce in 2020 [3]. Given the substantial presence of SMEs in the ROK and their significant role in employment generation, the challenges and threats posed by the pandemic to the country's SME sectors are even more pronounced.

The COVID-19 pandemic severely impacted micro-enterprises in the ROK due to their higher number, comprising 93.3% of the SME category, as shown in Figure 3. Additionally, the government's implementation of various stringent measures significantly impacted sectors such as food, retail, and tourism, including accommodation and transportation.



Efforts to digitize micro-enterprises have primarily focused on addressing the specific needs of brick-and-mortar businesses in retail and wholesale trade, as well as accommodation and food sectors. Given the generally limited capability of online business operations among micro to small enterprises, policy programs have been designed to provide comprehensive support at various stages, ensuring tailored assistance for these businesses.

Before the pandemic, the MSS offered consultancy services to micro-enterprises, covering the entire business process from product planning to online sales platforms. Additionally, micro-enterprises had the opportunity to receive direct support in listing their products on online marketplaces. Collaborations between the MSS and domestic e-commerce platforms were established to organize timed thematic sales events, facilitating the aggregation of products from micro-businesses that could not independently manage online sales.

Moreover, businesses can avail support in digital marketing, including activities such as creating product images and videos, as well as establishing connections with social network influencers. The previously mentioned public e-commerce platform serves as another notable example of the government's commitment to supporting micro-enterprises in this domain.

In the aftermath of the COVID-19 pandemic, the measures supporting micro-enterprises have seen a significant boost. Specifically, the MSS allocated KRW76.2 billion (approximately EUR57.2 million) towards initiatives aimed at promoting the digital sales of micro-enterprises, marking an eightfold increase compared to 2019. At the onset of the pandemic, the MSS augmented the number of beneficiaries for its existing support programs related to the digitalization of micro-enterprises. It also laid a special focus on assisting small businesses in generating digital content to enhance their online sales activities. In line with this, the Ministry developed policies to guide businesses in creating multimedia content for their digital storefronts and digital advertisements.

Another support measure adopted during the crisis involved the utilization of the public payment system, an existing mechanism available to micro-enterprises. Additionally, during the pandemic, the focus of the policy was on modernizing the facilities of brick-and-mortar businesses. Efforts were also directed towards strengthening digital and online training programs for micro-enterprises and entrepreneurs.

The Government of the ROK's response included specific policies aimed at facilitating SMEs' access to digital systems and services. These measures involve providing tailored support to address the unique needs of SMEs and expanding existing policies during the crisis. Initially, these policies were ad-hoc and temporary, designed to provide vital support to SMEs and ensure their survival. While most of these initiatives were experimental with limited funding, some received significant support and were extended with a broader policy scope. The COVID-19 response measures in the ROK, aimed at promoting digitalization among SMEs, can be divided into two categories: blanket and sector-specific measures. Both policies were designed to support SMEs, but horizontal policies targeted SMEs across various industries and were primarily implemented after the outbreak of COVID-19.

On the other hand, sector-specific policies consist of comprehensive, long-term packages that were strengthened in response to the COVID-19 crisis. These policies specifically target SMEs in particular business sectors, with a focus on manufacturing SMEs and micro-enterprises. The following section provides examples of government policies at different levels, ranging from national to regional, that aim to provide digitalization support to SMEs in both horizontal and sector-specific approaches. Table 1 outlines the government's efforts and policies regarding the digitalization of SMEs.

TABLE 1

SME DIGITALIZATION SUPPORT POLICIES IN THE ROK DURING COVID-19 [4, P35].

Horizontal/ Sectoral	Policy Type	Policy Examples	Timing and Type of Responses
Horizontal (concerned SMEs in all sectors)	Lowering barriers to digital adoption by SMEs	<ul style="list-style-type: none"> Grants for purchasing digital services Shared-use teleconference rooms Operating public sector platforms with lower commission fees Subsidizing the hiring of young digital talents 	Policies newly introduced during COVID-19
	Facilitating digital trade of SMEs	<ul style="list-style-type: none"> Hosting of virtual trade fairs Securing air and sea freight space for SME export 	
	Enhancing cybersecurity of SMEs	<ul style="list-style-type: none"> Grants for purchasing cybersecurity solutions Comprehensive cybersecurity support on monitoring, consultation, and training Digital forensics support 	
	Digitalizing public services for SMEs	<ul style="list-style-type: none"> Creation of a digital one-stop-shop Automation of application evaluation process Usage of chatbots for answering basic inquiries 	
	Promoting teleworking in businesses	<ul style="list-style-type: none"> Grants for purchasing teleworking solutions Consultations on legal aspects and training on teleworking Distribution of teleworking manual on best practices and online security systems 	Policies building on existing measures
	Strengthening SME-large enterprise relationship	<ul style="list-style-type: none"> Connecting SMEs with large companies to help ease their operational bottlenecks 	
	Creating an accommodative regulatory framework for digitalization	<ul style="list-style-type: none"> Clarification on electronic documents and their legal force Facilitating data sharing across government organizations and the acquisition of private sector data for evidence-based policymaking 	
Sectoral (concerned SMEs in targeted sectors)	Modernizing manufacturing SMEs	<ul style="list-style-type: none"> Providing reshoring manufacturers, smart manufacturing facilities, and robotics support Servicing of AI-based cloud computing platform for advanced computation and data storage 	
	Supporting micro-enterprise digitalization	<ul style="list-style-type: none"> Comprehensive e-commerce support from product planning to sales Provision of equipment and expertise for creating multimedia content for digital advertisement Grants for implementing digital technologies and systems in physical spaces, from stores to markets and commercial districts Providing training on the use of digital technology and offering online training 	

Source: Enhancing SMEs' Resilience through Digitalization: The Case of Korea. OECD; 2021, p 35 [4].

According to the Korea SMEs and Startups Agency (KOSME) Annual Report, 2021 [5], published in the spring of 2022, the Small and Medium-sized Manufacturing Production Index for 2021 showed a 3.8% increase from the previous year, reaching 100.6 points. This increase can be attributed to the expansion of vaccination efforts, improved consumer sentiment due to government support policies, and a positive trend in semiconductor exports. The average operating rate also showed a recovery, recording a 3.6% increase from the previous year to reach 71.2 points. This indicates a gradual improvement compared to the overall business slowdown experienced in 2020 due to the COVID-19 pandemic.

In 2021, corporate credit loans exhibited an upward trend, influenced by the impacts of COVID-19, rising commodity prices, increased investment in facilities and real estate, and financial support driven by government policies. However, with the economic recovery and extension of support measures such as maturity extensions and repayment deferrals, the delinquency rate for corporate loans decreased by -23.5% compared to the same period the previous year. Specifically, the delinquency rate for SMEs experienced a larger decrease of -25% compared to the previous year, surpassing the -11.1% decrease observed in the delinquency rate for large enterprises.

Despite the challenges posed by the prolonged COVID-19 pandemic and logistics disruptions, SMEs achieved a significant milestone by surpassing USD110 billion in exports for the first time in 10 years, recording USD117.1 billion in 2021. This represents a remarkable 16.3% increase compared to the previous year and marks the first time that the export growth rate for the SME sector exceeded 10%.

Overall, the SME sector in the ROK has demonstrated a robust recovery against the impact of COVID-19, including improvements in the manufacturing production index, average operating rate, delinquency rate, and export performance. This recovery underscores the resilience and adaptability of SMEs amid challenging circumstances and serves as a foundation for further support and policy initiatives to foster their growth and contribute to the overall economy.

TABLE 2**ECONOMIC TRENDS IN THE SME SECTOR OF THE ROK (2018–21).**

	2018	2019	YoY 2018 Vs. 2019 (in %)	2020	YoY 2019 Vs. 2020 (in %)	2021	YoY 2020 Vs. 2021 (in %)
Manufacturing production index	106.3	106.7	0.4	106.4	-0.3	114.3	7.4
Large Corporation Production Index	107.2	109.6	2.2	110.8	1.1	121.1	9.3
SME Production Index	103.6	99.9	-3.7	96.9	-3.0	100.6	3.8
Average Utilization of Manufacturing (in %)	73.8	73.2	-0.8	71.1	-2.9	74.4	4.6
Average Utilization of SMEs (in %)	73.0	73.3	0.4	68.7	-6.3	71.2	3.6
Corporate loan delinquency rate (in %)	0.53	0.45	-15.1	0.34	-24.4	0.26	-23.5

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	2018	2019	YoY 2018 Vs. 2019 (in %)	2020	YoY 2019 Vs. 2020 (in %)	2021	YoY 2020 Vs. 2021 (in %)
Large corporations' delinquency rate (in %)	0.73	0.50	-31.5	0.27	-46.0	0.24	-11.1
SMEs' delinquency rate (in %)	0.49	0.44	-10.2	0.36	-18.2	0.27	-25.0
Total exports amount (USD100 M)	6,049	5,422	-10.4	5,125	-5.5	6,444	25.7
Small business exports (USD100 M)	1,052	1,009	-4.1	1,007	-0.2	1,171	16.3
Percentage of SMEs in total exports	17.4	18.6	6.9	19.6	5.4	17.3	-11.7

Source: Annual Report 2021. Korea SMEs and Startups Agency; 2022, p.23 [5].

Research Approach and SME Best Practices During COVID-19

In the past three years, the global socio-economic environment has undergone a significant transformation due to the COVID-19 pandemic. This epidemic has presented a considerable challenge to businesses worldwide. However, amid these tumultuous conditions, certain enterprises have risen to the challenge, identifying opportunities amid the chaos, thereby achieving growth and improvement in productivity.

Numerous research papers and consultants have highlighted the crucial role of resilience and innovation for SMEs during these challenging times. Tera Allas, Michael Birshan, et. al. (2021) highlighted that according to the OECD estimates, across 32 countries, 70–80% of SMBs had experienced a drop in revenue of between 30–50% in April 2021. Larger businesses have been slightly less hard-hit as a group, but the pandemic amplified a divergence between leading companies and the rest [6.]

Meanwhile, the two elements, resilience and innovation, have been critical in navigating the pandemic and are recognized as key success factors in tackling global threats. Therefore, this study aims to explore the stringent health policies initiated by different countries, analyze the unintentional socio-economic consequences of these measures, and understand the strategies businesses have adopted to counter these impacts [7–11]

Policies such as social distancing, regional lockdowns, the quarantining of infected individuals, and contact tracing have significantly disrupted socioeconomic activities [8, 10–13]. These repercussions have led to extensive job losses, disruptions in supply chains, and an inflationary effect on prices due to the impaired functioning of relevant industries and those involved in supply chains. In response to these challenges, businesses have prioritized initiatives such as reorganizing workplaces, implementing WHF and hybrid work models [14–15], adopting factory automation, and engaging in digital transformation [16–18]. Additional efforts include creating a completely new business model to target new markets [19] and customers, rapidly compensating for sales shortfalls, and implementing structural changes to support these initiatives [10–12], including new talent acquisition and reskilling and upskilling of the workforce [12, 14, 20, 21]. In tandem with

these corporate efforts, governments [8] have sought to counteract the pandemic crisis by introducing numerous business support policies and programs [21–23].

This study uses a case-study approach, conducting comprehensive interviews to understand the strategies deployed and the successful outcomes achieved by resilient companies amid these challenges. The case studies focus on two selected SMEs that have exhibited exceptional performance during the pandemic, chosen from an initial pool of five companies in each country within the research scope.

In the case of the ROK, the study referred to the annual National Productivity Awards [24] list issued by the Korea Productivity Center (KPC) to identify high-growth and productivity SMEs from 2021 and 2022. Of the five companies shortlisted, each was contacted and invited to participate in the research, but only RS Tech accepted out of five. In the second round of selecting the research target, Megagen joined as the other case study.

Finally, the end goal of this study goes beyond the academic realm of hypothesis formulation and verification. It aims to comprehend, compare, and share the best practices of innovative companies from participating nations, providing valuable insights for other businesses aiming to survive and thrive in current and future crises.

Case Study: Megagen Implant

The COVID-19 pandemic has significantly impacted dental implant treatments, primarily due to the inherent challenges of these procedures, which involve proximity to the patient's mouth and the use of instruments producing aerosols, thereby increasing the risk of viral transmission. In particular, dental implant manufacturers have experienced considerable in sustaining their business operations due to the heightened risk of viral transmission. To illustrate this point, it is noteworthy to examine how Megagen, a leading implant manufacturer, has managed to continue serving its final implant patients and B2B clients in dental clinics. The purpose of this case study report is to examine the strategies and solutions that allowed Megagen to survive and thrive in such a challenging environment.

Company Overview

Megagen Implant Co. Ltd. was established in January 2002 with the primary focus on manufacturing, selling, importing, and distributing dental implants and dental medical equipment.¹ Megagen is derived from the combination of Mega, which means large or great, and Genuine, reflecting the company's aspiration to be a 'Global Total Healthcare Innovator' under the slogan "For Lifetime Smiles." The headquarters are situated in Daegu, about 283 kilometers southeast of Seoul.

The company's founder and CEO, Dr. Park Kwang-Bum, identified dental implant problems during his career as a dentist. Over two years, he established the company with the support of a few dental engineers and obtained various certifications. Driven by the goal of ensuring a complete recovery for his patients, he initiated the development of products designed to alleviate discomfort, enhance oral function, and improve overall health. At the core of Megagen Implants' vision is its mission as a 'global innovator in total healthcare,' dedicated to improving humanity's quality of life.

¹ Korean Standard Industrial Classification #C27191: Manufacture of dental instruments and appliances. This category includes industrial activities producing machinery and equipment for dental use, such as dental drill engines and grinding tools. <https://kssc.kostat.go.kr>.

The development of an implant that can successfully achieve its objective requires a multifaceted approach, encompassing considerations of human biology, mechanical mechanics, materials, design, and aesthetics. Evolving from its initial focus on implant products, the company has expanded through continuous research and development, fostering innovative product development to emerge as one of the world's leading manufacturers of dental instruments. This process led to the creation of a new implant product aimed at addressing the challenges associated with existing implants.

Currently, Seongseo 5th Industrial Complex in Daegu houses the company's first and second factories, along with a research and development center in Daegu Alpha City, which is the company's research and development center. Expanding its offerings to include high-quality dental care off-premises as well as Unit Chairs, the company leads the market as a total healthcare provider.

Megagen Implant is the top exporter of K-implants to Europe and the United States, maintaining this position for three consecutive years in the US and for 10 years in Europe. The company ranks among the top 10 implant manufacturers in the world.

Product Competitiveness

Megagen Implant has established itself as a leader in dental implants with its groundbreaking digital solution, R2GATE. This advanced technology allows the simulation of the entire dental implant surgery process in three dimensions. The company also offers a diverse range of over 2,000 implant types, including the highly acclaimed AnyRidge implant. The AnyRidge implant, known for its "Xpeed surface treatment technology" and "Knife Thread design," has gained international recognition as a world-class product and industry standard. It is suitable for various gum conditions and boasts an impressive success rate. Megagen's commitment to quality is evident through FDA approval and widespread recognition in Europe.

The AnyRidge implant, introduced in 2012, stands out as Megagen's flagship product. It has accumulated over a decade's worth of clinical data and is the only implant to incorporate the exclusive "Xpeed surface treatment technology." This process deposits calcium on the implant's surface, enabling optimal bone-implant integration. The AnyRidge implant's versatility and high success rate have solidified its position as a world-class implant.

Megagen's Blue Diamond implant, launched in 2019, also set new standards for strength and long-term stability. With the use of "Xpeed surface treatment technology," the implant achieves exceptional mechanical stability, up to 200% stronger than conventional products. Its advanced surface treatment ensures precise prosthetic alignment and prevents misalignment issues. The Blue Diamond implant is optimized for digital guide surgery, offering enhanced accuracy and precision. It has received numerous accolades and is Megagen's best-selling implant for seven consecutive years.

To address cases with narrow bone width, Megagen introduced the AnyOne NI implant in 2021. This implant surpasses the strength of previous solutions and is suitable for narrow bone width situations without the need for guided bone regeneration.

Megagen's R2GATE digital dentistry program simplifies implant procedures by automatically analyzing patient data and providing recommendations. It generates precise 3D hybrid images using CT and work model data. R2GATE Lite enhances accessibility and convenience, while digital centers provide faster feedback and enhanced services.

Megagen's N2 dental unit chairs offer ergonomic design and innovative features. They provide improved accessibility, flexible positioning, and dual lights that eliminate shadows during treatment. The chairs also include a camera function for easy storage of medical records and the production of academic videos. Megagen supports chair regular management through their BlueCare Service program.

In addition, Megagen developed the Free Arm Arteo Oral Suction device to prevent cross-infection. It removes airborne particles and features automatic activation and a flexible arm for easy operation. Overall, Megagen's commitment to product competitiveness is evident in its implants, digital dentistry program, dental unit chairs, and oral suction devices. These innovations have revolutionized dental implant procedures and contributed to superior patient care.

Business Performance

Megagen has started to show results out of its innovation and business best practices in 2022 and it has positioned as the top exporter to European Countries for the 10th consecutive year, and the top exporter to the United States for the third consecutive year, according to the Korea Trade Statistics Promotion Institute (2020). In the ROK, Megagen also won the USD100 million Export Tower Award in 2022 and obtained Committee European Medical Device Regulation or CE MDR certification².

In addition, Clean Implant has been recognized for its world-class quality capabilities. It has won the Clean Implant Trusted Quality Award³, the only global implant reliability certification award for Korean domestic companies, seven years in a row. The company has also been recognized by the Ministry of Employment and Labor as the Best Company for Jobs in the ROK, establishing itself as an organization with a 'people-centered management style.'

Increase in Sales

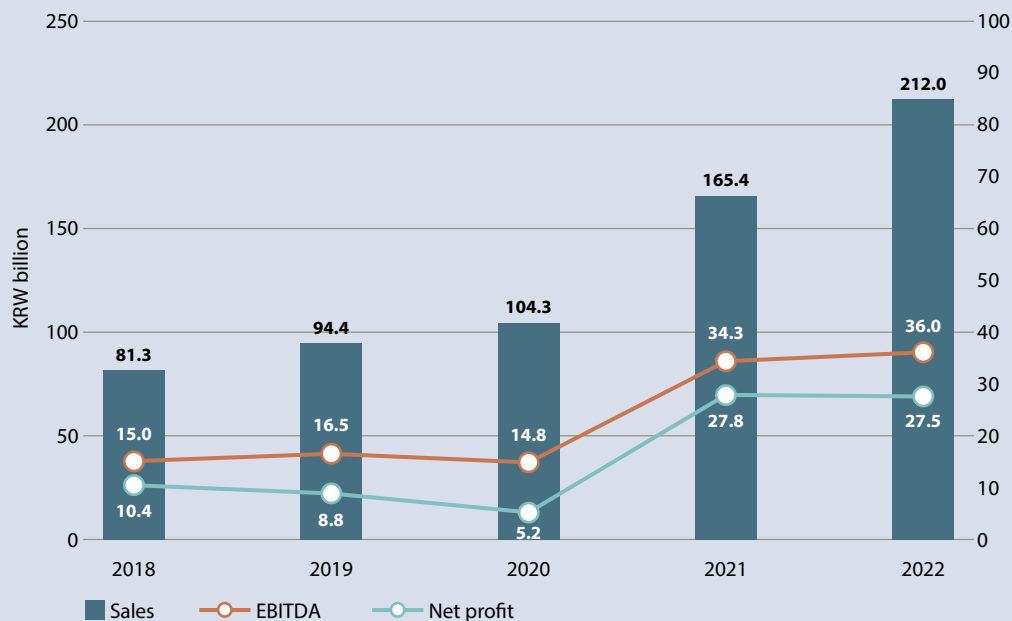
From 2019 to 2022, Megagen Implant experienced consistent growth in its sales revenue, expanding its global presence through the introduction of new products and strategic partnerships. The company's financial performance during the period exemplified its success in leveraging its technological expertise and diversifying its product portfolio to meet the evolving demands of the dental industry. Despite the challenges posed by the COVID-19 pandemic, Megagen achieved notable accomplishments in 2021, with a 16% increase in revenue compared to the previous year. This growth was primarily driven by the exceptional performance of its implant products, particularly AnyRidge and AnyOne.

The company also expanded its international footprint by establishing new branches and distributors in various countries. Megagen also made significant investments in research and development, leading to the successful launch of innovative products such as the Free Arm Arteo oral scanner and the R2GATE digital implant surgery solutions.

Megagen's achievements in 2021 exemplify its resilience and dedication to fostering innovation. The company experienced a remarkable 59% year-on-year increase in sales, amounting to KRW165.4 billion. Additionally, its operating profit surged by 131% to KRW34.3 billion, while the net profit touched KRW27.8 billion.

² Commercializing medical devices in the European Union requires a CE marking demonstrating compliance with the medical device regulations. The CE marking indicates that the legal manufacturer has assessed the device and that it meets the General Safety and Performance Requirements under the MDR 2017/745.

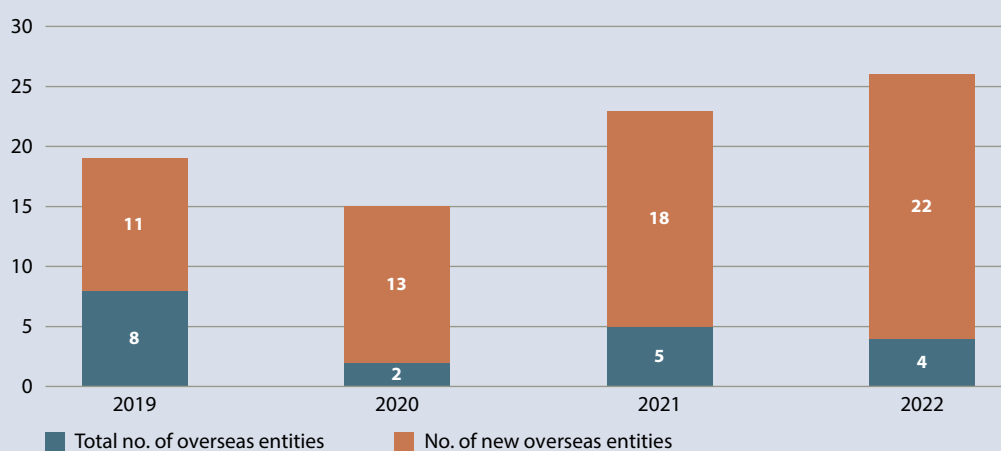
³ German non-profit foundation Clean Implant Foundation examines implants worldwide and awards only those that meet high-quality standards. Megagen is the only company in the ROK to win the award for seven years. www.cleanimplant.com.

FIGURE 6**SALES, EBITDA, AND PERFORMANCE OF MEGAGEN IMPLANT (2019–22).**

Source: Annual Business Report 2019–2022. Megagen Implant.

Expanding Global Sales Network

During its early stages, the company focused on the European and American markets to understand their unique characteristics. Currently, Megagen Implants is forging a global network spanning over 100 countries with global sales offices in 12 countries. Dentists worldwide are conducting numerous clinical cases using their products. Notably, the company has dominated the European and American implant markets for a long time. By the end of 2021, 72% of its total sales came from exports, with 29% in Europe, 22% in Asia, and 11% in the Americas.

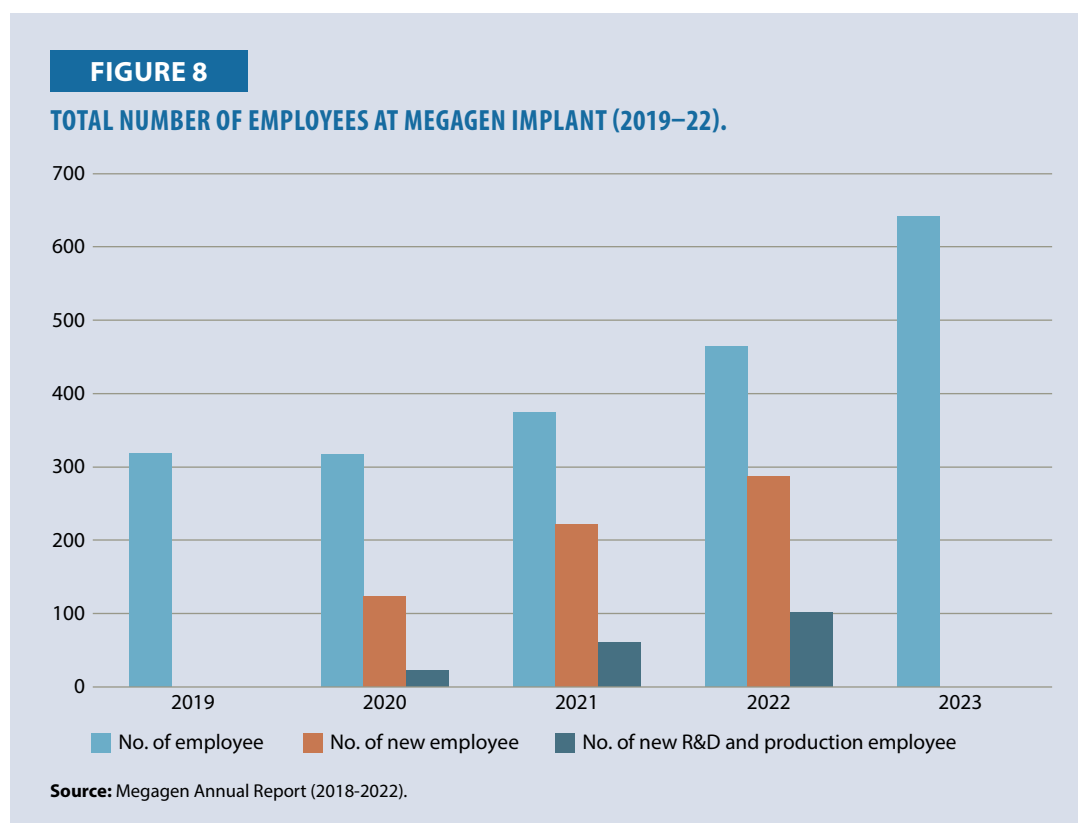
FIGURE 7**OVERSEAS EXPANSION BY MEGAGEN IMPLANT (2019–22).**

Source: Evolution of Overseas Corporate Entities: 2019–2022. Megagen.

Amid the COVID-19 pandemic and its impact on markets and clients, the company has prioritized expanding its overseas business network. They currently have 22 overseas subsidiaries and plan to open new ones in the United States, Mexico, Switzerland, Germany, and France by 2022. This strategic approach aims to counter the challenges posed by shrinking markets and demands.

Talent Acquisition and Reskilling

Megagen experienced a significant increase in hiring, particularly in research and development, and production engineers, as the COVID-19 pandemic began to escalate in the ROK in 2020. By the end of 2022, the total number of employees had increased by approximately 103% compared to 2019.



In 2020, Megagen hired 123 new employees, of which 22 were R&D and production employees, accounting for about 18% of all new hires. In 2021, R&D and production employees accounted for 61 out of 221 new hires, an increase of about 28%. Similarly, in 2022, R&D and production employees accounted for 101 out of 286 new hires, indicating a steady increase, with R&D and production staff accounting for 35% of the total new employees. This highlights the significance of hiring R&D and production staff for Megagen during the pandemic.

CEO Park's commitment to the well-being of his employees and the business was notably steadfast. During the April 2020 coronavirus outbreak, the company's sales dropped to zero. During this period, many competitors were laying off employees to navigate the downturn as sales plummeted. However, Park took a different approach and consulted with his Chief Financial Officer (CFO) to determine how long the company could sustain itself with zero revenue. The response was eight months. Instead of resorting to layoffs, Park instructed his staff to utilize this time to address neglected tasks, focus on efficiencies, and engage in research and development.

Over the next two months, the company dedicated efforts to R&D and other projects. As a result, employees who had left for perceived security at competitors started returning, boosting confidence in the company. This strategic decision helped Megagen survive the initial challenges posed by the pandemic and also helped to hire quality labor from its competitors.

After about three months of no sales, orders began to pour in for Megagen, from both domestic and international sources. This resurgence in business was reflected in the company's workforce, with the number of employees increasing from 300 before the outbreak to 580 by the end of June 2023. Furthermore, the company's sales also witnessed a substantial increase, rising from KRW104.3 billion in 2020 to KRW165.9 billion in 2022.

"If we had let go of employees to save the company at the beginning of the pandemic, we would not have been able to fulfill the rush of orders, and we would have lost all the people we cared about," Park emphasized, adding that the company's investment and faith in people led to its growth.

Expansion of Production Capacity

The investment in digitizing the production processes in the manufacturing facility, which started before the COVID-19 pandemic, proved to be successful. In 2020, there was a significant increase of 21.82% in manufacturing capacity compared to the previous year, producing a total of 2,803,866 implant units. However, in 2021, with the near completion of the digitization process, the annual total implant production saw a substantial increase of 94.74% compared to the previous year, reaching a total production volume of 5,460,151 implants.

TABLE 3

FLUCTUATIONS IN THE QUANTITY OF ANNUAL PRODUCTION AT MEGAGEN IMPLANT (2018–22).

	2018	2019	2020	2021	2022
Abutment	1,249,862	1,185,916	1,489,448	3,085,309	2,850,139
Fixture	931,761	1,115,785	1,314,418	2,374,842	2,714,813
Total	2,181,623	2,301,701	2,803,866	5,460,151	5,564,952
Growth Rate (in %)		5.5	21.8	94.7	1.9

Source: Megagen Annual Report (2018–2022).

Megagen's achievements are particularly noteworthy considering they were attained despite several unfavorable external factors, such as global logistics challenges and the COVID-19 pandemic that slowed the global economy.

The company's Vice President of Overseas Sales, Austin S. Park, succinctly explained, "These results stem from continued improvements in business structure, research, development, and a commitment to quality improvement. Additionally, the company has obtained various international certifications through bold investment and innovative management."

Challenges Vs. Opportunities

Logistics Chaos in Global Business

The outbreak of COVID-19 was initially reported in Daegu, the city where the company's headquarters and manufacturing facility is located. As the disease spread throughout Daegu and Gyeongsangbuk-do in January 2020, the Korean public health authorities began addressing the issue.

By the end of the 2020 outbreak, 65% of confirmed cases were reported in Daegu, 40% in Gyeongsangbuk-do, and 26.7% in Ulsan.⁴ This situation posed a risk to Megagen, potentially leading to the closure of its Daegu site as well as restrictions on employee movement and export activities.

During this period, overseas sales accounted for only 10% of the total sales in the previous quarter. Due to the severe impact of COVID-19 and subsequent lockdowns in global markets, sales operations and order processing were severely disrupted.

Nature of the Dental Clinic Business

The direct impact of the COVID-19 pandemic on hospitals has been particularly pronounced in dentistry, given the nature of its treatment, which involves opening the mouth and removing saliva. Consequently, patients in need of dental treatment avoided visits to the dentist. Besides, dentists were unable to perform normal procedures due to the constantly changing quarantine guidelines established by government health authorities. Despite efforts to recover from the pandemic, widespread acceptance of the unpredictable nature of the virus, with the emergence of new mutations, made it challenging to anticipate what will happen next.

Investments in Digitalization and Digital Transformation

The company made significant investments in automating its product production lines since the early days of the COVID-19 pandemic until 2022. Additionally, there is a focused effort on investing in software development. Leveraging robots and automation technologies, the company is streamlining processes, analyzing employee behavior, and substituting some tasks with delivery and work robots.

This strategic approach has led to the replacement of simple and mundane tasks previously performed by humans with robots, leading to a significant increase in productivity. The utilization of 3D printing has automated orthodontics. In cases where a patient's teeth are deformed, a new model can be created, and the progress in terms of time, cost, and pain can be monitored. Consequently, 3D printing has proven to be a time and cost-saving innovation for both dentists and patients.

Implementing Agile Business Process

In the early spring of 2019, as COVID-19 began to spread in the Daegu region, the company's executives, including the CEO and overseas sales representatives engaged in brainstorming sessions and prepared for various worst-case scenarios to address the situation. One of their initial actions involved relocating products from the company's headquarters and production factory to the Seoul area to mitigate potential logistics disruptions.

Strengthening Trust with Employees, Partners, and Domestic Dental Hospitals

Given the nature of the industry, the company maintained a substantial stockpile of masks, allowing them to provide sufficient masks to their employees and partners to protect their health even during the challenging period of mask shortages. Additionally, the company through video conferencing, emphasized to its overseas sales representatives that staying healthy and safe was more important than financial concerns.

Despite reaching a point where the company had to halt production and faced a financial crisis, CEO Park refrained from laying off employees or reducing salaries. Instead, the company

⁴ Source: Two-year report of COVID-19 outbreak from 20 January, 2020 to 19 January, 2022 in the Republic of Korea. National Center for Medical Information and Knowledge.

utilized video conferencing systems to provide education and enhance the capabilities of internal employees and overseas partners. Internal employees received education related to ‘performance management’ to facilitate their growth, while overseas partners underwent in-depth technical education.

In addition, the company extended support to dental clinics facing difficulties by providing disinfection service, contributing to individual clinics’ hygiene, and ensuring a safe environment for patients. The following training programs were implemented for employees:

1. Production Understanding Project (Starting in October 2022)
2. Introduction of a Competency-based System (2022)
3. Implementation of a Work Circulation System for Managerial Training (2022)

Corporate Culture and ESG Management Practices

Megagen has demonstrated remarkable commitment towards ESG practices through various initiatives.

- Striving to contribute to the healthy lives and happy smiles of people worldwide, the company aims to go beyond simply selling products and become a global total healthcare innovator.
- Designing implant ampoules for reuse as educational playblocks contributes to environmental protection and fulfills the company’s social responsibility.
- Participating in various medical support initiatives, including providing implants and other medical aid to the needy, such as the recipients of basic livelihood, and low-income and multi-cultural North Korean defector households, through an agreement with Angel Enterprises.
- The company endeavors to give back to society by donating KRW10 billion to the Seoul National University School of Dentistry for the development and future of the Korean dental industry and dental medicine.
- As part of its ESG management, Megagen provides implant treatment support and oral hygiene products to the Korean Army training center.

Megagen’s commitment to ‘human-centric’ corporate culture has evolved into a robust ESG initiative, “Megagen will continue to be a company that believes in and practices the power of ‘human magic’ while pursuing a noble purpose with the goal of ‘100 year company, 100-year Megagen’. We will create a better world and take the lead for the health and well-being of people around the world,” CEO Park emphasized while delivering the Humane Entrepreneurship Initiative award speech at the conference of the International Council for Small Business jointly held by the UN and HEI on 27 June 2022.

Summary

During the COVID-19 pandemic, Megagen achieved tremendous success in showing high performance in increasing sales, expanding its workforce, and expanding overseas operations through the following strategies and initiatives:

- **Technological innovation and productivity improvement:** Megagen focused on enhancing product competitiveness through technological innovation and improving productivity. It effectively implemented automation technologies and optimized its production system to significantly improve productivity.
- **Workforce expansion:** The company made significant efforts to expand its workforce, particularly in overseas subsidiaries, to support its global market expansion and ensure sustainable growth.
- **Enhancing global marketing activities:** Megagen prioritized strengthening its overseas marketing activities and developing strategies to identify and meet global demand effectively.
- **Strengthening online sales:** Recognizing the challenges of face-to-face sales during the pandemic, The company actively reinforced its online sales channels and implemented robust online marketing strategies to maintain and increase sales.
- **Active M&A strategy:** Megagen pursued an active M&A strategy, enabling it to expand its global market presence and establish a greater number of overseas subsidiaries.

As a result, 8 out of 9 essential management practices were adopted and Megagen has been able to successfully turn around the negative impact of the COVID-19 pandemic. Its early engagement with digital transformation and efforts to enhance productivity through automation can serve also as an example to others. The company's quick response to the problems it faced, as well as its consistent digital transformation effort to educate employees and transfer technologies to overseas partners, have been deemed as positive business outcomes.

TABLE 4
MANAGEMENT PRACTICES ADOPTED BY MEGAGEN IMPLANT DURING THE PANDEMIC.

Practices in Management	Adopted (Yes/No)	Net Promotion Score (1~10)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	Yes	10
3. Digitalization and digital transformation during COVID-19	Yes	10
4. Building a new business model	Yes	9
5. Hybrid and remote work during COVID-19	Yes	9
6. Talent acquisition during COVID-19	Yes	9
7. New market and customer development	Yes	10
8. Utilization of macro-level government policies	Yes	8
9. Cost optimization during COVID-19	No	
Total Score	8 out of 9	

Source: Based on inputs from Megagen Implant.

Through a carefully crafted set of comprehensive strategies and meticulously executed initiatives, Megagen adeptly navigated the formidable challenges posed by the COVID-19 pandemic. The company emerged triumphant fortifying its competitive advantage in the dynamic global market landscape. Megagen successfully overcame the challenges posed by the COVID-19 pandemic, enhancing its competitiveness through strategic management initiatives.

Case Study: RS Tech

The COVID-19 pandemic has had a profound impact on the business community in the ROK, particularly smaller and medium-sized businesses [4]. In the second part of the Korean case study, RS Tech Co. Ltd. (RS Tech) an SME, is presented to demonstrate how the company successfully navigated the COVID-19 pandemic despite the challenging environment. RS Tech implemented several strategies and initiatives to overcome the challenges posed by the pandemic. This case aims to provide valuable insights from the experience of RS Tech, which could be useful for other companies facing similar situations in the future.

Company Overview

RS Tech was established in November 2012, with headquarters located 130 kilometers away from Seoul in Cheongju, Chungcheongbuk-do, the ROK. The company is listed under the category of manufacturer of other electrical equipment and primarily manufactures, repairs, and modifies plasma-forming devices used in semiconductor chips, displays, and solar energy technologies.

In the spring of 2013, RS Tech's largest customer, SK Hynix, had its first transaction with the company for a repair service on the company's equipment since Wang Jong Kim took office as CEO. During this period, he focused on the company's vision, direction, and future business continuity. At that time, when RF components were not well-known in the ROK, most manufacturers were located in the United States, Japan, and Germany.

As a result, the decision was made to manufacture the product using the company's technology. The engineers who founded the company with the CEO had nearly 20 to 30 years of experience in this field and collaborated on the development of new equipment intending to achieve the first class in the world, at least in the field of sensors. From its inception, the company has focused on developing new products and utilizing its technology, believing that the only way to maintain and expand is to develop new technology and grow with it.

Repair Service and Product Competitiveness

RS Tech specializes in manufacturing, modification, and repair of various equipment, including RF Generators, RF Matchers, Remote Plasma Source (RPS), Impedance sensors, water leak detectors, and RF Splitters. The company also offers comprehensive repair and maintenance services.

The consistent growth of RS Tech is attributed to its repair services for RF generators, RF Matcher, and RF Plasma equipment, along with the continuous development of new localization products every year. This foundation has contributed to the expansion of semiconductor businesses in key markets such as China, Japan, Singapore, and the United States. The company's proactive investment in new RF products has generated numerous evaluation requests from both domestic and international customers, positioning the company for a leading role in the future development of RF products.



The RF Power System is a device that supplies high-frequency power to a chamber to produce plasma in all semiconductor manufacturing equipment. High-frequency power is provided by an impedance-matching network and an RF Power Generator.

As semiconductor circuit patterns become finer and three-dimensional, the process becomes intricate, requiring a diverse range of frequencies, spanning from 2MHz to 3.2MHz, and 13.56MHz. Various functions, including pulse and frequency variability, are crucial. Key development factors include suppressing arcs generated during the process, minimizing matching time and reflected power, monitoring dynamic changes in the chamber environment during the process, and addressing instantaneous power outages.

To improve the integration of semiconductor circuits, the deposition and etching processes of RF Multi-Power Systems using Pulse need to be improved due to 3D stacking and line width refinements. Most domestic companies in the ROK focus on repair and laboratory assembly, while only three to four major overseas manufacturers produce RF Power Systems (high-frequency power units) for semiconductor parts equipment.

Business Performance

Following the successful completion of new product development, RS Tech plans to continue its research and development efforts, focusing on Dual Pulse and Generator products and related additional models to expand its product lines. The company also aims to optimize production processes to ensure mass production technology and provide competitive pricing.

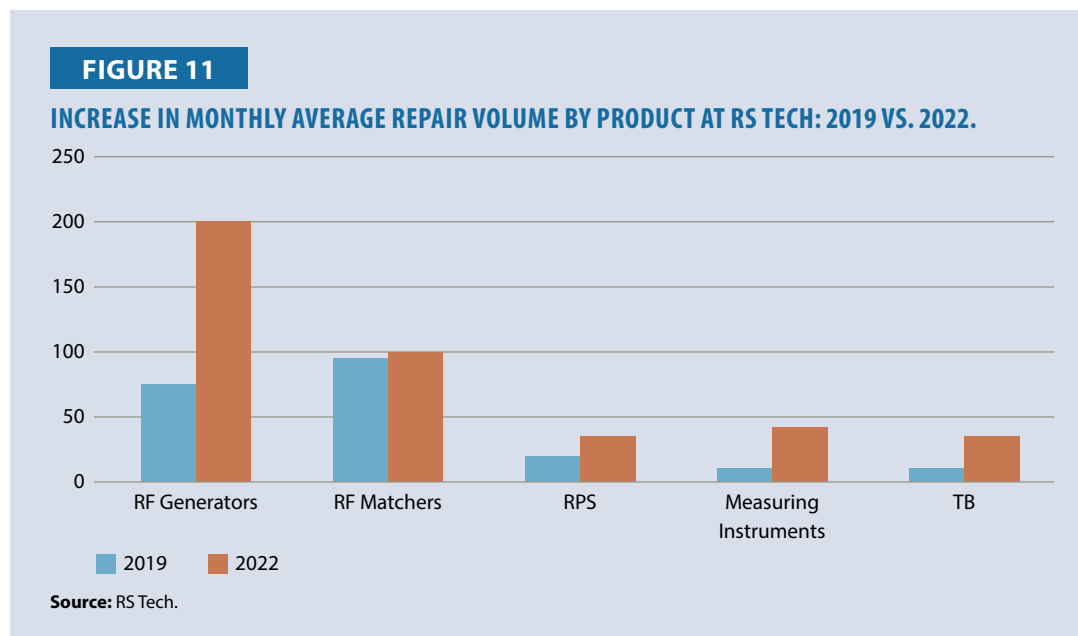
In April 2015, the company established RS Tech Shanghai Ltd. for business operations in China. Furthermore, in October 2022, the company launched its US branch, Solution Technology Research Inc., to conduct business in the United States. Local repair service stores were opened in Singapore and Japan in June 2018. By the end of 2022, the company expects to become an SME, projecting an asset value of KRW8,931 million, an equity capital value of KRW4,499 million, and a total workforce of 37 employees.

TABLE 5
SALES PERFORMANCE OF RS TECH (2019–22).

	2019	2020	2021	2022
Annual Revenue (KRW million)	3,030	3,576	4,798	4,958
Growth Rate (in %)	11	18	34.2	3.3

Source: Company Credit Rating Report for RS Tech Co. Ltd. ECREDIBLE Research, April 2023. www.ecredible.co.kr.

RS Tech is building trust based on technologies by establishing long-term repair transaction relationships with companies such as SK Hynix System IC, SK Hynix, DB Hi-Tech, Kwang Electronics, and Singapore Global Foundry. In addition to being manufactured and sold to semiconductor manufacturers, self-developed matching is also being developed in cooperation with equipment manufacturers.



COVID-19 Pandemic: Challenges and Opportunities

In 2020, the outbreak of COVID-19 in the ROK had a significant impact on the company. Numerous employees contracted the virus, primarily through extracurricular activities, resulting in the widespread absence as many factory workers took paid leave.

The rapid spread of COVID-19 also posed challenges in procuring raw materials for the company's products. Additionally, closely monitoring and adapting to changes in the work schedules of key customers like SK Hynix and other partner companies became crucial. These disruptions resulted in production delays, leading to delays in receiving payments within the usual timeframe. With payment getting delayed for more than three months, the company was suddenly under financial strain. Restoring normal financial operations is contingent on returning to regular business circumstances.

Employee Empowerment through Agile Business Practices

During the COVID-19 pandemic, CEO Wang Jong Kim held a meeting with department heads and team leaders to discuss the situation and encourage them to think of solutions. It was decided that all employees would be allowed to voice their opinions, and they voluntarily agreed to receive only 70% of their salary for one month, with the remaining 30% carried forward to the following month. Additionally, management found a substitute employee to quickly resolve issues with contracted employees, and all issues related to pay and finances were resolved in less than six months.

To ensure the well-being of team members and their mental health during the pandemic, the company provided masks and hand sanitizers, distributed hygiene materials to employees and their families, and maintained proper hygiene and disinfection every two hours. These efforts resulted in higher employee loyalty and job satisfaction.

RS Tech implemented a flexible system to accommodate remote work and social distancing requirements, including telecommuting, video conferencing, and weekly video conferences. The company also conducted health checkups and implemented worker monitoring, flexible work, and a 40-hour work alarm system to prevent overworking.

The company recognized employees' families as part of the extended RST family and established that remote work methods would be promoted in the future. There were no significant changes to the company's work processes, but they communicated with key consumers through videoconferencing to provide honest and timely information.

It also established a system to manage attendance, performance, and personnel evaluation to maintain the telecommuting system and adapt to rapid changes in the business environment. Performance management standards were diversified and linked to existing KPI indicators to ensure work efficiency. Indicators for human resources were selected based on current target sales, customer management, and process management.

Developing New Strategies to Identify Emerging Business Opportunities.

COVID-19 also impacted the company's customers and partners, as well as its business environment, requiring new adaptation efforts. There have been no unseen changes in the market and customers because of COVID-19. However, the business environments for management and operation have changed in addition to much use of telecommuting and video conferencing tools.

This company specializes in the manufacture of plasma supply equipment for semiconductor deposition. Rather than being dissatisfied with the changes in work patterns and working hours of their customers and partners, they attempted to be proactive in their response. The system operated as a system where the team leader of a telecommuting team was responsible for managing the employees, external customers, and business partners. This resulted in no dramatic drop in sales, continued sales growth throughout COVID-19, and no productivity issues.

During the pandemic, the company reoriented its priorities to sustain its value to customers. Post-pandemic there was a shift in the company's focus, leading to the formulation of specific strategies and directions for developing and managing value as a social enterprise. This includes initiatives related to employee health, welfare, and capacity building.

In particular, a dedicated team is tasked with planning and promoting social trust activities. These efforts involve attracting members with a commitment to manpower-oriented goals to Chungcheongbuk-do, to foster the growth of social enterprises.

To navigate the challenges during the pandemic, the company initiated a project to develop equipment capable of removing aerosol oxygen active species by incorporating plasma power control technology. As part of the future planning, the project serves as an example of a system designed to solve social problems associated with domestic fine dust problems, including concerns about health and hygiene.

Global Market Expansion and Product Improvement Strategies

Amid the COVID-19 pandemic and evolving government guidelines regarding lockdowns and remote work, RS Tech saw the situation as an opportunity to enhance its global market presence through product enhancements and business model transformation. Its focus was on developing strategies to expand into new markets and attract new customers with improved products.

TABLE 6

R&D INVESTMENTS BY RS TECH (2019–22).

	2019	2020	2021	2022
R&D Investment (in KRW million)	29	157	221	273
Growth Rate (in %)		441	41	24

Source: Company Credit Rating Report for RS Tech Co. Ltd. ECREDIBLE Research, April 2023. www.ecredible.co.kr.

The company planned to gradually expand its business through technical collaboration with both domestic and international equipment companies. A new line of RF Components (Generator and Matcher) has been developed with enhanced performance. Simultaneously, the company is ensuring sustainable growth and stability by offering local construction services in China, Japan, Singapore, and the US as its overseas customer base expands.

To improve the quality of its new radio frequency products, the company established mid- to long-term quality strategies, leading to company-wide quality innovation initiatives. These efforts resulted in continuous growth and sales of KRW4.8 billion for the new RF Component business. Through these quality innovation activities, the company achieved several developments including the successful development of high-performance domestic product utilizing a 380Khz 500W-5,000W, 13.56Mhz 500W-5,000W, and 2Mhz 500W-5,000W RF generator, as well as high-performance domestic product development for the RF Matcher (380Khz 500W-5,000W, 13.56Mhz 500W-5,000W, and 2Mhz 500W-5,000W at 500W-5,000W). Other successful developments include the creation of the RPS Monitoring System and a baffle design change for it.

Over the past few years, the company has accumulated localization technology based on various Marker RF System Repair technologies from semiconductor manufacturers. Through collaboration with partner equipment manufacturers, the RF System has amassed localization technology that allows it to set different communication and parameter parameters for each competitor.

FIGURE 12

R&D CENTER PRODUCT LINES AT RS TECH.



Source: RS Tech, May 2023.

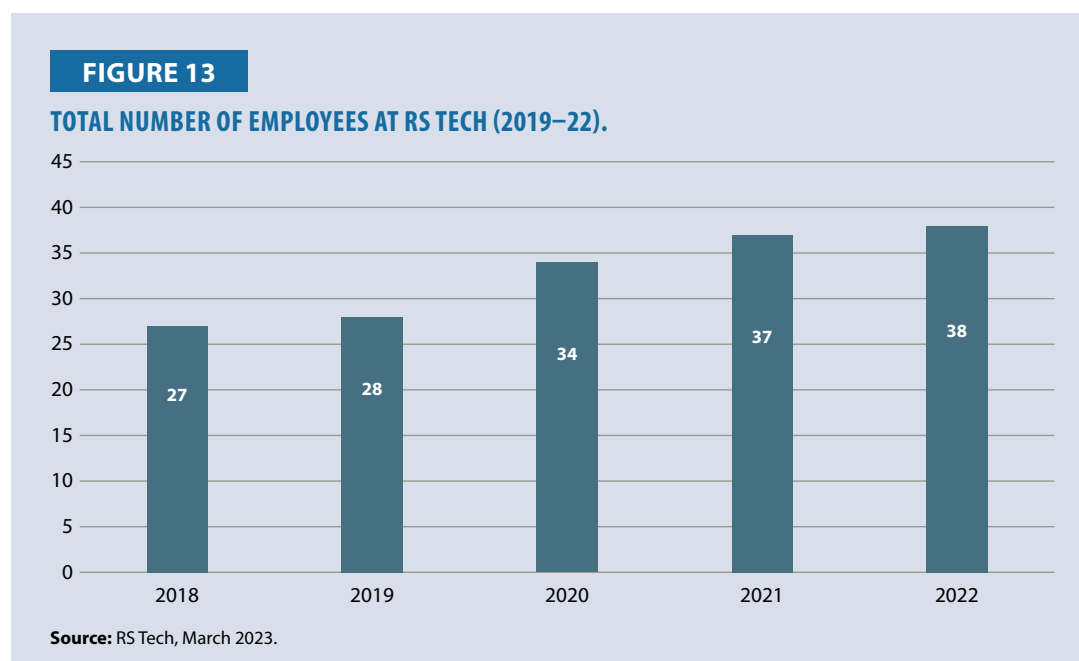
Strengthening Talent Acquisition and Compensation

Due to the location of RS Tech in the Korean Cheongju industrial zone, which is far from the capital city of Seoul, it is difficult to retain young talent and skilled technicians within the organization and prevent them from being lured away by competitors. To address this challenge, the company decided to focus on three things,

1. Transparently sharing all company issues with employees and communicating with them.
2. Taking care of employees as well as their families.
3. Recognizing and rewarding employees with over two years of experience and skills by significantly increasing their salaries.

As of 2023, RS Tech employs a total of 37 individuals, with 10 in administrative roles, 22 in technical positions, and five in operational roles.⁵ The average age of the workforce at RS Tech is mid-to-late 30s. CEO Kim emphasizes the importance of communication and consideration, identifying them as one of the key elements to retaining talent in a small but robust company, in contrast to larger corporations.

Due to rapid changes that occurred during the COVID-19 pandemic, the company realized that forecasting human resource demand was imperative to meeting its management goals, as well as replenishing vacancy staff. This experience underscored the importance of building a system capable of managing internal members. Additionally, it was established that there was a need for an education and training system to strengthen the capabilities of key personnel who might be absent, which should have an impact on increasing technology to secure market share in semiconductor equipment. For example, the company developed detailed work guides, recorded individual knowledge, and implemented measures to reduce reliance on individual personnel, automating and systematizing processes.



⁵ Source: Company Profile: RS Tech Co., Ltd. (as of 4 May 2023). NICEBIZINFO.COM.

During the COVID-19 pandemic, the company focused on securing productivity for production manpower vacancies due to increased sales and new manpower inflow, ensuring the efficient creation of vacancy manpower. Recognizing the need to secure existing personnel's expertise to solve the problem of manpower vacancies, education, and training were conducted concurrently after reviewing educational programs from KPC.

By introducing an internal intranet, the company encouraged cross-functional collaboration and communication within the organization. To ensure that collaboration with external partners and the provision of products and services to customers was not interrupted, the company conducted teleconferences using Zoom throughout the organization. The company also provided a psychological counseling program for employees through its intranet to alleviate psychological stress caused by the COVID-19 pandemic.

During that time, several new HR policies were established: 1) distributing company stocks to allow employees to participate in management decisions; 2) making a bold investment by hiring 15 new talented employees to increase R&D activity; 3) encouraging golf as a hobby by building a golf practice facility on the rooftop of the headquarters, with the company partially subsidizing the cost of golf rounds played by employees; and 4) establishing a culture of respect for employees regardless of their backgrounds, age, gender, or experience.

Summary

RS Tech's remarkable success in navigating the challenges posed by the COVID-19 pandemic could be attributed to a multifaceted approach grounded in management best practices. The company was evaluated under nine key management practices, of which seven were found to be implemented as shown in below Table 6.

TABLE 7

MANAGEMENT PRACTICES ADOPTED BY RS TECH DURING THE PANDEMIC.

Practices in Management	Adopted (Yes/No)	Net Promotion Score (1~10)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	No	
3. Digitalization and digital transformation during COVID-19	No	
4. Building a new business model	Yes	10
5. Hybrid and remote work during COVID-19	Yes	9
6. Talent acquisition during COVID-19	Yes	10
7. New market and customer development	Yes	10
8. Utilization of macro-level government policies	Yes	8
9. Cost optimization during COVID-19	Yes	8
Total Score	7 out of 9	

Source: Based on the analysis of responses from the companies.

First and foremost, RS Tech fostered a culture of transparency and employee empowerment. Rather than relying on top-down directives, the company encouraged open dialogue by sharing management issues with the entire workforce and empowering employees to actively participate in problem-solving. This inclusive approach promoted transparency and resulted in innovative solutions. Notably, during the financial crisis, employees willingly suggested deferring a portion (30%) of their salaries to the following month, reflecting their commitment to the company's well-being.

Secondly, when confronted with material supply challenges that hampered new product development and expansion into international markets, RS Tech capitalized on this opportunity by enhancing existing products, conceptualizing novel offerings, and formulating strategies to penetrate overseas market segments. The company's efforts bore fruit as inquiries and orders for microprocessors surged by approximately 150% from late 2022 to the present, not only from prominent domestic semiconductor companies but also from global players from markets like China, Singapore, and the United States.

A third critical aspect of RS Tech's success lies in its strong commitment to employee welfare and professional growth. The company demonstrated genuine care for its workforce and their families by providing ample opportunities for skill development and continuous learning through professional education and training initiatives. Moreover, RS Tech's support extended beyond the workplace as they invested in employees' interests by establishing a dedicated golf practice range on the company premises and subsidizing part of the expenses. Additionally, the company provided psychological counseling services that created a supportive environment, ensuring employees' mental well-being and personal growth.

RS Tech's remarkable achievements amid the COVID-19 pandemic serve as a testament to its resilient corporate culture, strategic management practices, and commitment to sustainable growth. By prioritizing transparency, adaptability, employee empowerment, and holistic support, the company set a valuable benchmark for other organizations seeking to thrive in challenging times.

Conclusion

Both Megagen and RS Tech implemented strategies to face the challenges posed by the COVID-19 pandemic. Megagen focused on technological innovation and productivity improvement, workforce expansion, enhancing global marketing activities, strengthening online sales, and pursuing an active M&A strategy. However, Megagen has been building a strong and fundamental corporate culture and moral of 'human magic' that was an impetus to turn around external crisis into an opportunity for growth.

On the other hand, RS Tech fostered a culture of transparency and employee empowerment, enhanced and innovated existing products into offerings, and formulated strategies to penetrate overseas market segments. It also demonstrated a strong commitment to employee welfare and professional growth by providing opportunities for skill development, continuous learning, and psychological counseling services.

Both companies prioritized agile adaptability, employee empowerment, and sustainable growth to emerge successfully from the pandemic. Megagen's early engagement with digital transformation and efforts to enhance productivity through automation through massive investment in both Digital

Transformation and new talents could serve as an example for others. Meanwhile, RS Tech's emphasis on transparency and employee empowerment resulted in innovative solutions and a supportive environment for employees' mental well-being and personal growth.

Both companies demonstrated their ability to overcome the crisis by employing various initiatives. In addition to the suggested best practices, they experimented with multiple approaches based on their respective circumstances. By evaluating the NPS of the most effective measures, it becomes evident that the two companies made different choices and concentrated on different means.

The initial difference between the two companies becomes apparent when considering the measures that had the most significant impact, excluding the management initiatives rated at 10 or 9 points in the NPS evaluation in Table 7.

Megagen, in particular, focused on securing new markets and customers through agile organizational operations and new business models driven by robust digital transformation and automation. Even though Megagen did not implement telecommuting or hybrid working arrangements but instead emphasized strong employee training. Tools such as Zoom were actively utilized in their operations. On the other hand, RS Tech concentrated on employee retention to overcome the challenges faced by small businesses during the crisis. Despite this difference, both companies set good examples during the COVID-19 pandemic by developing new products and successfully acquiring new markets and customers.

Korean SMEs faced significant challenges during the COVID-19 pandemic, with declining sales and disrupted operations. However, through resilience, digitalization efforts, and government support, many SMEs were able to adapt and find growth opportunities. The crisis prompted innovation, collaboration, and the exploration of new business models. The lessons learned from this period are expected to shape the future of Korean SMEs, with a greater emphasis on digital transformation, diversification, and preparedness for future disruptions.

TABLE 8

COMPARISON OF TWO CASE COMPANIES BASED ON NPS EVALUATION SCORE.

Practices in Management	Megagen	RS Tech
1. Agile organization BP during COVID-19	10	10
2. Automation and mechanization during COVID-19	10	
3. Digitalization and digital transformation during COVID-19	10	
4. Building a new business model	9	10
5. Hybrid and remote work during COVID-19		9
6. Talent acquisition during COVID-19	9	10
7. New market and customer development	10	10
8. Utilization of macro-level government policies		
9. Cost optimization during COVID-19		

Source: Based on the analysis of responses from the two companies.

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SINGAPORE

Economic Overview

Singapore is a city-state occupying a land area of about 720 square kilometers, making it 0.6% the size of New York. It has a highly open economy with the highest trade-to-GDP ratio in the world (around 350% on average) reflecting its position as a major transshipment hub and the high import intensity of Singapore's exports. Net exports constitute slightly more than 30% of GDP. In 2022, Singapore's GDP is SGD644 billion (USD467 billion) in 2022. This is less than 2% of the GDP of the United States in the same year. However, in terms of GDP per capita, Singapore's figure of USD82,808 is higher than the United States' figure of USD76,622 in 2022.

The industrialization program to spearhead Singapore's development strategy in the early 1960s spurred the expansion of the manufacturing sector and populated it with many foreign MNCs attracted by government fiscal incentives and readily available pre-fab infrastructure for production. The relative size of the manufacturing sector increased from around 13% in the 1960s to 27% in early 2000. Since then, it has decreased with the growth in other economic sectors like finance, transport, information, and business services. However, it still maintains its dominance, contributing 21.6% of the GDP in 2022 as shown in Figure 1. The Singapore government has a deliberate intention to maintain a sizeable manufacturing sector in recognition that the sector is a 'bedrock' for innovation and productivity growth. Many of the high value-added activities such as research and development, design and testing, marketing, and regional headquarters are linked to the manufacturing sector. The main industries in the manufacturing sector include electronics, petrol-chemical, pharmaceuticals and biotechnology, and precision engineering.

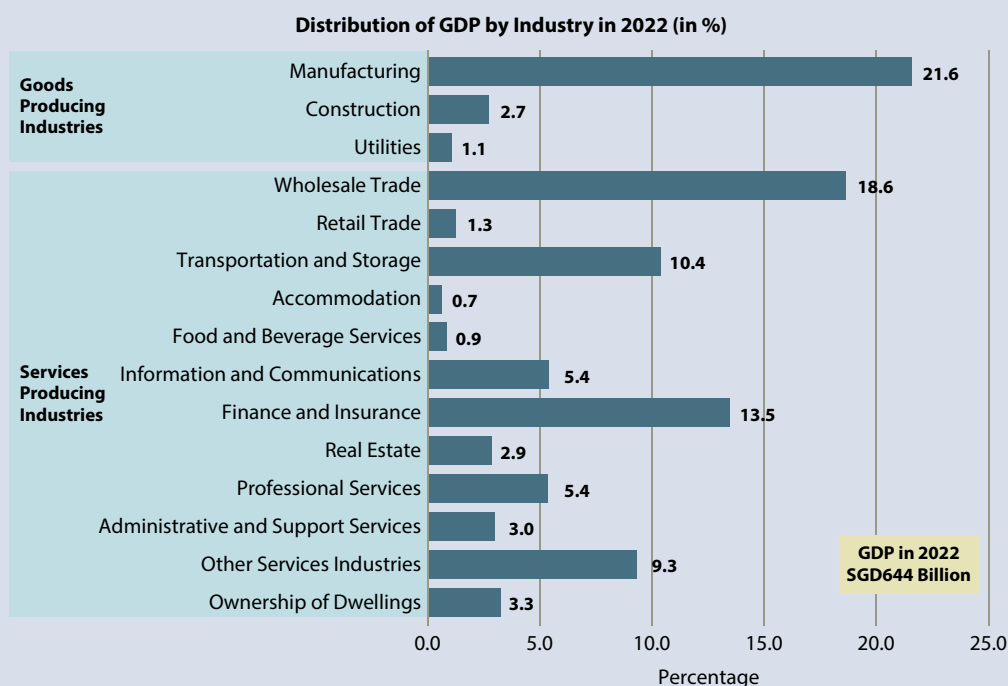
As one of the major transport and trading hubs in the Southeast Asia region, businesses providing services in the areas of wholesaling, finance, and logistics flourish. These are manifested in the value-added contribution to GDP. The wholesale and retail sector contributes 18.6% of the GDP, while the finance sector stands as the third largest sector contributing 13.5% of the GDP, followed by the transport and storage sectors with 10.4% of the contribution to the GDP.

The impact of the COVID-19 pandemic on the performance of the sectors can be discerned from the sectoral growth rates shown in Figure 2. All the sectors except information and communication, manufacturing, and finance, registered negative growth. The hardest hit sectors are construction (-42%) and those in the hospitality business: hotels (-25%) and transportation (-16%). Indeed, the overall GDP growth of the Singapore economy in 2020 was -3.3%. A relatively quick recovery was recorded in 2021 with a GDP growth rate of 8.8%. Only the hotel sector continues to register negative growth due to many countries having yet to remove restrictions on cross-border travel.

According to data published by the Department of Statistics, there are 291,600 enterprises in Singapore, of which 99% comprised SMEs in 2021. Overall, SMEs employed 71% of the workforce and contributed 44% of the GDP. An overwhelming 80% of these SMEs are locally owned, with the remaining foreign-owned. A corporation is considered an SME in Singapore when its yearly sales turnover is less than SGD100 million or when it employs fewer than 200 workers. SMEs have played a pivotal role in Singapore's economic advancement. Besides supporting resilience and

FIGURE 1

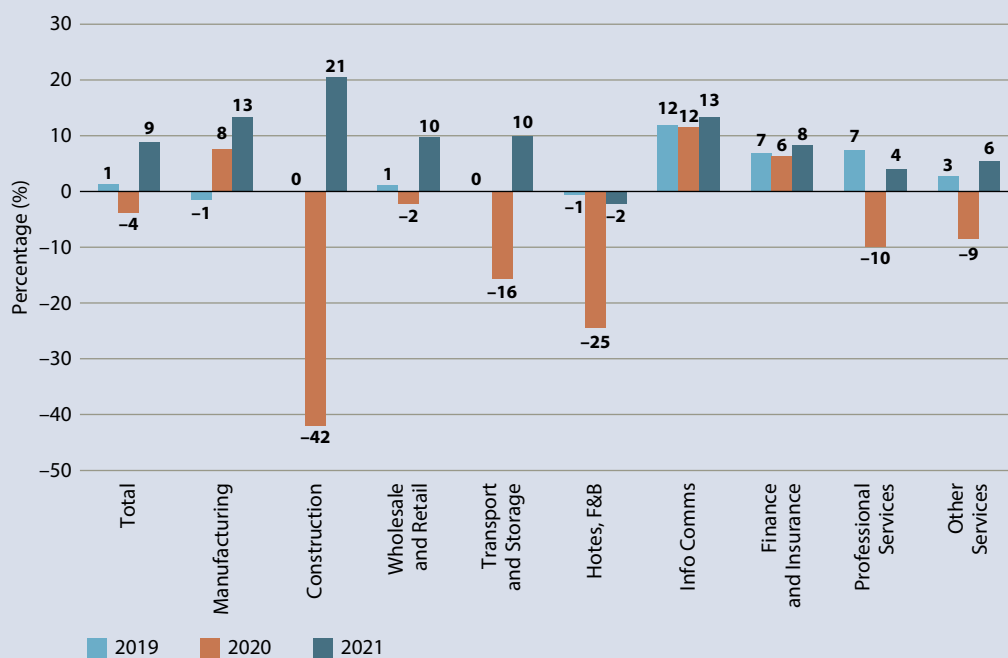
SECTORAL COMPOSITION OF SINGAPORE GDP IN 2022.



Source: Ministry of Trade and Industry, Singapore.

FIGURE 2

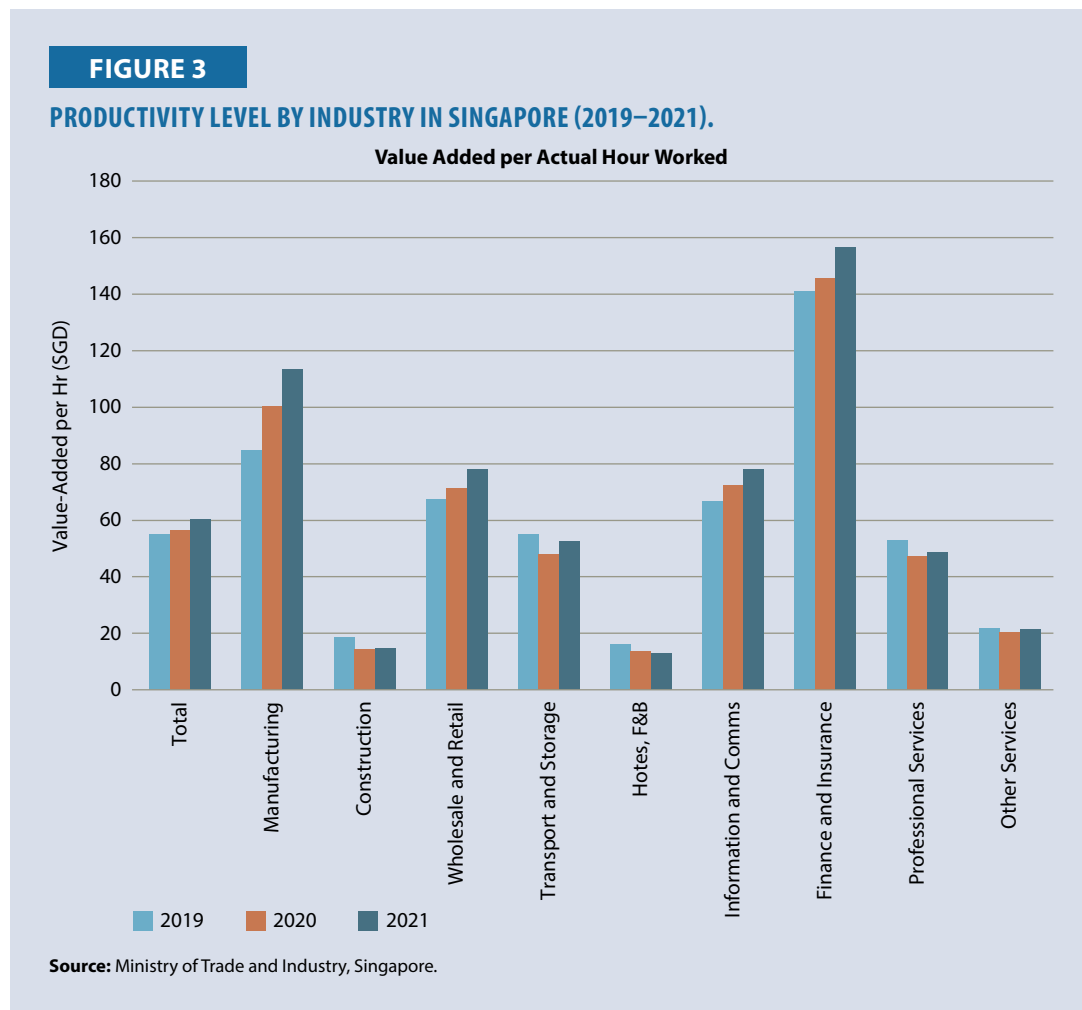
GROWTH OF GDP BY INDUSTRY IN SINGAPORE (2019–2021, IN %).



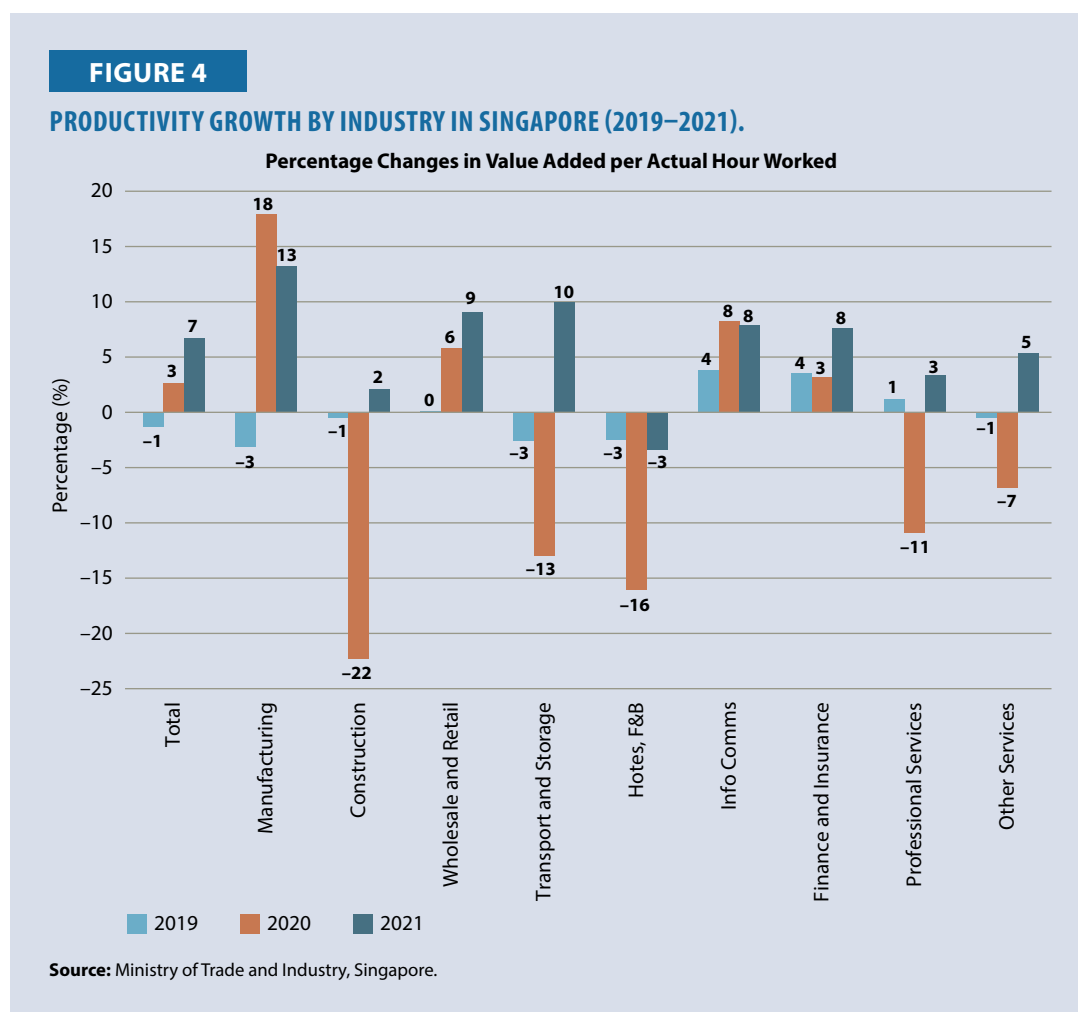
Source: Ministry of Trade and Industry, Singapore.

improving innovation through their characteristic agility, deftness, and ingenuity, SMEs are critical for Singapore's digital transformation to spur economic growth and develop a smart nation. In 2014, Singapore launched its Smart Nation Initiatives to leverage technologies such as IoT, cloud computing, AI, and machine learning algorithms, introduced by the Fourth Industrial Revolution and implement them to increase TFP, improving the lives of Singaporeans, retaining local talent and attracting foreign talent [21].

As illustrated in Figure 3, the aggregate productivity measured in terms of value-added per hour, had not decreased due to the pandemic. Aggregate productivity growth was negative (-1.3%) in 2019 before increasing to positive growth of 2.6% and 6.7% in 2020 and 2021 respectively, declining marginally by -0.8% in 2022, as in Figure 4. The pandemic triggered a recession that induced negative demand shocks in firms, which reduced the demand for input factors. In flexible labor markets, firms can activate retrenchment and shed jobs, thereby reducing labor inputs and increasing aggregate productivity. Stewart [23] suggested that the change in the distribution of workers across sectors during the pandemic can account for the rise in productivity. ILO [12] reports a similar explanation for the surge in productivity post-crisis. The massive job losses in leisure and hospitality and other low-wage sectors imply a higher proportion of productive workers retaining their jobs. Consequently, the average productivity of the economy is increased. Many companies accelerated their digitalization plan, implementing automation and platform amidst the pandemic, had also contributed to the elevation of productivity scores.



At a more disaggregated level, all sectors in Singapore registered improvement in productivity in the COVID year of 2020, except for the construction, hotel, transport, and professional services sectors.



SMEs During the COVID-19 Pandemic

To get a better understanding of the impact of the pandemic on business enterprises, we consider the survey conducted by the Singapore Business Federation. The survey conducted from 9 October–28 November 2020, drew responses from 1,075 companies across key industries. 85% of the responses were from SMEs and 15% of the responses were from large companies.

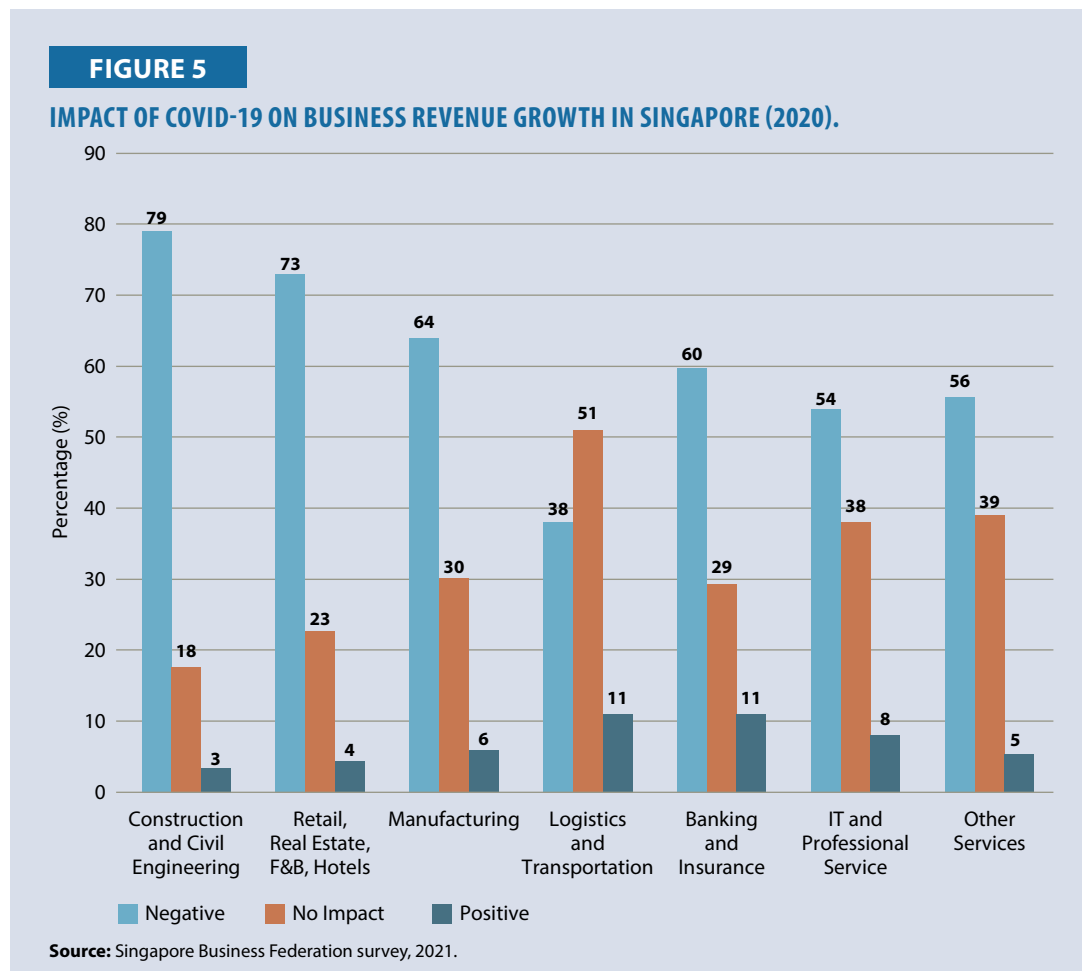
COVID-19 has brought about new challenges to businesses: uncertain demand for business services or products, high manpower costs, new travel restrictions, and changes in employee attitude and productivity. The survey shows that two in three companies (63%) have been negatively affected by COVID-19. Average revenue decreased by 31%. The impact of the pandemic was uneven across industries.

As illustrated in Figure 5, high percentages of companies in the construction and civil engineering field (79%), hotels, restaurants, retailing (73%), and manufacturing (64%) registered negative impacts of the COVID-19 pandemic. However, companies in the logistics and transportation sector (62%) and IT and professional services sector (46%) reported positive or no impact of the pandemic.

Despite the challenges, 69% of companies reported confidence in sustaining their business over the next 12 months. COVID-19 has accelerated digital transformation efforts for 84% of businesses. 40% of companies report an increase in investments in new technology. Business priorities in this troubling period continue to revolve around fundamentals such as raising revenue, building cash flow, and lowering costs.

The majority (88%) of companies surveyed agreed that government support measures in subsidizing wages to protect employment and rental relief are helpful to their efforts to cope with the pandemic crisis. SMEs indicated cost, cash flow, and credit schemes are most pertinent to them, while large companies find schemes related to talent, and enterprise development as relevant and useful.

Companies with existing overseas presence were also negatively impacted by the pandemic. Around 47% of the companies with overseas presence, reported a decline in business performance, with 93% attributing it to the negative impact of COVID-19 on the overseas markets. Also, 63% of businesses point to a drop in demand for their products and services, while 47% indicated that travel restrictions have hindered their activities. However, such companies perceived a faster recovery to resume normal business than others.



Responding to the question of actions the companies will take to move their business forward, the majority of the companies surveyed highlighted three areas. These include workforce, technology, and finances. Many businesses have devoted investments in training their workforce, as well as

accelerated their progress up the digital transformation ladder. Targeted support from the government and internationalization are also reckoned to be critical for a successful recovery from these difficult moments and to emerge stronger from the crisis.

Methodology

Business Viability and Productivity

Barring an extensive survey of companies, and given the timeliness of the findings to be made available across APO member countries, the case study approach has been adopted as the main methodology. Chief executives and or senior management officers of companies are interviewed. Through the case studies, we will understand more intimately the constraints and difficulties posed by the pandemic crisis, and the measures and actions undertaken by affected companies to overcome the difficulties and emerge stronger for greater growth beyond mere survival.

Whether in a crisis or otherwise, productivity in a company is important. Higher productivity does contribute to greater profitability. To illustrate this, owners or CEOs of companies would not deny the simple rule of the game for sustainability in business, especially in the long term, is to have revenue (R) greater than cost (C). A simple metric encapsulating this is the ratio of R to C or the revenue-cost ratio denoted by π^1 . Revenue, by definition, is the price (P) multiplied by quantity (Q). Total cost is the total wage bill (wage rate 'w' multiplied by workers employed 'L') inflated by a factor ϕ to capture all other non-labor costs².

$$\pi = R/C = P.Q/[\phi wL] = (P/\phi w).(Q/L)$$

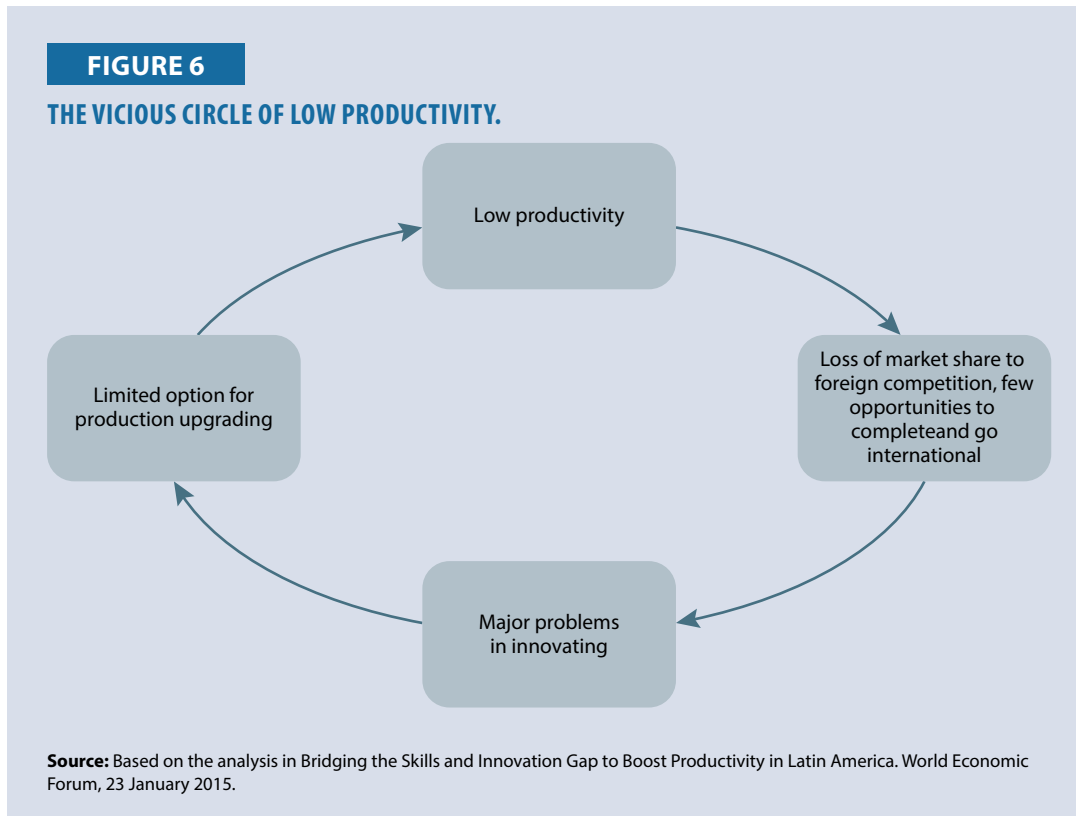
With simple algebraic rearrangement, the expression following the last equality sign shows the direct relationship between the revenue-cost ratio and labor productivity (Q/L). Higher productivity can be attained with an injection of new technologies, such as the digitalization of processes and the use of AI. The ratio (P/ ϕw) is the 'revenue per unit cost' ratio. Positive growth in this ratio can result in profitability increasing despite constant labor productivity. On the other hand, declining productivity may ultimately bring about the closure of the company.

The effects of low productivity are manifold, as displayed in Figure 6. Low productivity not only leads to loss of market share due to foreign competition but also reduces the possibilities of integration in international value chains. The resulting fragility of SMEs reduces the innovation capabilities and options for production upgrading, which again results in low productivity. Low productivity along with the loss of market results impacts the survival chances of SMEs. Thus, the importance of innovation should not be underestimated, and to be proactively pursued to break the vicious circle of low productivity.

Breach of governance, reputational scandal, and financial malfeasance can put an enterprise in a crisis. However, such a crisis is usually considered internal and endogenous. Often, the crisis refers to hardship generated from external events. In such a situation, if the company has all along been emphasizing business management excellence, resilience, agility, and recovery from disaster, then there is a high chance that it will cope well with the disruption from the crisis and even achieve exceptional positive performance relative to its competitors. For many enterprises, to weather the

¹ When the ratio $\pi=R/C$ is greater than unity, it implies a positive profit, indicating the viability of the company's activities.

² If other non-labor costs such as rental, materials, utilities, promotion, etc. amount to 60% of the wage bill (wL), then factor ϕ will assume the value of 1.6.



crisis without liquidation will mean either reincarnation or rejuvenation. Reincarnation may be in the form of pivoting to alternative business activity, like changing from an F&B outlet to becoming a venue for in-house physical exercise. Rejuvenation comes in the form of modification of products and offering of services; from classroom-based tuition to online-tuition services, from dining-in to delivery of food to place of customers' choice.

Before thinking and seeking for magical formula or method that a company can use to survive a crisis, it would be worthwhile for a company to check on its foundational management principles. The APO recommends enterprises to use its Business Excellence Framework (BEF) [1] for this. BEF is an integrated leadership and management system that comprises seven elements of leadership, customers, strategy, people, processes, knowledge, and results, as essential to sustainable organizational excellence. It is about developing and strengthening the management systems and processes of an enterprise to improve performance, address various business challenges, and create value for stakeholders. Since the framework includes steps beyond just the quality system, an enterprise with BEF in place would be able to weather any crisis better than others.

It is expected of a wise CEO with strategic thinking to take tactical actions to cope with uncertainty and disruption caused by a crisis. A well-managed company will be functioning well in ordinary times as well as exceptional times. It has to be prepared for the unexpected. A crisis is an unexpected event. It will create stress on its resources, heighten the existing risk, and demand a higher order of agility in securing new streams of revenue to handle committed payables targeted for expansion of the market, upgrading production processes, and growth of the organization.

In tough economic times or a crisis, it may feel like success is simply to be still in one piece at the end of your planning period. In stormy seas, it may be that the only strategy is all hands on the deck!

But most of the time in management the key to success can remain ‘swimming’ and produce a positive net level of economic return from now into the future. In their research on successful models for SMEs to compete in turbulent environments, North and Varvakis [17] highlight the importance of developing dynamic resilient capabilities. Companies with such capabilities can internalize (sense new opportunities and learn from the knowledge acquired) and combine (integrate) the information and new knowledge, coordinating them with the existing knowledge base [19].

Sensing and understanding the needs and desires of customers is not always an easy task. The needs and desires of customers change as the crisis materializes in different forms and intensities. If these needs are identified, they provide opportunities for revenue and business expansion. Learning is about acquiring, assimilating, transforming, and exploiting knowledge. Integrating capability is about contributing individual knowledge to the group, it focuses on building an overall sense-making and understanding through the organization. It includes the ability to encourage the employees’ participation in strategic decisions. Coordination capability is exhibited by the ability to assign resources to tasks, appoint the right persons to the right tasks, and identify synergies among tasks, activities, and resources. It includes skill in planning and designing actions considering contingencies, and effective tracking of the results obtained.

Talking about enterprises coping well with crises, the concept of business resilience is often discussed. Resilience is the desired characteristic of an organization to absorb changes and adapt in an evolving environment, continue to provide important products and services to external parties, regardless of the disruption, and survive and prosper [8, 10]. It encompasses both crisis recovery and business continuity [4]. Turbulent environments cause threats and offer opportunities that require capabilities to survive “the storm” or a longer “drought”. Dahles and Susilowati [2] suggested that resilience has to be understood in terms of the businesses’ embeddedness in a package of livelihood strategies. In a business context, agility is the ability of an organization to mobilize resources to rapidly adapt to market and environmental changes in productive and cost-effective ways [29].

Companies, in particular SMEs need to be resilient to the impacts of environmental turbulence as well as agile to stay in the market and capture new business opportunities. They have to take steps towards changing people’s minds and attitudes, adapting the way of planning and implementation, and tailoring tools and techniques to the business situation [20]. A knowledge-creating, learning organization thrives in such a situation [15]. In turbulent times, learning fast and adapting the company’s strategies quickly to an ever-changing environment is essential [22]. The effect of turbulences, without a doubt, is demanding for those directly affected. Turbulence in itself is not necessarily bad all the time, it can provide favorable opportunities for innovation and structural adjustments to occur [9]. Competitive SMEs learn and exhibit their capabilities in adapting to the environment best when the latter is turbulent [13].

Resilience is about more than surviving. It is necessary to keep growing. It is what allows a company to adapt as markets change and new technologies emerge. Resilience is essential for innovation because, almost by definition, innovation disrupts the business [7].

Innovation is targeted. It may be targeted to meet a specific problem or goal and then channeled through strategy. In the literature on business innovation, analysts identified three types of innovation: efficiency innovation, sustaining innovation, and disruptive innovation [5]. Efficiency innovation protects the company’s core business. Companies use known methods available in the

market to reduce waste and hassle in existing value streams. Often, they involve process redesign with smart automation, advanced analytics, and machine learning algorithms with the ultimate goal of catching up with the digitalization wave.

Sustaining Innovation helps a company to grow. It often entails one or more of the following actions: making existing products better and creating new digital offerings, new delivery methods, and enhanced applications. A good example would be introducing an online presence or moving up the value chain. Disruptive Innovation involves creating new business models, such as creating a digital platform and an ecosystem of clients and suppliers.

To understand how SMEs develop agility and resilience, we have to take a closer look at human capital and creativity as key resources. Creating, sharing, using, and protecting knowledge effectively spur the development of new market opportunities, and improve productivity performance. This in turn helps to develop competitive advantage, which consequently leverages business success [14, 16]. To sustain their competitive advantage in turbulent times, SMEs need to actively consider the reconfiguration of organizational resources [6] and the company's capabilities for matching its environment. These capabilities support organizations not only in adapting to the business environment but also structurally through innovation and collaboration with other companies, organizations, and institutions [26]. With enhanced capabilities, SMEs can create business models that are more resilient to the impacts of environmental turbulences as well as more agile to stay in the market and capture new business opportunities.

To achieve resilience, the cooperation of the employees is imperative. Companies may have to invest resources to enable employees to work remotely from home, to acquire new skill sets to be effective in the transformed business environment. In many countries, such as Singapore, the resilience of the business sector is also a national concern, an integral part of the economic transformation. As such SMEs can tap into the various support schemes and initiatives rolled out by the government to help the development of business resilience. As alluded to, turbulent times can also be times of opportunity. The resilience of a company can be strengthened through the adoption of new technology, such as contextually adaptive AI in product design and production, reforming the corporate structure for growth via mergers, spin-outs, and acquisitions, and introducing new business design or new corporate capability in the form of business model innovation [7]. Diversification in the form of having sales in more countries (internationalization) and a wider range of products and services, is also a way to inculcate greater resilience into the business operation of a company.

Thus, the various measures adopted by companies to foster business continuity and develop business resilience amidst the pandemic include the following.

1. Agile organization BP during COVID-19
2. Automation and mechanization during COVID-19
3. Digitalization and digital transformation during COVID-19
4. Building a new business model
5. Hybrid and remote work during COVID-19

6. Talent acquisition during COVID-19
7. New market and customer development
8. Utilization of macro-level government policies
9. Cost optimization in COVID-19
10. Structural change and value-chain integration

These measures are not necessarily independent of one another. Often, they are complementary. A company making efforts in digitalization and automation will require a learning mindset among employees, as well as acquiring external talents such as data scientists and automation experts to help in the transformation.

Case Study Design and Case Selection Rationale

Representatives of the companies interviewed for this report were asked to complete the 8Ms scorecard. Additional information about the 8Ms and the scorecard can be found in the Appendix to this report. The scorecard serves as a quick assessment tool for Business Excellence, offering insights into the dimensions that excel in navigating the challenges posed by the pandemic. The Management Business Excellence (MBE) score provides a means to select the companies with ‘best practices’ to be highlighted in this report. The 8Ms represent a simplified management vocabulary rooted in the BEF [27].

For this study, three Singapore companies, Phoon Huat, Omni-Plus System, and Memiontec were selected. The interviews with the owner-managers or top executives took place in April 2023, nearly three years after the beginning of the circuit breaker (lockdown) in response to the COVID-19 pandemic. Each interview lasted about 60 minutes. Those interviewed, included the CEO, CFO, and the Founders of the respective companies. The questionnaire, as in Table 1, was sent to the companies in advance. Interviews were conducted under the condition that no financial data would be disclosed unless it was already publicly available for product promotion or as part of the regulatory obligation for listed companies. All three companies have been operating in Singapore for more than five years. Among the companies, OPS and Memiontec operate in the manufacturing sector, while Phoon Huat specializes in trading kitchenware and culinary products and ingredients through both online and physical retail stores.

TABLE 1

THE QUESTIONNAIRE.

- | | |
|------|---|
| A. | What are the major difficulties encountered during the COVID-19 pandemic? |
| B. | How did your company improve its resilience (continuous operation) during the epidemic? |
| i. | Hybrid bricks-and-mortar/work-from-home. |
| ii. | Agile/flexible/work redistribution. |
| iii. | Digitalization and automation accelerated |

(Continued on next page)

(Continued from the previous page)

- iv. New (contactless) business models
- v. Arrangements for training and recruitment.
- vi. Redefinition of customers/market.
- vii. Leveraging the government's subsidy policy tools.
- viii. Cost Optimization
- ix. Other measures
- C. How does your company leverage new technologies to drive innovation? (Automation and mechanization, digitization, AI, AIoT, metaverse, etc.)
- D. Before the outbreak of COVID-19, did your company plan management measures to prevent or absorb risks?
- E. After the outbreak, did your company continue to introduce innovations (products, services, production processes, etc.) or take preventive measures to generate operational benefits early or create post-epidemic revenue growth?
- F. After the outbreak, what are the key drivers for your company's continued revenue generation?
- G. After the outbreak, how long did it take the company to make changes in the business operation and business models?
- H. What aspects of the business operation would the company continue even after the pandemic is over? Would the pandemic affect positively or negatively the prospect of the company's business?

Case Study: Phoon Huat

The interview aimed to understand the response strategies and resilience measures adopted by Phoon Huat Pte. Ltd. during the challenges posed by the COVID-19 pandemic. The insights provided below are based on the responses to the questions in Table 1 by Lee Tien Chew, the CFO of the company.

Background

Founded in 1947, the Singapore-based Phoon Huat Pte. Ltd. has evolved into one of the leading food suppliers in the country. The company specializes in manufacturing and supply of high-quality baking ingredients, tools, and services catering to various segments, including food services, consumer retail, artisan, and industrial bakeries. Apart from its retail operation, Phoon Huat has an outlet that features an on-site studio for hosting culinary classes for baking, cake decoration, cooking, and demonstrations.

Phoon Huat currently operates 19 retail stores across Singapore and an online shopping platform. It has a diversified supply chain spanning 900 suppliers worldwide. Its B2B arm, which supplies more than 4,000 hotels, restaurants, and cafes in Singapore forms the bulk of its business. Notably, the B2C component, facilitated through its e-commerce platform, emerged as a crucial lifeline during the pandemic and continues to serve as an engine for growth in the post-pandemic landscape.

Impact of COVID-19 Pandemic

Like many other companies, Phoon Huat experienced a significant decline in revenue during the pandemic. The closure of three of Phoon Huat's top 10 customers during the lockdown resulted in a substantial reduction in sales. The company had to contend with order cancellations and Phoon Huat had to write off some of the goods with a short shelf life. Despite these challenges, the surge in interest in home baking activities presented a viable opportunity to boost sales and revenue. However, a new challenge emerged with the existing packaging of flour and other baking ingredients. Primarily designed for large sizes of (20 kg and 25 kg) suitable for restaurants and food services companies. The demand from retail customers, driven by the rise in home baking, necessitated a shift towards smaller packaging sizes of 1 to 3 kg per package.

Externally, overseas suppliers also grappled with the challenges of keeping up with the demand, especially in areas with high infection rates. While COVID-19 affected the world as a whole, the severity of the impact was not uniform across all geographical areas. Clear indications and advice from both the government and the business community prompted the adoption of online sales, given the implementation of social distancing and other anti-contagion measures. However, online transactions and B2C e-commerce were still in a nascent state for Phoon Huat. The setup and coordination of various activities, including order processing, packing, payment, and delivery needed to be established to adapt to the evolving business landscape.

Resilience and Business Continuity Strategies

As part of its good management practice, Phoon Huat instituted regular meetings to assess the business environment and evaluate the impact of the pandemic. A key challenge, namely adapting packaging to cater to both in-store and online customers, was successfully addressed through collaborative efforts with suppliers, many of whom are based overseas. The importance of reliable suppliers cannot be underestimated, and Phoon Huat has maintained effective communication and rapport with its extensive network of 900 suppliers worldwide. This proactive approach to supplier relations underscores the company's commitment to resilience and business continuity in the face of unprecedented challenges.

Training, Employee Cooperation, and New Business Model

Important information about the company's situation during the COVID-19 was promptly shared with employees. This helped Phoon Huat to create awareness among the employees about the gravity of the situation. The willingness of the employees to work with the management to accelerate programs and initiatives helped the company adapt to the new business environment. Training initiatives in digital skills, online ordering, and digital payment were well received, particularly since the company's early decision to digitalize its operation in 2013. The foray into e-commerce necessitated the acquisition of skillsets related to online ordering, processing, payment, and delivery.

In response to the changing market dynamics, knowledgeable and trained staff played a crucial role in identifying new business opportunities, leveraging their familiarity with ingredients, products, and baking methods associated with different ethnic groups. The decline in B2B activities was offset by the surge in B2C transactions.

Given the lockdown and the increasing trend of people staying and working from home, Phoon Huat observed a significant increase in demand for ingredients and tools used for baking. Notably, there was also a growing interest in learning how to bake. Recognizing this opportunity, Phoon Huat effectively put the studio in one of its outlets to good use. While physical baking classes were

not possible, the studio became a valuable asset for online demonstration and teaching, leading to an uptick in online sales for Phoon Huat's array of ingredients and baking equipment.

To comply with government regulations restricting the number of workers in the office, the company implemented a team rotation system. It divided the workers into teams, allowing them to work from both home and on-site, compensating for the drastic fall in walk-in customers at the outlets by redirecting customers to order ingredients and equipment online.

Phoon Huat systematically assessed the skills of employees, gradually encouraging them to upskill through appropriate training to strengthen their capabilities and meet the evolving needs of the company. To support the digitalization initiatives, Phoon Huat applied for SPRING Singapore's (now Enterprise Singapore³) Capability Development Grant⁴, which subsidizes up to 70% of qualifying costs. This strategic move underscores Phoon Huat's commitment to adapting and thriving in the changing business landscape.

Leveraging New Technologies to Drive Innovation

The process of digitalization, initiated in 2013, gained momentum at Phoon Huat during the pandemic, with a heightened appreciation for its utility and potential by both management and employees. The implementation of a new integrated e-commerce and point-of-sale system stands out as a significant step forward. This system ensures real-time availability of inventory information, offering customers a quicker and seamless shopping experience.

A notable innovation involved replacing traditional paper price stickers on products at its retail outlets with electronic shelf labels. This allowed prices to be changed overnight remotely. Apart from keeping prices up to date, this freed up time for service staff to engage customers.

Looking ahead, Phoon Huat is exploring the adoption of AI and the introduction of chatbots. A chatbot is a computer program that uses AI and Natural Language Processing to understand customer questions and provide automated responses, simulating human conversation. Beyond this, they can also provide personalized product and service recommendations based on the customer's responses, contributing to an enhanced and interactive customer experience. This strategic integration of new technologies underscores Phoon Huat's commitment to continuous innovation and meeting the evolving needs of its customer base.

Management Measures to Prevent or Absorb Risk

Phoon Huat underwent the Singapore Service Class assessment under the Business Excellence (BE) framework, achieving successful certification in March 2017. According to Lee, adopting the BE framework played a pivotal role in establishing systems and processes that fostered business growth. "The framework highlighted the different things we should have in our company. Some we already had, others we were thinking of already doing," he explained. This framework has proven instrumental in instilling confidence and providing a systematic approach for the management in navigating disruptions caused by the pandemic.

Phoon Huat's management, bolstered by the BE framework, exhibits a more confident and systematic approach to coping with the disruptions caused by the pandemic. The company has also

³ SPRING Singapore merged with IE Singapore to form Enterprise Singapore on 2 April 2018.

⁴ The Enterprise Development Grant has replaced the Capability Development Grant and Global Company Partnership Grant as of 25 October 2018.

built a relatively strong reserve of assets over the past couple of decades, serving as a crucial buffer in mitigating the risk of insolvency despite a sizeable decline in receivables during the pandemic. These strategic measures underscore Phoon Huat's commitment to proactive risk management and resilience in the face of unprecedented disruptions.

Generating and Sustaining Post-Pandemic Growth

Knowledge management has emerged as an important focus area at Phoon Huat, recognizing the value of intellectual properties such as recipes for newly invented cakes, instructional notes for baking and cooking classes, and videos illustrating the uses of equipment are valuable assets. To address the challenge of internal knowledge retention, the company has implemented a formal system for documenting processes and facilitating knowledge sharing across various contexts, including management meetings, employee appraisals, and operational procedures.

When the company decided to set up a new outlet, it adopted a systematic approach by creating checklists for IT-related assets and services required for the new store. It also drew up a network map of the IT-related assets in the outlet, allowing the company's IT team to troubleshoot more efficiently.

Key success factors for Phoon Huat include its early adoption of digitalization and a dedicated workforce willing to acquire new skills. Recognizing customer constraints during the pandemic, the company offered effective alternative means for them to purchase goods. Responding to the growing demand for baking knowledge, Phoon Huat expanded its retail business (B2C) by offering online classes and demonstrations, covering not only recipes but also advising on how to use equipment correctly and safely.

Despite the initial challenges in re-establishing and reorganizing business links during the crisis, Phoon Huat's agility and employee flexibility in adopting new job arrangements have contributed to successful outcomes. Regular management meetings are held to review customer trends and the ongoing external environment. Once a decision is made, staff work hard to ensure suppliers can fulfill orders and appropriate coaches and teachers are engaged to launch the baking classes and training programs.

Riding on the momentum, Phoon Huat is intensifying its digitalization efforts. The Pandemic has underscored the importance of business excellence, technology adoption, risk management, and employee training. The company has also put in place processes to regularly review and refresh activities and measures in these areas.

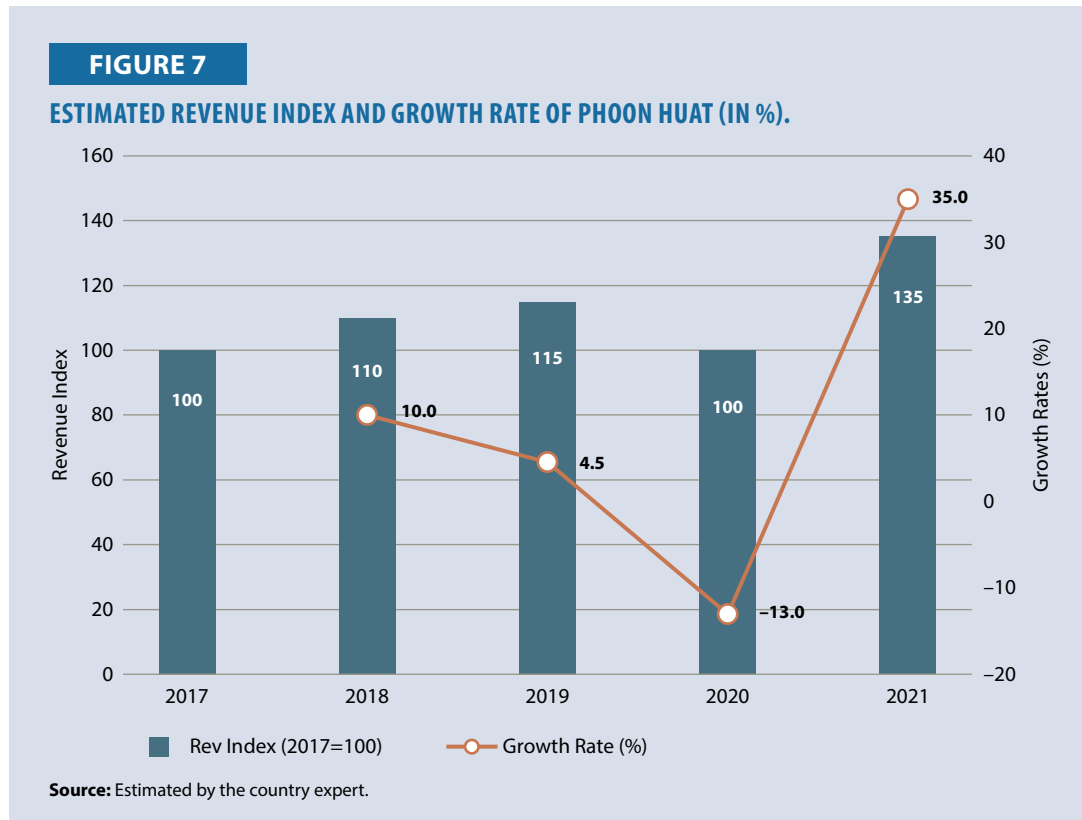
Using the BEF as a reference, Phoon Huat is documenting processes at its concept store, intending to use it as a template for planned overseas expansion. The management envisions that digitalization, together with overseas expansion, will fuel the company's growth through enhanced productivity and an expanded customer base.

In June 2021, Phoon Huat acquired a majority stake (91.5%) in Le Petit Depot, a Singapore-based online retailer specializing in European food products. Positioned as a strategic partnership rather than a takeover, this alliance aims to double both companies' sales volume in three years. The strategic alliance allows Phoon Huat to diversify its current product range with European offerings, catering to the F&B industry, its 19 retail stores, and the online shopping platform. Additionally, the companies plan to collaborate on reducing supply chain costs and optimizing IT infrastructure, further contributing to their success.

Financial Data and Revenue Growth

Phoon Huat surpassed SGD100 million in revenue in 2017. Despite the challenges posed by the pandemic, the company not only sustained its operations but also achieved its revenue target of approximately SGD100 million in 2020. Notably, Phoon Huat managed to achieve revenues of SGD135 million in 2021, higher than that in the previous year. Using 2017 as the baseline (indexed at 100), the revenue index for 2021 stands at 135, as indicated in Figure 7.

Currently employing 248 individuals, Phoon Huat manages a network of 19 stores and an online shopping site, showcasing resilience and adaptability in navigating market uncertainties while achieving impressive revenue milestones.



Summary

Phoon Huat's ability to cope with the disruption caused by the COVID-19 pandemic can be attributed to effective management practices guided by the BEF, the cooperation of employees in adapting to the changing demands, and a strategic emphasis on digitalization. The adoption of a new business model centered around B2C transactions has emerged as a new revenue generator, offering potential for further development. The shift towards B2C has allowed Phoon Huat to bolster its online retail business, offsetting the decline in revenue from B2B transactions during the pandemic. This demonstrates the company's agility in adapting to market dynamics and leveraging new channels for sustained revenue growth.

Looking beyond the pandemic, Phoon Huat is expanding its global footprint and strategically engaging in acquisitions and partnerships to expand its product offering and revenue sources. The implementation of various resilience-building practices, including digitalization and structural changes through alliances, reflects a comprehensive approach to navigating uncertainties.

In Table 2, where each crisis response practice is scored between 1 and 10, with higher scores indicating better practices, Phoon Huat showcases excellence across various aspects. Besides agile management, the adoption of a new online B2C business model stands out as the new channel to sustain revenue growth. Of course, other practices in developing resilience are not neglected. Digitalization and structural change in the form of strategic alliances to expand product choices and markets are also implemented.

Phoon Huat recognizes the multifaceted nature of resilience and is actively implementing a range of practices beyond the successful adoption of the new B2C business model. The commitment to digitalization reflects an understanding of the importance of leveraging technology to enhance operational efficiency and adapt to changing market dynamics. Additionally, the strategic alliances formed to expand product choices and markets showcase a forward-thinking approach, demonstrating the company's readiness to embrace structural changes for sustained growth.

TABLE 2**BUSINESS PRACTICES ADOPTED BY PHOON HUAT TO DEVELOP RESILIENCE.**

Practices in Management	Adopted (Yes/No)	Most Distinguished Practices (1–10 Score)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	Yes	8
3. Digitalization and digital transformation during COVID-19	Yes	8
4. Building a new business model	Yes	10
5. Hybrid and remote work during COVID-19	Yes	8
6. Talent acquisition during COVID-19	Yes	8
7. New market and customer development	Yes	8
8. Utilization of macro-level government policies	Yes	8
9. Cost optimization during COVID-19	Yes	6
10. Structural change and value-chain integration	Yes	8
Total score	10 out of 10	

Source: Based on inputs from Phoon Huat.

Case Study: Omni-Plus System

The interview was conducted to learn about the response strategies and resilience measures adopted by Omni-Plus System (OPS) Pte. Ltd. in mitigating the challenges posed by the COVID-19 pandemic. The narratives and insights presented in this study are based on the responses to the questions (see Table 1) by the company's Founder and CEO Marcus Neo and its Corporate Planning and Strategy Manager Daryl Neo.

Background

OPS is a Singapore-based company engaged in the distribution of engineering plastics, selling cataloged and general-purpose products. The company is also active in the development and manufacturing of resin compounds mixing and coloring. It specializes in providing supply chain solutions for engineering plastics, which are synthetic resin materials, through two core business operations: distribution and development, and manufacturing.

In the distribution business. OPS manages the distribution and sales of both generic and specialty engineering plastics materials. The development and manufacturing business segment involves the manufacturing of original engineering plastics materials. The company caters to various industries, providing component applications for products, such as household electrical and electronic equipment, OA equipment, automobiles, communications equipment, and medical devices.

With a presence across eight countries in Southeast Asia, Japan, and the People's Republic of China, OPS collaborates closely with upstream suppliers, partners, and customers. The company is dedicated to delivering end-to-end solutions in engineering plastics, technical consultancy, product development, and specifications, primarily serving MNC clients in the technology sector.

Recognized as a high-growth and rapidly expanding company by Enterprise Singapore's Scale-Up Programme, OPS consistently invests in its digital infrastructure and human capital to position itself as a leader in the industry. This proactive approach not only equips OPS to respond with agility to challenges such as COVID-19 but also enables them to reset for growth.

Impact of COVID-19 Pandemic

The recent COVID-19 pandemic, coupled with the 2021 Suez Canal obstruction, caused disruptions leading to a decline in sales for OPS. Additionally, the company's factories faced constraints on production capacity due to manpower and supply chain issues. This difficulty was further compounded by OPS's expansive business operations spread across eight countries, necessitating heightened coordination and supervision. The economic uncertainty caused by the pandemic exacerbated challenges in acquiring new clients, making it a daunting and complex endeavor.

Recognizing the evolving circumstances, OPS management reckoned the need for a shift in leadership style. The transition from a predominantly command-driven approach to one fostering two-way communication, openness to feedback, and expression of concerns, was deemed not only necessary but essential. The shift necessitated flexibility to address individual needs and adopt a more compassionate leadership approach during the crisis. The enforcement of anti-pandemic restrictions by the government meant that employees needed to work remotely from home. To facilitate this transition, OPS ensured adequate support in terms of equipment and software and established an easy-to-follow protocol for consultations. This strategic approach aimed to minimize disruption to business operations while maintaining high employee morale during the challenging period of remote work.

Resilience and Business Continuity Strategies

With WFH becoming the norm, OPS acknowledged the need to accelerate digital transformation. To foster expansion and growth, the company focused on addressing gaps and significantly investing in infrastructure to support its operations while developing and upgrading its human capital. For example, systemizing knowledge management became imperative for reaching out to relevant executives and employees more effectively without dependence on specific personnel. This is particularly critical given OPS's geographical spread across eight countries.

Reskilling and upskilling the workforce as part of building a learning organization has become a key priority for the company. Efforts are underway to accelerate and structure this process, with systematic training programs implemented for both management staff and employees to acquire and enhance skills essential for optimal job performance.

Despite potential challenges posed by multiple overseas operations, OPS strategically leveraged its international footprint as an advantage. This diversity not only provided the much-needed resilience but also varied earning sources, enabling the company to remain agile and capitalize on new opportunities. During the COVID-19 crisis, OPS played a vital role in helping multinational corporations manage their supply chains.

Fortunately, the company had initiated a move towards adopting a cloud-based system before the pandemic, streamlining its business operation. This helped the company swiftly address the needs of employees working remotely and accelerated the digitalization process.

Management Measures to Prevent or Absorb Risks

OPS asserts that fostering a learning organization is the best approach to managing and preventing risks. A learning organization, characterized by progressiveness and innovation, cultivates a flexible and capable workforce that serves as a valuable asset in minimizing risk and uncertainty during crises. By consistently valuing and investing in human capital, OPS mitigates risks and encourages employees to contribute new ideas, whether in product packaging, service delivery, or the creation of new market segments.

The company also highlights the significance of diversification into international markets. This strategic move reduces the pressure of limited market opportunities in Singapore and also provides a much-needed buffer when faced with crises like the COVID-19 pandemic.

Leveraging New Technologies and Partnerships for Innovation and Growth

OPS asserts a consistent commitment to investing in both digital infrastructure and human capital, positioning itself as an industry leader. It actively engages in joint research with other organizations to continually develop and enhance its product offerings. In 2018, it worked with the Agency for Science, Technology and Research's (A*STAR) Institute of Materials Research and Engineering and Enterprise Singapore to establish its engineering center in Singapore. The center, which has an in-house materials database of over 500 formulations, enables OPS to efficiently develop materials for its clients. Through its partnership with A*STAR, OPS successfully reduced the lead time for developing new materials to three to six months.

Scaling Up the Business

In 2019, OPS joined Enterprise Singapore's Scale-up SG program, designed to help local companies with high growth potential to scale quickly and effectively, emerging as leaders in their respective fields, and laying the groundwork to become global champions. Spanning 12 to 18 months, the program provides executives from the participating firms an opportunity to network with local business leaders and work with consultancies to devise and fine-tune their growth strategies. Through the program, OPS identified building and construction, 5G communications, and EV as its target sectors for new business due to their rapid growth and the demand for advanced materials.

While the core business continues to contribute the majority of revenue, OPS remains vigilant about supply chain issues across its operations in eight countries. The management did a quick assessment and review of the situation as frequently as information became available to decide on the course of action and responses. Having offices globally enables OPS to adapt more easily to new business environments and changing customer needs, to drum up business. Expertise and competence in supply chain management coupled with a reputation in materials and ability to solve supply chain issues helped generate a new stream of business revenue. During the crisis, with

disruptions in travel and goods transport, OPS experienced a surge in inquiries and service sales, including from some multinational corporations.

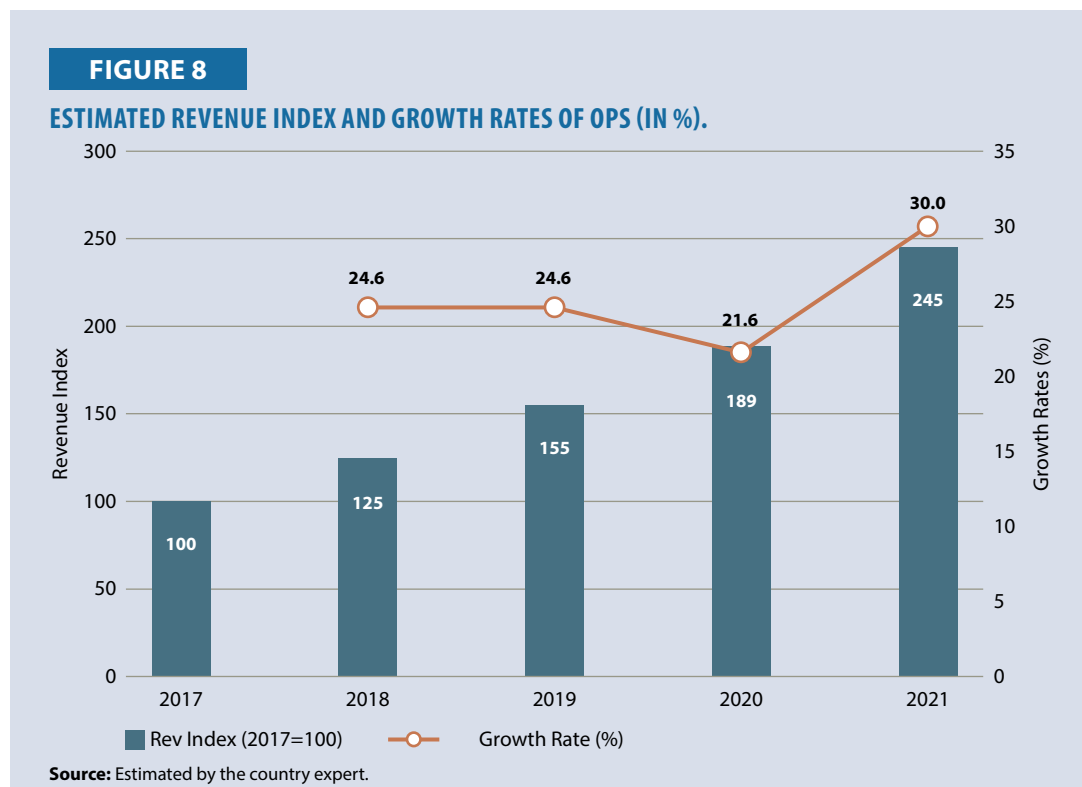
Employee productivity and morale have witnessed improvements through focused staff training and skill development. When WFH became mandatory, a comprehensive list of tasks amenable to this practice was quickly drawn up, and employees were promptly informed. Necessary equipment, such as computers, needed for WFH were made available to staff requiring them.

OPS CEO Marcus Neo emphasized the company's commitment to consistent investments in organization-wide learning. Collaborations with institutions like A*Star and Yamagata University for internships aim to groom prospective talent through cross-functional, end-to-end projects.

The company has also hired young professionals well-versed in Data Science, offering them an 18-month structured training program to equip them for the job. Mobility options are provided for these professionals to help them gain regional exposure across OPS's business operations. The Scale-Up Programme extends opportunities for senior management at OPS to undergo overseas training and attachments. Notably, CEO Marcus is also upgrading his knowledge and skills by enrolling in a PhD course in material science at Yamagata University, Japan.

Financial Data and Revenue Growth

OPS achieved a historic milestone by becoming the first company from Singapore to be listed on the Tokyo Stock Exchange in June 2021. Despite the challenges posed by the pandemic, it achieved a compounded annual growth rate of 25% between the financial years 2016 and 2021. In the 2021 financial year, the company experienced a massive 30% increase in sales, reaching USD249.6 million (approximately SGD345.9 million). Indexed with 2017 as 100, the revenue index for 2021 stands at an impressive 245, as illustrated in Figure 8.



Summary

Recognized as a high-growth and rapidly expanding company under Enterprise Singapore's Scale-Up Programme, OPS maintains a consistent focus on investing in digital infrastructure and Human Capital, positioning itself as an industry leader. This strategic approach not only prepared OPS to respond with agility to the challenges posed by COVID-19 but also facilitated a reset for sustained growth.

In 2020, OPS engaged Singapore Polytechnic (SP) to carry out a comprehensive analysis of training needs for its junior staff, a proactive measure initiated after learning about the school's offering from a fellow Scale-up SG participant. SP conducted interviews with staff, assessing their skills, and identifying gaps and areas for improvement, to determine relevant training needs. Armed with this knowledge, the company organized various training courses for its staff at education centres like the National Trade Union Congress LearningHub, and SP. Depending on the needs, employees were encouraged to learn new skills, from Zoom usage and advanced Excel functions to big data analytics.

TABLE 3

BUSINESS PRACTICES OF ADOPTED BY OMNI-PLUS SYSTEM TO DEVELOP RESILIENCE.

Practices in Management	Adopted (YES/No)	Most Distinguished Practices (1–10 Score)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	Yes	6
3. Digitalization and digital transformation during COVID-19	Yes	6
4. Building a new business model	Yes	6
5. Hybrid and remote work during COVID-19	Yes	10
6. Talent acquisition during COVID-19	Yes	10
7. New market and customer development	Yes	10
8. Utilization of macro-level government policies	Yes	8
9. Cost optimization during COVID-19	Yes	8
10. Structural change and value-chain integration	Yes	6
Total score	10 out of 10	

Source: Based on inputs from Omni-Plus System.

OPS also conducts in-house training programs focusing on material science, ensuring that employees stay updated on the latest trends and developments. Neo emphasized that the company's investments in professional development and internationalization have paid off well, particularly in navigating the challenges during the COVID-19 pandemic.

Table 3 outlines the main measures adopted by OPS to counter the negative impact of the pandemic, emphasizing the smart use of human resources for adapting to WFH, hiring data scientists, auditing available skills, and identifying new market segments for expansion and revenue growth.

Case Study: Memiontec

The interview aimed to understand the response strategies and resilience measures adopted by Memiontec Pte. Ltd. in mitigating the challenges during the COVID-19 pandemic. The questions (see Table 1) were directed to the company's Chief Executive Tay Kiat Seng and Managing Director Dewi Kwek.

Background

Memiontec, a Singapore-based, one-stop total solutions water treatment company, has nearly 30 years of experience in water and wastewater management services across the People's Republic of China, Indonesia, and Singapore. With expertise in membrane technology, ion exchange, physical, chemical, and biological processes, the group develops reliable, compact, cost-effective, innovative, and space-efficient water and wastewater treatment solutions tailored to the needs of the water industry's value chain. Leveraging in-house design, engineering, fabrication, and assembly capabilities, Memiontec serves municipalities and diverse industries across Asia.

Founded in 1992, the company initially focused on securing local contracts to establish a track record and obtain licenses to bid for larger public sector projects. After six years, Memiontec expanded its horizons internationally. Recognizing the limitations of Singapore's size, Kwek highlighted the company's commitment to openness to change and transformative strategies for growth. Memiontec aspires to achieve a market capitalization of USD500 million by 2026, transforming into a multinational corporation proudly representing Singapore globally. Currently, the company employs 240 individuals, including out-station employees, positioning itself just beyond the definition of SME in Singapore.

Impact of COVID-19 Pandemic

Like many other companies, Memiontec encountered several challenges and constraints during the COVID-19 pandemic. The company, recognized as part of the list of industries performing or producing critical services during a crisis by the government, was obligated to sustain operations despite uncertainties, restrictions on manpower availability, and disruption or shortage of critical materials and equipment.

Being designated as essential, suspending business operations was not an option for Memiontec. It had to navigate through the challenges of providing services amidst uncertainties. Suppliers of essential equipment components also faced difficulties, leading to delays in the shipment of goods that were scheduled to be delivered from China to Singapore and Indonesia between February and April 2020.

During the circuit breaker and lockdown periods, Memiontec received specific directives to carry on with operations, maintenance, and services to ensure the continuous supply of critical water services to owners of water treatment plants (PUB in Singapore and PT JMA in Jakarta). It also received instructions to continue total solutions Engineering, Procurement, and Construction (EPC) works for selective projects of PUB in Singapore and state-owned companies in Indonesia, to ensure timely completion of important water infrastructure projects.

In compliance with anti-contagion measures, employees, especially foreign workers, had to undergo regular testing and were relocated to alternative accommodations arranged by the authorities. The compliance involved additional costs that were somewhat alleviated with grants and government assistance. Memiontec anticipates challenges in a tight labor market for skilled foreign workers in Singapore, with the increase in the cost to employ foreign workers.

Memiontec also faced challenges in its overseas business operation. In Indonesia, one project was deferred and another was halted due to the lockdown during the pandemic. Travel restrictions further complicated coordination and supervision efforts in the affected regions.

Resilience and Business Continuity Strategies

As a company providing critical services and products, Memiontec is less concerned about business survival and more focused on meeting delivery requirements. The challenges faced, such as supply chain disruptions and manpower issues related to shortages and new arrangements for WFH, are viewed as manageable hiccups. With a healthy order book and a diversified business portfolio across various locations, Memiontec is confident about overcoming these challenges. The company maintained cautious optimism regarding its performance for FY2020, contingent upon unforeseen circumstances. Notably, revenue continued to grow by 18% in FY2020, though slightly lower than in FY2019.

Memiontec collaborates closely with relevant authorities and bankers to benefit from various government assistance schemes aimed at supporting companies. The company finds these schemes, particularly those addressing manpower costs and premise rentals, helpful in replenishing working capital for ongoing business operations.

The company has also made an effort to keep employees informed about the business operation and the requirements, especially considering its role as a provider of critical services. Memiontec demonstrates flexibility by embracing WFH for tasks and assignments that can be effectively completed through remote working.

Collaboration across business units in different locations is a focal point of enhanced sustainability. The subsidiary in China works closely with the Singapore and Indonesia offices, contributing to Memiontec's cost-saving strategy by providing more cost-competitive supplies of products and systems.

Managing Risk and Driving Innovation through Technology

Recognized as an essential services company, Memiontec responded swiftly to the outbreak, ensuring the continuity of construction projects and services with a reduced workforce while complying with the government's pandemic containment regulations. The company collaborates closely with authorities on productivity improvement initiatives in the post-COVID-19 workplace, actively seeking relevant grants to support implementation.

Memiontec believes that the best approach to manage or prevent risk is to have diversified revenue streams. While expanding its business in the ROC, Indonesia, and Singapore, it continued to explore avenues for further growth. Since its founding, the company has specialized in EPC projects, involving the design and construction of systems and plants delivered to the customer upon completion.

New Business Model for Advancing the Value Chain

In 2016, Memiontec expanded its scope of work to include Build-Own-Operate-Transfer (BOOT) and Transfer-Own-Operate-Transfer (TOOT) projects, encompassing financing, operations, maintenance of plants, and the sale of treated water. With support from Enterprise Singapore, the company partnered with firms in Indonesia to initiate such projects.

In 2022, Memiontec acquired Leaseweb Cloud for application hosting and computing services. This gave it the flexibility to modify virtual infrastructure dynamically. This allows Memiontec to

scale up and down virtual machines based on changing workloads and demands, without the need for expensive and time-consuming hardware upgrades. Digital tools are integral to Memiontec's design, engineering, fabrication, and assembly services.

While EPC projects traditionally drove Memiontec's revenue, the company recognizes the need to evolve its business model and move up the value chain. Exploring asset ownership of water treatment systems or facilities, Memiontec aims to co-own these facilities with project owners. This meant Memiontec would go beyond designing and supplying technology to profiting from the sale of treated water. Besides, BOOT and TOOT projects can provide additional and recurring income streams from the extra work. The concession periods to manage the plants and sell water can be up to 25 or 50 years, allowing the company a steady flow of revenue throughout.

KS Tay, Chief Executive of Memiontec, remains optimistic about the strong demand for clean water despite uncertainties and delays due to the COVID-19 pandemic, driven primarily by population and economic expansion, as well as accelerated efforts by governments to develop sustainable water supply and accessibility. This aligns well with the company's business prospects and growth strategies. Memiontec joined Enterprise Singapore's Scale-Up Programme in 2021, gaining access to consultants who could help design and fine-tune its growth strategies, and the opportunity to network with local business leaders.

With inputs from consultants, Memiontec formulated a five-pillar growth plan for the next few years. This includes securing more BOOT and TOOT projects, fostering partnerships with firms in Indonesia to upgrade from industrial and commercial projects to larger municipal projects, and venturing into new markets, such as Vietnam. With over 300 operational industrial zones in Vietnam, each requiring water and wastewater treatment services, the decision to set up a subsidiary in the country in October 2022, aligns with Memiontec's strategic priorities.

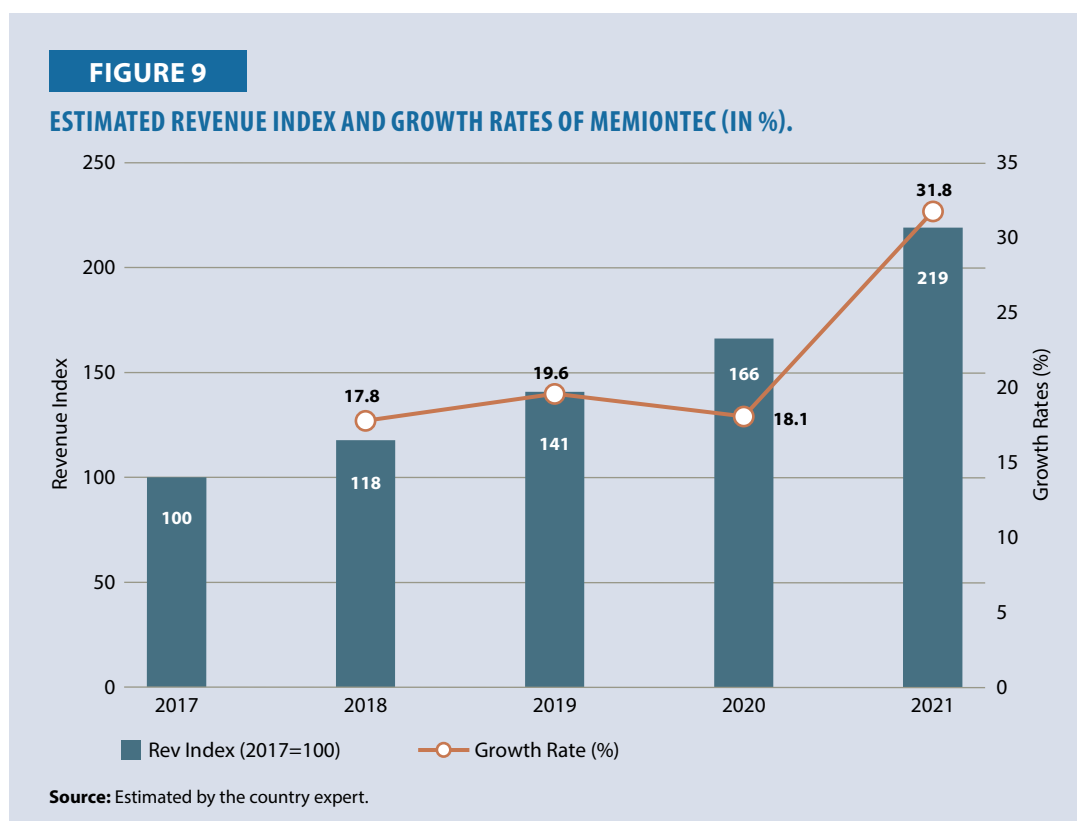
Financial Data and Revenue Growth

Listed on the Singapore Exchange's Catalist board in 2020, Memiontec is worth USD132 million. In 2021, the company secured its largest contract, amounting to USD56.6 million, for the installation of equipment at the Changi Water Reclamation Plant. During the year Memiontec also started its third overseas expansion into Vietnam. For the financial year of 2022, the company recorded a profit growth of 36.4% with the help of overseas contracts. It aspires to reach a market capitalization value of SGD500 million by 2026.

The revenue trajectory demonstrates significant growth, surging from SGD20.82 million in FY2017 to a record SGD45.65 million in FY2021. With FY2017 indexed as 100, the revenue index for FY2021 stands at 219, as indicated in Figure 9. Overall, the group has maintained profitability for the past five years, registering a 23.7% year-on-year growth in EBITDA to SGD2.09 million in FY2021.

Summary

During its initial foray into the market, Memiontec focused on the EPC model, involving the design and supply of equipment for water technology. It also helped run and maintain water treatment plants. As an early entrant, this model facilitated Memiontec's organic expansion. However, recognizing the inherent revenue fluctuations tied to project life cycles within the EPC mode, its Chief Executive KS Tay decided to pivot the company's focus, aiming to move up the value chain.



He had begun exploring avenues for asset ownership of water treatment systems or facilities through collaboration with project owners, allowing co-ownership of water treatment systems in BOOT and TOOT projects. The strategic move extended Memiontec's role beyond designing and supplying technology to include profiting from the sale of treated water over project lifespans of up to 50 years, ensuring a consistent revenue stream.

The transformation also meant Memiontec needed to adjust its business strategy and market positioning, and more importantly, change the mindset of its team, and the company is making active progress in that direction.

The company's commitment to rationalizing supply chains to achieve cost reduction together with its active pursuit of value-chain integration have placed Memiontec in good stead to sustain revenue growth and increase profitability. These achievements are reflected in the top scores recorded in Table 4.

TABLE 4

BUSINESS PRACTICES ADOPTED BY MEMIONTEC TO DEVELOP RESILIENCE.

Practices in Management	Adopted (YES/No)	Most Distinguished Practices (1–10 Score)
1. Agile organization BP during COVID-19	Yes	10
2. Automation and mechanization during COVID-19	Yes	5
3. Digitalization and digital transformation during COVID-19	Yes	5
4. Building a new business model	Yes	8

(Continued on next page)

(Continued from the previous page)

Practices in Management	Adopted (YES/No)	Most Distinguished Practices (1–10 Score)
5. Hybrid and remote work during COVID-19	Yes	6
6. Talent acquisition during COVID-19	Yes	6
7. New market and customer development	Yes	8
8. Utilization of macro-level government policies	Yes	8
9. Cost optimization during COVID-19	Yes	10
10. Structural change and value-chain integration	Yes	10
Total score	10 out of 10	

Source: Based on inputs from Memiontec.

Conclusion

The concluding section reflects on the lessons and imitable business practices learned from the case studies while examining the impact of the COVID-19 pandemic on diverse enterprises across industries. Management practices slated for review and reform because of digitalization saw a surge in response to the pandemic. The COVID-19 pandemic also raised the question to analysts and managers whether businesses need a new set of management practices and strategies to cope with such crises.

A survey of existing literature and insights from seasoned entrepreneurs in the case studies indicate that existing standards of good management practices remain valid and useful at all times, irrespective of disruptions arising from crises like the pandemic. A crisis, in general, is a short-run phenomenon, and should not be a serious threat to a well-run company under vigilant and adaptable management. However, specific aspects and functions of management practices demand heightened attention during a crisis, encompassing financial health, continuous revenue inflow, employee cooperation and trust, and the mobilization of resources and technology to support productivity improvements and new business models. Business continuity plans⁵ embedded in the practice of business excellence will place the company in an even more secure and favorable position [11].

Contrary to popular (but erroneous) belief, productivity improvement remains equally important for companies amid crises. The ability to enhance productivity despite crises is a good pathway for survival and growth. The case studies underscore that companies practicing Business Excellence exhibit greater confidence in handling crises such as the COVID-19 pandemic. These companies have a checklist of fundamental ingredients for good management practices to guide and evaluate their preparedness to deal with a crisis. As noted, a crisis is not necessarily bad for all enterprises. Some may prosper due to the nature of the products and services offered by them, the demand for which may increase during a crisis⁶. A well-managed company that excels in ordinary times and in times of crisis, showcasing resilience and agility to mobilize resources and design new strategies to overcome difficulties.

⁵ Business Continuity (BC) involves building resilience in a business by identifying its key products and services, along with critical activities that underpin them. It involves devising strategies (translated into plans) to facilitate trading through disruption and recovery thereafter [25].

⁶ In the event of a power failure triggered by an earthquake, there may be a substantial increase in demand for torches, candles, and oil lamps.

Table 5 consolidates the scores recorded in Tables 1, 2, and 3, enabling easy comparison and analysis. Figure 10 provides a graphical representation of these scores. While the total score for each of the case studies is nearly identical, the significance of each factor varies for Phoon Huat, OPS, and Memiontec in achieving resilience and growth. Phoon Huat prioritizes new business models, OPS leans on upgrading human capital and internationalization, and Memiontec capitalizes on cost rationalization and structural changes in terms of expanding its business up the value chain. Notably, Phoon Huat also adopted strategic alliances and partial mergers to increase resilience and spur business growth.

TABLE 5**FACTORS FOR RESILIENCE AND GROWTH: RANKING IMPORTANCE ACROSS THREE CASE STUDIES.**

Practices	Phoon Huat	OPS	Memiontec
1. Agile Management	10	10	10
2. Automation and mechanization	8	6	5
3. Digitalization and digital transformation	8	6	5
4. Building a new business model	10	6	8
5. Hybrid and remote work	8	10	6
6. Talent acquisition	8	10	6
7. New market and customer development	8	10	8
8. Utilization of government assistance	8	8	8
9. Cost optimization	6	8	10
10. Structural Changes and value-chain integration	8	6	10
Total Score	82	80	76

Source: Based on the analysis and computation by the country expert.

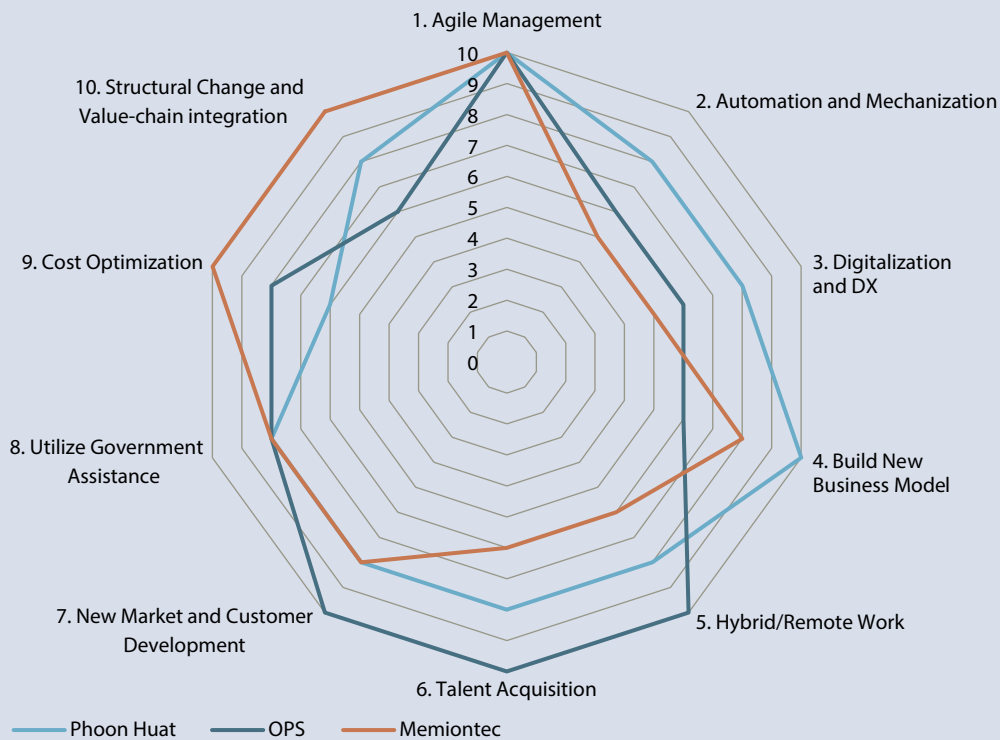
The assessment includes an emphasis on technology adoption. Digitalization helps companies cope with crises like the pandemic, holding particularly significant value for Phoon Huat. The company's proactive stance in the early adoption and continuous installation of equipment and software serves a dual purpose: facilitating changes in order processing, goods delivery, and service provision, as well as supporting remote work arrangements. The digital system acts as a conduit for communication, conveying relevant information critical for business continuity. Moreover, it contributes to the formulation of new business models to deliver products and services profitably. Enterprises are nudged into a fast track of transformation towards Service 4.0 and Industry 4.0. This evolution involves the integration of technologies such as AI, blockchain, the IoT, and machine learning algorithms into economic activities.

Training and upgrading the skillsets of employees have become a crucial strategy to boost workers' morale and enhance retention, especially when employees are encouraged to share their ideas and initiatives with management to cope with the uncertainties and opportunities brought along by crises like the COVID-19 pandemic. This proactive approach is reported to be especially significant for Phoon Huat and OPS.

Government assistance schemes, particularly those injecting liquidity into working capital, are welcomed by the companies. More importantly, business development programs aiding companies in technology adoption, skill upgrading, and internationalization of their business provide long-term benefits, nurturing resilience and sustaining growth.

FIGURE 10

RANKING OF RESILIENCE AND GROWTH FACTORS ACROSS THREE CASE STUDIES.



Source: Based on the analysis and computation by the country expert.

Recommendations

While the business environment, transactional practices, and strategic focus may differ across the APO economies, there is a convergent need and desire to have productive enterprises that are resilient to crises and prospering. The recommendations for companies emerging from the COVID-19 pandemic in APO countries include:

1. **Business excellence framework:** Companies that practice business excellence demonstrate confidence in handling crises, such as the COVID-19 pandemic.
2. **Business continuity plan:** Embedding BEF with BCPs provides an additional layer of protection. Such plans help build business resilience by identifying key products and services, and critical activities that underpins them, and devising strategies to trade through disruptions and recover afterward.
3. **Adopting new technologies and digitalization:** Essential for innovation to protect the core business, digitalization plays a dual role. Firstly, facilitating innovation within the existing business model in delivering products and services and mode of payment. Secondly, it enables entry into new businesses by capitalizing on existing talent, resources, and technologies available in the market.
4. **Agility and tactical operations:** Companies need to be agile and tactical during crises. Resilience ensures survival in turbulent times, while agility involves swift actions to

address disruptions successfully. These actions may include identifying new markets, and hence new revenue streams; changing delivery method of existing core services; modifying existing products and services to suit restricted environments; new business models with new value propositions; organizational changes through acquisition and mergers; and foray into other parts of the value chain.

5. **Human resource development:** Training and upgrading of employee skillsets boost morale and enhance workers' retention, especially in a tight labor market. A partnership approach in human resource management, with shared information between management and employees, becomes crucial during a crisis, fostering mutual trust and coordinated action.
6. **Cost reduction and optimization:** Reducing costs helps improve the revenue-cost ratio, ensuring business viability. Uncontrolled cost increases can erode the advantage of productivity gains from technology adoption and innovation.

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Appendix

The 8-Ms Management Business Excellence (8MBE) Model

The 8-Ms Management Business Excellence (8MBE) Model is a modification of the BEF, championed by many organizations including the APO [1], for business enterprises to have an all-round awareness of the key business functions, achieving excellent results consistent with the vision and mission of the organization. The 8MBE scheme simplifies the BEF seven criteria of Leadership, Customers, Strategy, People, Processes, Knowledge, and Results, into 8 items easily understood by members of the managing team. The outer core items of Management, Make, Message, and Market, encapsulate the inner core items of Money, Method, Manpower, and Material for continuous assessment and performance guidance. Some details about each M are shown in the Table below:

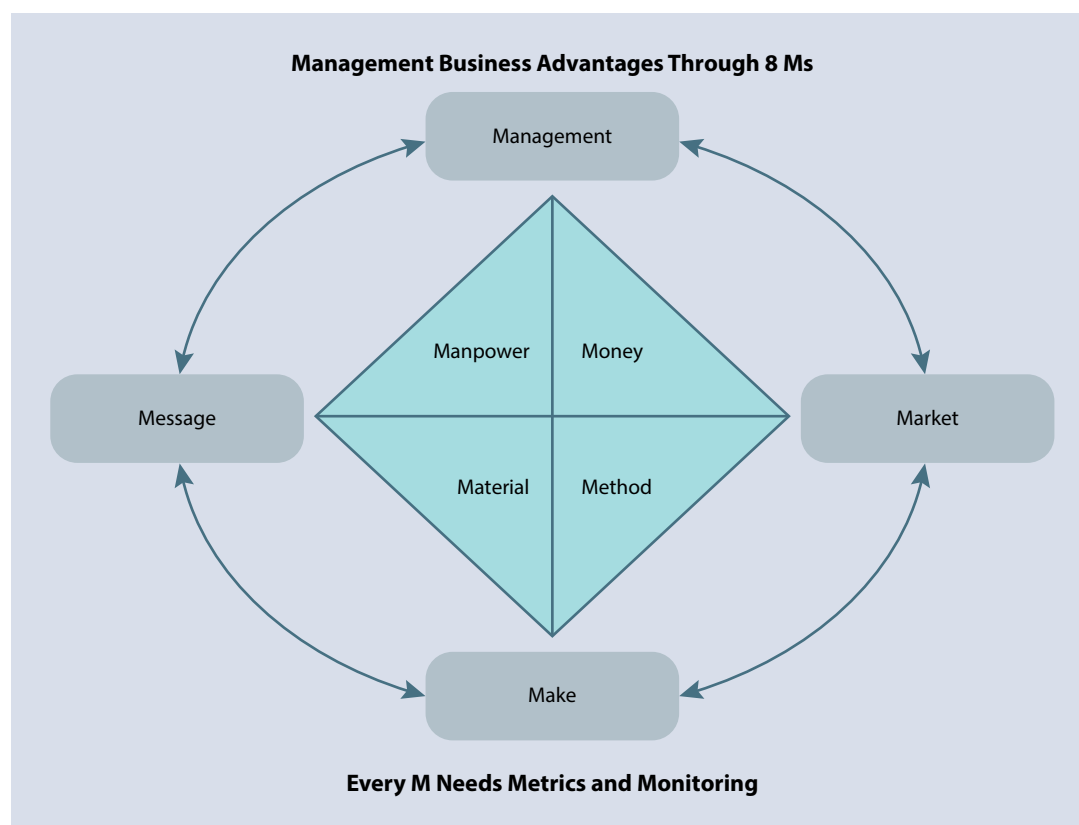
	8 Ms	Desirable Characteristics	Score
1	Management	Strategic, able, responsible, agile, mission-vision-mindset 1. Does management team provide effective leadership in facing challenges or problem? 2. Does the management team have strategic planning, long term survival vision?	
2	Make	Products and services quality; customers satisfaction 1. What product/services are the company offering? Do customers know them well? 2. Is the quality & 'menu' of products/services updated or improved to keep customers interested & satisfied?	
3	Message	Effective communication with stakeholders; info; promotion. 1. How good is the various departments in the company communicating with each other? 2. Are feedback (from staff & customers) taken seriously & systematically in running of organization & serving customers better?	
4	Market	Segmentation; local and foreign; B2B & B2C; online presence 1. Are markets appropriately segmented & identified for effective sales and revenue generation? 2. Are markets beyond traditional types considered: online, overseas, platform sales, etc?	

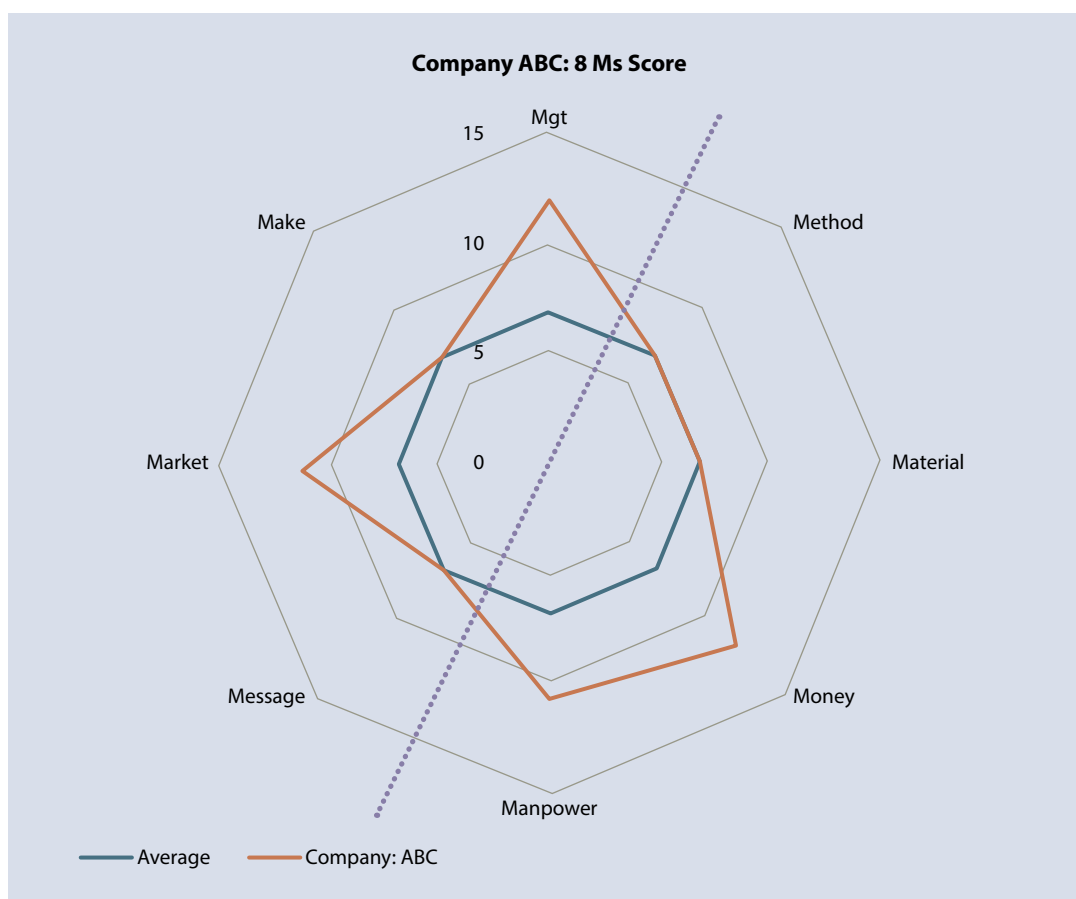
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	8 Ms	Desirable Characteristics	Score
5	Money	Finance; working capital; access to credits 1. Is there adequate working capital? Balanced leverage? 2. Are creditors satisfied with company performance, ample sources of funds for investment & expansion?	
6	Manpower	Skillsets; training; morale; productivity 1. Is the current set of workers providing the required support for company to excel & optimise? 2. On job training and attendance of training courses keeping employees' morale high and contributing positively to companies' productivity & performance?	
7	Method	Technology applied; process innovation; business models 1. Is the method of production able to yield competitive advantage and improve market share? 2. Are there streams of innovation in processes and products that will sustain business growth & profit?	
8	Material	Reliable suppliers; diversified sources; supply chain 1. Is the set of suppliers providing sufficient assurance to the quantity and quality of essential input materials for production of goods/services? 2. Is the supply chain and logistic partners sufficiently robust to enable continued production in the event of crisis?	

Rounding up the 8Ms are two additional elements or 'M's: Metrics and Monitoring, which persistently pervade all effective management frameworks.





Creating an MBE Scorecard and 8M Radar Chart

Developing an MBE Scorecard and an 8M Radar Chart involves rating each question on a Likert scale of 1 to 7, with 7 being the most satisfactory. The total Likert score ranges from 8 to 112 (2 x 7 x 8). For example, if a company ABC's total Likert score is 74, then the MBE score would be 66.1%, calculated as $100 \times 74/112$.

Diagnosis Using the Radar Chart

Strong management team, well-funded, supported by talented sales crew selling products profitably in local and international markets. Performance can be improved by expanding the range of products and services offered, adopting technology to update the method of production, securing the supply chain, and having more inclusive communication and sharing of information across all departments.

The MBE scores for the three case studies from Singapore are given in the table.

	Phoon Huat	OPS	Memiontec
Maximum Likert Score	112	112	112
Actual Likert Score	87.0	86.0	85.0
MBE Score	77.7%	76.8%	75.9%

LIST OF ABBREVIATIONS

8MBE	8-Ms Management Business Excellence
AI	Artificial Intelligence
AIoT	Artificial Intelligence of Things
BCP	Business Continuity Plan
BE	Business Excellence
BEF	Business Excellence Framework
BOOT	Build-Own-Operate-Transfer
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CRM	Customer Relationship Management
DX	Digital Transformation
EBST	East Bright Star Technology Co. Ltd.
EPC	Engineering, Procurement, and Construction
ERP	Enterprise Resource Planning
ESG	Environmental, Social, and Governance
FY	FY Furniture
GDP	Gross Domestic Product
KDI	Korea Development Institute
KOSME	Korea SMEs and Startups Agency
KPC	Korea Productivity Center
M&A	Mergers and Acquisitions
MBE	Management Business Excellence
METI	Ministry of Economy, Trade and Industry
MSS	Ministry of SMEs and Startups
NPS	Net Promoter Score
NTUC	National Trade Union Congress
OPS	Omni-Plus System Pte. Ltd.
PMH	Pregetic Medical Health Co. Ltd.
POS	Point-of-Sale
ROC	Republic of China
ROK	Republic of Korea
RPS	Remote Plasma Source

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SME	Small and Medium Enterprises
SMEA	Small and Medium Enterprise Agency
SOP	Standard Operating Procedures
SP	Singapore Polytechnic
TCA	Taiwan Carbon Asset Co. Ltd.
TDC	Tender Die Casting Enterprise Co. Ltd.
TFP	Total Factor Productivity
TOOT	Transfer-Own-Operate-Transfer
WFH	Work-from-Home

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