Startup Island TAIWAN

2021

INDUSTRIAL TRANSFORMATION REPORT

THE 5 BROTHERS OF ELECTRONICS

Editor’s Note

In recent years, innovation and entrepreneurship has become a global phenomenon and trending buzzword, more and more countries around the world have been actively involved in startup investments to get a head start in the latest generation of technology development. Taiwan has also been actively powering innovation through the development of its own startup ecosystem.

Today, Taiwan is regarded as one of the high-tech powerhouses in the world with its strong foundation on hardware technology. But how did Taiwan end up having this role in the global tech manufacturing supply chain today? How are Taiwan's corporations evolving? What are the innovation trends in Taiwan? In this report, we will showcase the evolution of the Taiwan Tech scene, analyzing how Taiwan’s corporationsis handling “Corporate Innovation” and how “Coporate Innovation” has developed from era to era, along with case studies of big players in the corporate innovation scene.

Within this report, we want to showcase the comprehensive ecosystem and innovation capabilities of Taiwan. We want to share with you how this high-tech empire was built and the latest innovation trends happening in Taiwan. Hopefully after reading this report, we can inspire you to learn more about everything happening in Taiwan, and eventually one day, invest in Taiwan.

Overview of Taiwan's Technology Industry

First Beginnings

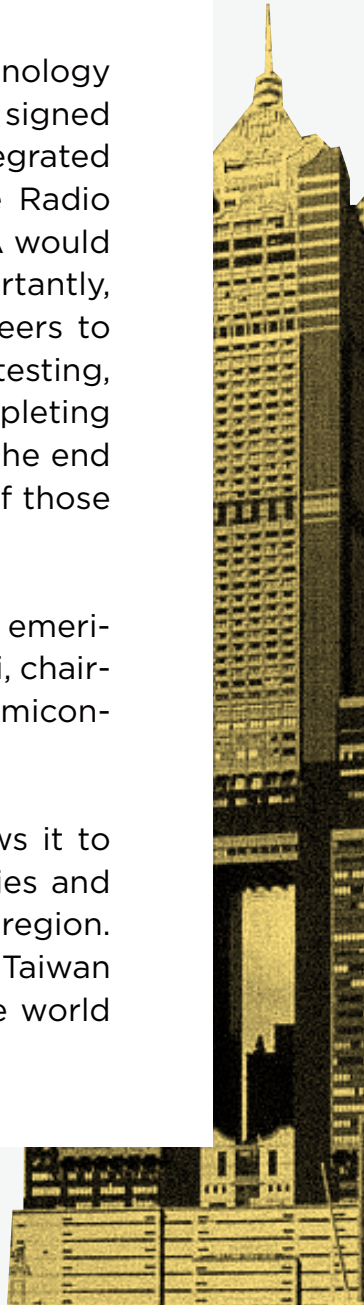
Before we talk about Taiwan's corporate innovation scene, we must begin from the roots of the semiconductor industry, as Taiwan's technological foundation is mostly built from it.

To begin a story about Taiwan's path to becoming the high-tech global powerhouse it is today, we must take you back almost 50 years to the period of 1973-1977.

The year is 1976 and Taiwan's newly created Industrial Technology Research Institute (ITRI) formed just 3 years ago in 1973 has just signed the "Complementary Metal–Oxide–Semiconductor (CMOS) Integrated Circuit (IC) Technology Transfer Licensing Agreement" with the Radio Corporation of America (RCA) on March 5, 1976, under which RCA would transfer its know-how in CMOS technology to Taiwan. Most importantly, the agreement also included sending 19 young Taiwanese engineers to RCA's facilities for training in IC design, process technology, IC testing, and semiconductor equipment. In the meantime, ITRI was completing pilot runs at Taiwan's first 3-inch wafer fabrication plant towards the end of 1977. This plant would later be managed by Chintay Shih, one of those seed engineers who trained at RCA.

Notable among the 19 exchange engineers at RCA were Bob Tsao, emeritus chairman of United Microelectronics Corp (UMC).; Tsai Ming-kai, chairman of MediaTek Inc.; and F.C. Tseng, vice chairman of Taiwan Semiconductor Company (TSMC) and former ITRI President Chintay Shih.

Fast forward to 2021, Taiwan exhibits notable qualities that allows it to continually lead the world in developing cutting edge technologies and rank the best annually among its peers in the Asia-Pacific (APAC) region. In fact, based on the 2019 World Economic Forum (WEF) ranking, Taiwan was ranked 4th globally for its innovation capability, showing the world that Taiwan is one of the most innovative countries in the world.



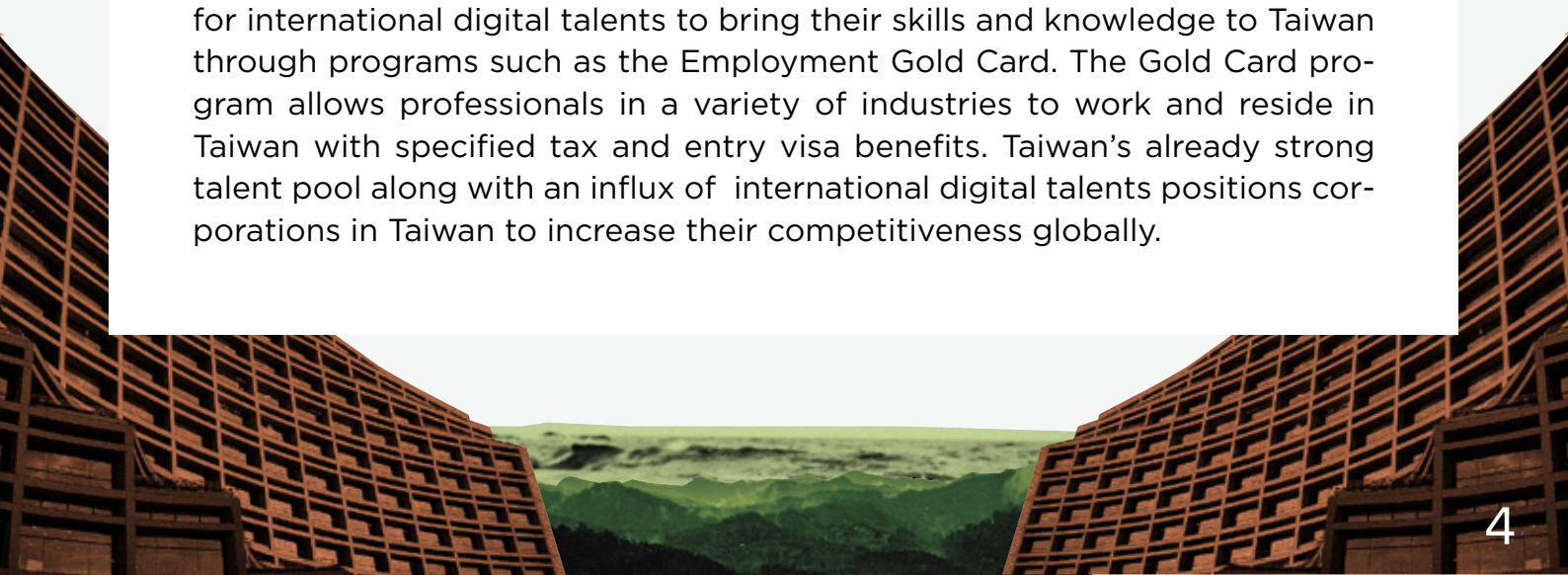
The 3 Central Pillars of the Taiwan Technology Scene

Supporting Taiwan's continued excellence are 3 central pillars that are the vital cogs that we'd like to share with you in this section.

1. University Graduates, Tech-savvy Talents, and Human Resource Advantages

Complementing all successful enterprises is great talent. A capable pipeline of STEM graduates ranks as one of the most critical elements for Taiwan's leading corporations to continue their leadership positions and technical excellence. According to the International Association for the Evaluation of Educational Achievement, over 600,000 students from 64 countries were assessed in both the subjects of math and science. Taiwanese students aged ten (10) years old and fourteen (14) years old ranked in the top five in both math and science among their international peers in those same categories. In addition, the cabinet level National Development Council (NDC) along with its investment vehicle National Development Fund (NDF) has set forth programs that will maintain Taiwan's competitiveness.

The NDC's 2030 goal of transforming Taiwan into an English-Mandarin bilingual nation is already underway with support from the Executive Yuan. The bilingual nation effort will better prepare the next generation of Taiwanese to be better equipped to join the digital technology workforce required for Taiwan's major tech corporations. In addition, The NDC's Department of Human Resource Development has also amended the "Act for the Recruitment and Employment of Foreign Professionals" to open up opportunities for international digital talents to bring their skills and knowledge to Taiwan through programs such as the Employment Gold Card. The Gold Card program allows professionals in a variety of industries to work and reside in Taiwan with specified tax and entry visa benefits. Taiwan's already strong talent pool along with an influx of international digital talents positions corporations in Taiwan to increase their competitiveness globally.



2. Advantages of Taiwan's Upstream, Midstream, Downstream Supply Chain

Globally, Taiwan plays a critical role in the production of Information and Communication Technology (ICT) products that everyday consumers and companies need to operate their businesses. Notable examples for this include the manufacturing of smartphone components in almost everyone's pockets to laptops used by students and office workers. In fact, everything from Smart TVs, Teslas, video gaming systems, to the air conditioner in your home relies on semiconductors for the "brain power" to allow you to make a call, drive home, or sleep comfortably at night.

Taiwan's position as a key partner in the global ICT industry can be attributed to the leading Taiwanese corporations whose services and products impact the entire supply chain of the semiconductor industry.

3. Government Support Towards the Taiwan Tech Scene

The monumental task of fostering Taiwan's talent pool, providing the needed resources for Taiwan's chip suppliers and ensuring emerging technologies such as healthcare, electric vehicles, and Artificial Intelligence (AI) are also incubated has been the task of Taiwan's central government.

Central to that theme is ITRI, which is a technology research and development institution in Taiwan. ITRI plays a vital role in transforming Taiwan's industries from labor-intensive into innovation-driven. Its open lab and incubator have fostered emerging industries and startups including well-known names such as UMC and TSMC, which are now the world's top two semiconductor foundries.

One of the biggest Taiwan government initiatives to expand Taiwan into the global tech scene was the establishment of the Hsinchu Science Park, which was an idea of building a science and technology ecosystem just like Silicon Valley. The primary goal of founding the park at the time was to expand the size of the private economy and creative vitality of Taiwan. The location of the science park is right next to the National Tsing Hua University and National Chiao Tung University. Like Silicon Valley, which is adjacent to Stanford University and University of California, Berkeley. The science park was eventually built and opened in 1980 in Hsinchu. The park now houses more than 400 high-tech companies, mainly involved in the semiconductor, computer, telecommunication, and optoelectronics industries, and have been established in the park since the end of December 2003. Its 400-plus technology companies accounted for more than 10% of Taiwan's gross domestic product since 2007.

Trend of Taiwan's Corporate Innovation

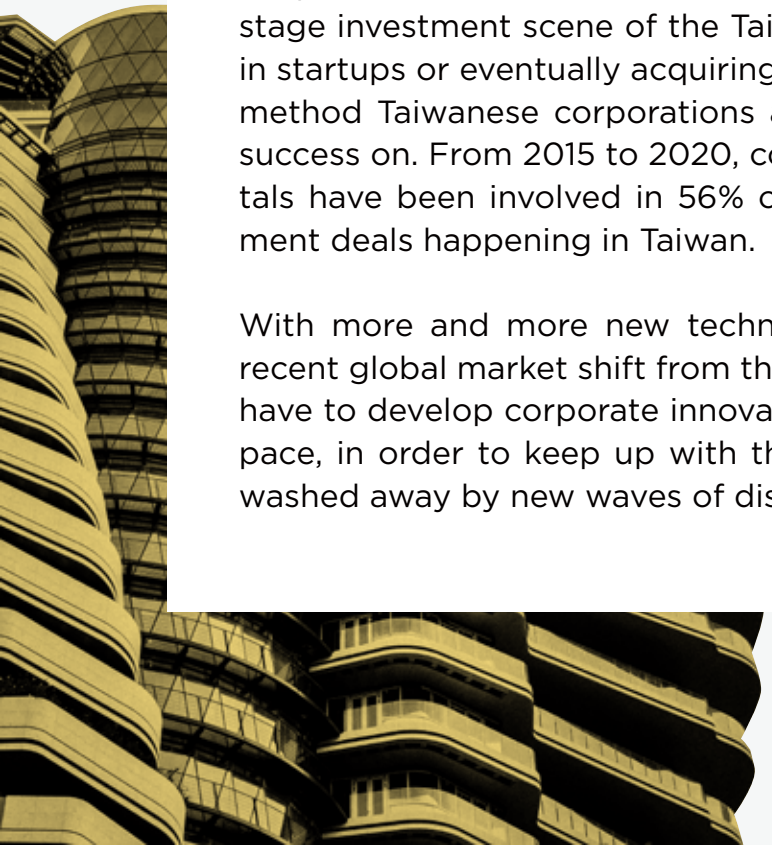
Why Innovation

This century-old question has been discussed over and over, why innovation? Why do corporations need to innovate?

Innovation is the key driving force for continuous growth. Corporations in Taiwan mainly operate on the Original Equipment Manufacturer (OEM) or Original Design Manufacturer (ODM) business model for their main revenue stream, and mostly rely on internal research and development in creating the second growth curve; however, as the life cycle of products, services, and technologies become shorter, the pace of internal innovation cannot keep up with various fast-evolving disruptive innovations and models. This is when corporations have to consider maintaining their momentum of innovation through external forces such as investment, mergers and acquisitions of new ventures, or strategic cooperation models.

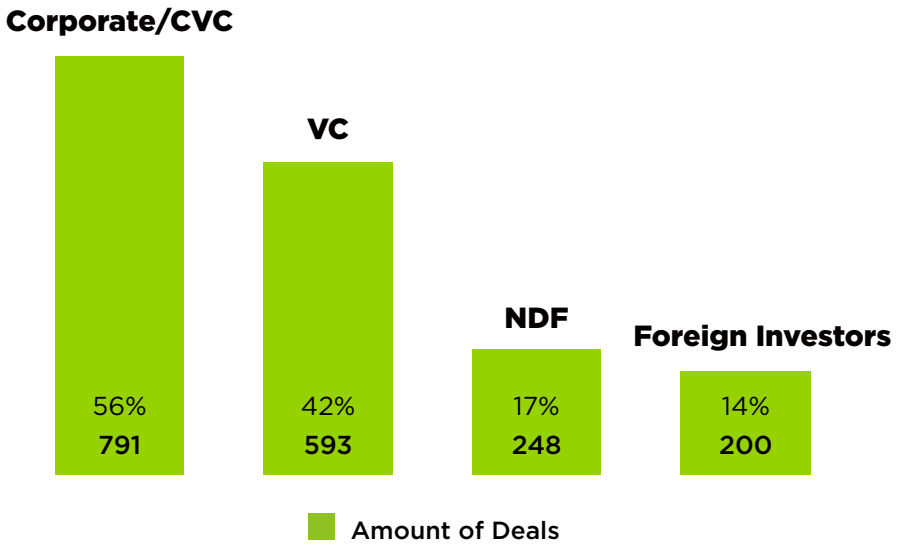
Corporations in Taiwan have always been heavily involved in the early stage investment scene of the Taiwan startup ecosystem, as investing in startups or eventually acquiring teams have always been a strategic method Taiwanese corporations are familiar with, or even built their success on. From 2015 to 2020, corporates or corporate venture capitals have been involved in 56% of the amount of early-stage investment deals happening in Taiwan.

With more and more new technologies developing, along with the recent global market shift from the pandemic, Taiwanese corporations have to develop corporate innovation on a larger scale and at a faster pace, in order to keep up with the innovation trends and to not get washed away by new waves of disruptive innovation and technology.



Startup Investors in Taiwan

Accumulated from 2015 to 2020



From 2015 to 2020, corporates or corporate venture capitals have involved in 56% of the early-stage investment deals in Taiwan.
Note that most investments involve multiple companies, VC's, or investors, so the total percentage is over 100%.

Source: FINDIT Team/ TIER

Methods of Innovation

While "Innovation" has long been the buzzword and the key enabler of sustainable growth among corporations both large and small, recently corporates have been shifting their innovation approach away from the traditional "closed/internal" (e.g., R&D) toward "open/external". The traditional pathways are considered too slow to supply the rates of innovation required to sustain the business and its growth under fast-changing market trends, ever-increasing industry competition, and rapid-growing technology innovation. According to KPMG's 2020 Global CEO Outlook, over 80% of CEOs believe the key is the ability to either continuously challenge existing thinking and business norms or through disruptive innovative solutions. Since COVID-19 affected all economic activities globally, corporations are even more enticed than ever to explore new ways to capture innovation and develop digital solutions externally through cooperation with startups. Another thing noticeable is, due to the pandemic affecting the economy, 80% of companies are speeding up the process of innovation and digitalization, with 40% of companies even estimating this process to be a few years earlier than their original plan. Looking ahead, the fastest and most efficient way to engage upon digital transformation for corporations is to work with startups, adopt their innovative technologies, and most importantly incorporate their entrepreneurial spirit into their corporate culture and business.

Global Corporate Innovation History

1960s - 1980s Era of Industry Giants

In the 1960s, innovation was mainly confined to researchers, R&D departments, and laboratories, who steadily pushed the boundaries of technology in support of the corporation's next generation of offerings. Internal R&D was viewed as a strategic asset and even a barrier to competitive entry in many industries. At the time, only large companies with significant resources and long-term research programs would have the resources to compete.

1990s: Digital Disruption and the Rise of Open Innovation

In the 1990s, online opportunities emerged due to the rapid growth of the Internet, which allowed corporations to reach a much larger audience more quickly. Software also scaled faster than offerings from traditional industries, e.g. manufacturing. And the venture capital model was instrumental in funding innovative startups. The combination of the digital revolution, venture capitalism, and fast-changing consumer behavior enabled market disruptions.

2000s: Emerging of Future Technologies

Since the 21st century, the rise of social networks and smart phones have disrupted the market and created a fresh wave of new digital innovation. Following the development of new technologies like AI, IoT, Biotech, 5G, and Blockchain. Though we are only in the early phases of the digital revolution, corporations will continue to be challenged to rethink their models to access, organize, and deploy these technologies to benefit all of their business units.

Taiwan’s Corporate Innovation History

There are two key players in Taiwan's corporate innovation scene, just like the Taiwan tech scene, ITRI and the Hsinchu Science Park play a huge role in Taiwan's innovation scene. The development of these two support pillars contributed heavily in Taiwan’s technological development and have become the life line of Taiwan’s economy during 1980 to 2000.

Taiwan's venture capitalists (VC) also have a great impact on the high-tech industry and corporate innovation scene. Taiwan's VC industry was introduced by Mr. K.T. Li in the 1980s with reference to Silicon Valley practices to invest capital in high-tech industries. At the same time, ITRI had cultivated a large number of R&D technologies and then spun them into independent startup companies. The high probability of success made the incentive for VCs to invest in more capital higher than ever.

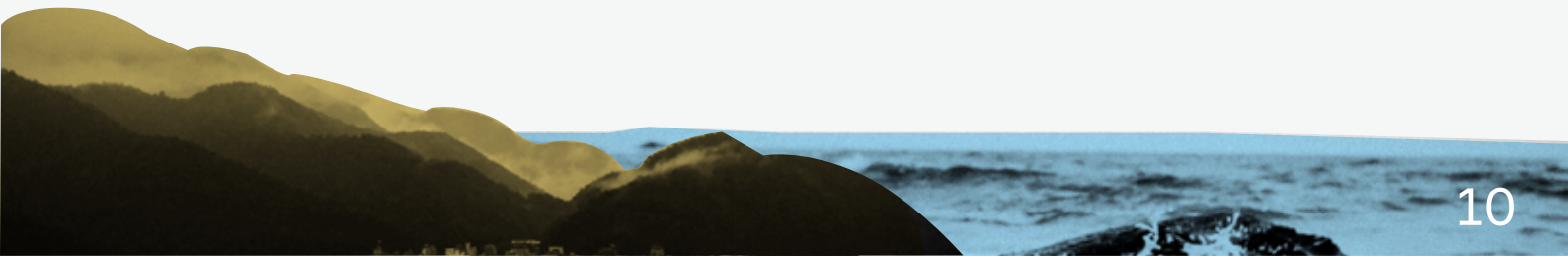
In 1990, the newly implemented “Statute for Upgrading Industries” policy had provisions on investment deductions for VC shareholders. This meant as long as VCs invest in early stage teams in strategic industries, 20% of the investment amount available to VC shareholders would be used to deduct personal income tax.

This policy incentivized more than 7 billion USD in venture capital to invest in semiconductor-related manufacturing industries, which led to more than 70 billion in USD funds from the hands of the general public pouring into Taiwan. These large amounts of capital built the foundation of Taiwan’s strong semiconductor industry and forged Taiwan into the tech power house it is today. This also made 1995 to 2000 the golden era for VCs with up to 40% of the investments involving early stage funds. From 1986 to 2011, a third of every listed company in Taiwan received VC funding. The NDF also invested 300 Million USD, which had a big impact on attracting more international VCs to come to Taiwan to invest.

In 2000, due to equitable taxation and the principle of trade liberation, the tax deductions for VC shareholders were canceled by the government. With the Taiwan stock regulation system restricting 10 NTDs per share (Note 1), along with the number of teams derived from ITRI also falling, causing VCs incentive to invest in early stage startups to gradually dissolve.

The Taiwan government's "Challenge 2008 Sub-Project: International Innovation R&D Base Project" (2002-2007) promoted the establishment of 35 innovative R&D centers approved by the Ministry of Economic Affairs (MOEA) in Taiwan by multinational corporations. These R&D centers all have technical cooperation or technology transfer relationships with local Taiwanese manufacturers, and can receive subsidies from the MOEA. So far, there are 59 similar R&D centers stationed in Taiwan (Note 2). Compared to our counterparts in Asia, Taiwan has a better balance of openness and technological capabilities, and has so much untapped potential in innovation capabilities. Based on the 2020 IMD ranking, Taiwan is ranked 6th in scientific infrastructure and 10th in technological infrastructure globally. We look forward to Taiwan's corporations doing more innovation experiments and expect it to gradually become a normal practice for Taiwan corporations.

One thing to notice is Taiwan has a large number of inventions and outstanding talent, but the proportion of patent commercialization is far below international standards. The main reason for this is the lack of early stage funding (Note 3), most companies are not willing to take the risk of developing innovative solutions with a longer development curve and seek safer revenue options. The VC scene in Taiwan also lacks the willingness to invest in risky ventures, so it is more dependent on government funding. The Taiwan IPO system is also a reason why many startups tend to lean towards being merged by big corporations as the regulations make it hard for startups to become a listed company in Taiwan. With the Taiwan Stock Exchange recently launching a new trading platform, making IPO an easier accessible option, we might see new exit strategies for Taiwan startups in the future.

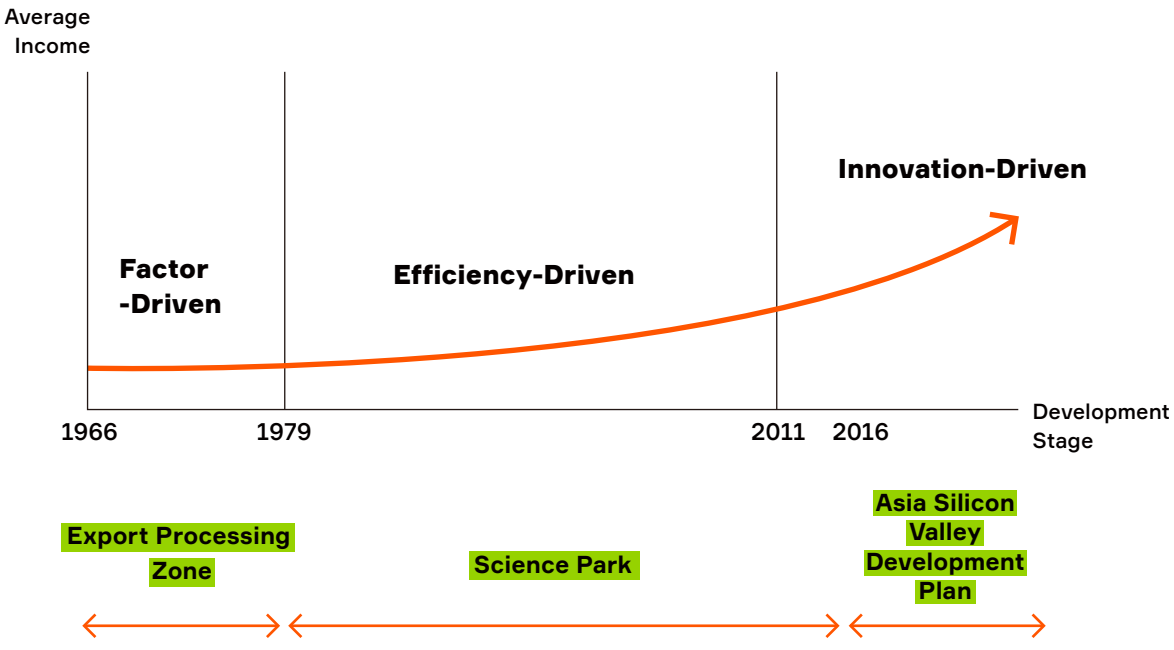


The Future of Taiwan Corporate Innovation

There are a few viewpoints we can look at when talking about Taiwan's future in corporate innovation.

In order to better orientate itself with international capital markets and government's policies towards innovation, the Taiwan Stock Exchange is launching a new trading platform to make it easier for startup companies to become listed on the Taiwan stock market. These companies usually have limited capital or incur losses due to needed capital injection, but have promising outlooks to raise funds for expansion and list on the Taiwan Innovation Board (TIB) (Note 4). This opens up a new pathway for startups to go public and increases the incentive for investors to invest in startups early on and inspire more innovation in the future.

According to the WEF, Taiwan's economy has stepped into the innovation-driven stage since 2011



Source: World Economic Forum

According to the WEF, Taiwan's economy has stepped into an innovation-driven stage since 2011. Taiwan has come a long way in terms of corporate innovation since the 1960s. Starting from the factor-driven era of the 1960s to 1980, where most of Taiwan's economy came from OEM exports. Next off is the efficiency-driven "Science park era" of the 1980s to 2010, with cost-efficient OEM, ODM manufacturing dominating Taiwan's capital market. This is also when Taiwan introduced the high tech and semiconductor industries, setting the innovative genes and foundation for Taiwan.

Starting from 2011, along with the NDC launching their Asia Silicon Valley Development Plan in 2016, promoting innovation and R&D for devices and applications of the internet of things (IoT), and upgrading Taiwan's startup and entrepreneurship ecosystem, symbolizing Taiwan's transition from efficiency-driven to innovation-driven. Where strategic innovation is the new focus for corporations and the government to develop from a national level.

With new regulations being more friendly to early stage investors and startups, along with more corporations noticing the need to innovate. Their heavy involvement will only benefit the capital market and increase the talent pool of Taiwan. We foresee a bright future for Taiwan's innovation scene, as corporations have always been a driving force for innovation.

Note 1

Taiwan stock regulation requires a denomination of 10 NTD, which is equivalent to requiring all investors to hold at least 10 NTD per share. Based on data from the Taiwan Stock Exchange the average share price of listed companies in Taiwan is about 30 NTD, multiplied by the average success rate of global startups of about 30%, leaving the average return being 9NTD per share. This means investing in early stage startups is almost always a loss for VCs under these circumstances. With other profitable investment opportunities, this type of transaction does not make sense for early stage investors. Normally Taiwan VCs would rather wait until a company is relatively stable with a success rate greater than 70% before they are willing to invest, but at this point, VCs are not needed for those companies that have a steady cash flow and business model. Starting from 2014, listed companies can issue their own denomination, and since then the "10 NTD per share" limit has been eliminated.

Note 2

Including the first ever overseas server R&D center established by IBM, and the DuPont R&D center. Multinational corporations have expressed their willingness to operate in Taiwan for a long time or expand their R&D capacity in Taiwan through methods such as building new R&D departments or purchasing land and building factories.

Note 3

The Entrepreneurship Consulting Service Center of the Small and Medium-sized Enterprise Division of the MOEA conducted a survey of entrepreneurial consultants and new entrepreneurs of SMEs. The survey found that the first reason for entrepreneurship is "Realizing personal ideals", and the biggest problem of entrepreneurial predicament is "insufficient venture capital" (Small and Medium Enterprise Division (2012)).

Note 4

To assist the development of innovation, improve fundraising channels, and expand the scope of our capital markets, the Financial Supervisory Commission (FSC) has announced that the TWSE and Taipei Exchange (TPEx) will establish TIB and the new board under emerging stock market within its multi-tiered capital market framework to facilitate innovative businesses in raising funds on the capital market.

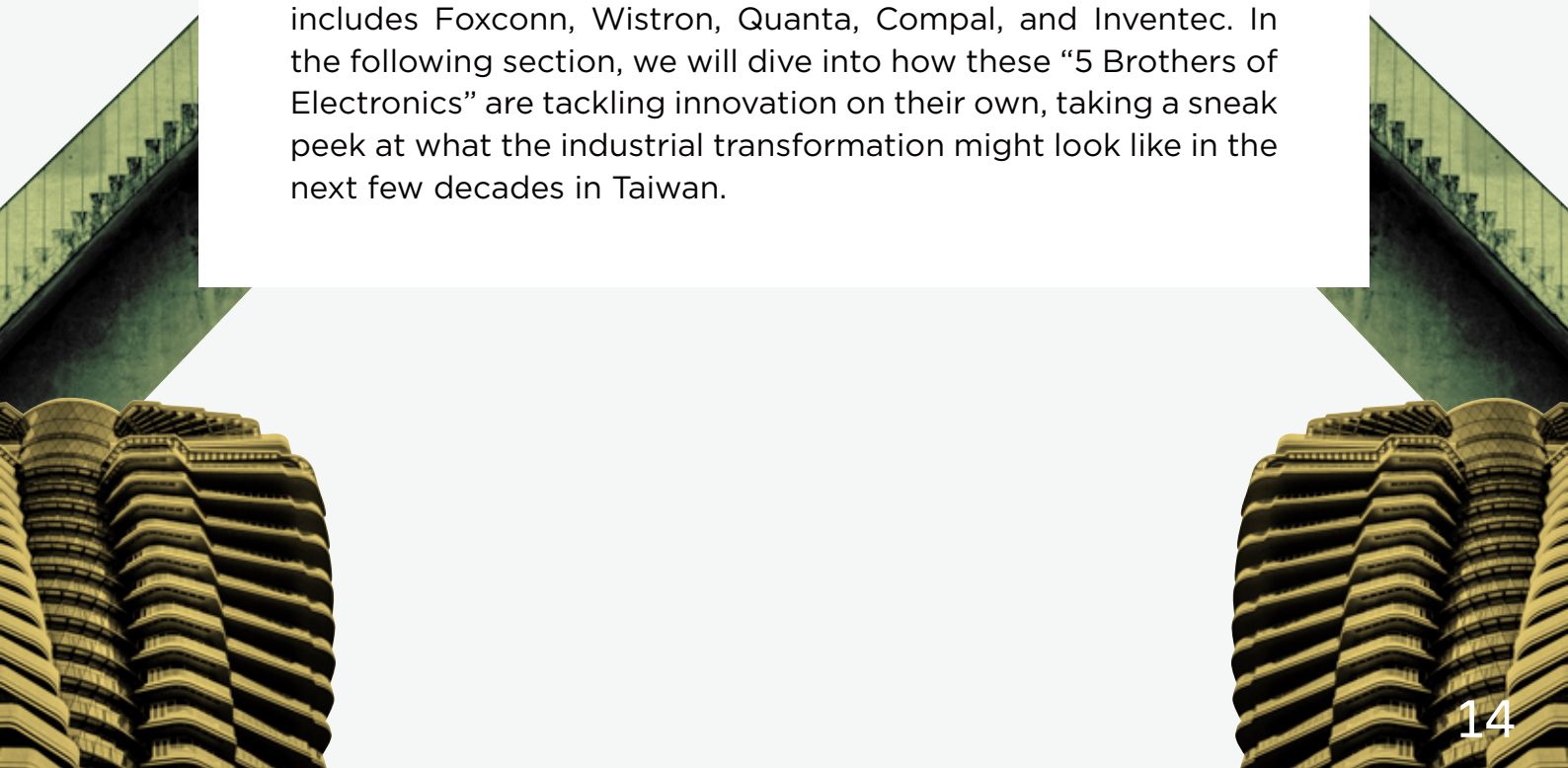
The FSC has supervised the two exchanges to refer to international capital market practices in order to ensure the function of the two Boards, protect investor rights, and boost industry development. In addition, the establishment of the two Boards has taken into consideration the difficulties that innovative new companies face, such as the gap between their preliminary business model and existing requirements for listing and public offering.

Taiwan Innovation Board and TPEx's new board have launched officially in the third quarter of 2021. And is expected that this new initiative will support innovative companies in raising funds on the capital market, boost the development of the real economy, and strengthen the competitiveness of Taiwan's capital markets.

Case Study on 5 Brothers of Electronics

Why these 5 Brothers of Electronics

The term “5 Brothers of Electronics” was first coined by Terry Gou, the former Chairman and General Manager of the Foxconn Technology Group, during the company’s annual shareholder’s meeting in 2003. The “5 Brothers of Electronics” referred to the 5 electronics manufacturing powerhouses from Taiwan at the time: Quanta, Asus, Compal, BenQ, and Foxconn. The “5 Brothers of Electronics” are especially significant to Taiwan’s tech industry due to their global domination, annual gross revenues, and number of employees. They are oftentimes used as a benchmark for Taiwan’s economic strength. Fast forward to 2 decades later, the consumer electronics industry in Taiwan underwent an industry specialization to separate major brand manufacturers and contract manufacturers. Nowadays, the “5 Brothers of Electronics” usually refer to the five major Taiwan-based ODM for consumer electronics devices, which includes Foxconn, Wistron, Quanta, Compal, and Inventec. In the following section, we will dive into how these “5 Brothers of Electronics” are tackling innovation on their own, taking a sneak peek at what the industrial transformation might look like in the next few decades in Taiwan.



Industry

Electronics

Year Founded

1974

Key Executive

Young Liu (Chairman and President), Terry Gou (Founder)

Headquarters

New Taipei City, Taiwan

Main Products and Services

Electronics, electronic components, PCBs,

PCB components, computer chips

Number of Employees

Over 1M worldwide

Company Profile

Foxconn

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Company Background

Foxconn Technology Group is a Taiwanese multinational electronics contract manufacturing company, also known as Hon Hai Precision Industry Co., Ltd. Foxconn is the world's largest electronics contract manufacturer and the fourth-largest information technology company by revenue. The company is also the largest private employer in China and one of the largest employers worldwide.

Foxconn manufactures electronic products in various industries, including computer, automobile, communications, consumer product, medical, and defense industries. Foxconn has produced notable products for major American, Canadian, Chinese, Finnish, and Japanese tech companies such as the BlackBerry, Apple, Amazon, Nintendo, Nokia, Google, Xiaomi, Sony, and Microsoft.

Current Strategic Transformation Focus

In the past decade and a half, Foxconn has been actively expanding into numerous industries through investments and partnerships. The company has emphasized on a "domestically reserved, internationally active" approach, which means that Foxconn will scout for feasible solutions internationally and leverage the solutions to enhance its in-house capabilities domestically. Foxconn Group has deployed a "3+3" transformation strategy to prepare itself for its next stage of long term growth. The "3+3" transformation strategy covers three major industries and three different emerging technologies of the future. Going forward, Foxconn will focus on electric vehicles, digital healthcare, and robotics industries; and extend its capabilities in artificial intelligence, semiconductor, and next-generation communications technologies.

To strengthen its technological capabilities, Foxconn also announced the establishment of the Hon Hai Research Institute, which has five major branches: Artificial Intelligence Research Center, Semiconductor Research Center, Next-generation Communications Research Center, Information Security Research Center, and Quantum Computing Research Center. The research centers are dedicated to strengthening Foxconn's technology and product innovation pipelines. Its findings and results will serve as the main support for Foxconn's development in the next five years, maintaining the company's product competitiveness while exploring the group's entry opportunities into new businesses at the same time.

Timeline of Strategic Transformation

According to the data collected in a study conducted by FINDIT, Foxconn has invested a total of 47 early-stage investments from 2015 to 2020, including 8 investments in Taiwanese companies. The investment amount exceeded 26 billion NTD, with Taiwanese companies receiving more than 680 million NTD. Breaking down Foxconn's investment strategy across various fields, the company has placed the most investments in artificial intelligence and IoT, while automotive technology, transportation, and manufacturing fields received the highest investment amounts. However, after 2018, Foxconn's early investment trend has specifically focused on artificial intelligence, healthcare, and automotive fields.

In the field of artificial intelligence, Foxconn invested in Cyber-Insight from China and Carbon Relay from the U.S. in 2019, both focusing on providing smart manufacturing solutions. In the field of health technology, Foxconn invested in Nanox Imaging, an Israeli company that develops medical imaging technology, and Zap Surgical Systems, an US company that produces radiosurgery machines used to treat and kill cancer cells in the brain, head, and neck. In terms of automotive technology, besides Zoox and Xpeng Motors, Foxconn also invested in a Taiwanese startup named Noodoe in 2015, which provides electric vehicle charging solutions. Noodoe successfully obtained the OpenADR 2.0b certification in CES 2019, becoming the first and only manufacturer in Taiwan to obtain such certification.

Corporate Innovation Playbook

Collaborative Workspace | External Innovation Competition | Incubation Space | Internal Innovation Competition | Internal R&D | M&A | Strategic Partnership

Key Investments

StormForge - Series A as lead investor

Yungongchang - Series A as lead investor and Series B

PENSEES - Series A as lead investor

Light - Seed Round

Zap Surgical Systems - Private Equity Round

Nanox Imaging - Series B as lead investor

SigmaSense - Series A as lead investor

Kneron - Venture Round

GyroGear - Seed Round as lead investor

Industry

ODM (Original Design Manufacturer)

Year Founded

2001

Key Executive

Simon Lin (Chairman & CSO), Robert Huang (President & CEO)

Headquarters

Taipei City, Taiwan

Main Products and Services

Notebook PCs, Desktop systems, Server and Storage systems,

IA (information appliances), Handheld devices,

Networking and Communication products; Design,

Manufacturing and after-sales support service

Number of Employees

Over 80,000 worldwide

Company Profile

Wistron

緯創

Company Background

Wistron Corporation is an electronics contract manufacturer based in Taipei, Taiwan. Originally a manufacturing arm of Taiwanese computer powerhouse Acer Inc., Wistron spun off as an independent company in 2000 to focus on contract manufacturing. The company is now one of the few OEM/ODM companies with an annual revenue of more than US$3 billion with more than 10 research centers and 12 manufacturing sites around the world.

Wistron provides design, manufacturing, testing, and after-sales service for notebook and desktop computers, servers, storage, LCD TVs, handheld devices, and devices and equipment for medical applications. Wistron's major international clients across its various product lines include Hewlett Packard, Dell, Acer, Lenovo, IBM, Facebook, CISCO, Tencent, and Microsoft.

Current Strategic Transformation Focus

According to Wistron's latest annual report, the company will place an emphasis on the needs of the industry value chain of the future such as artificial intelligence and 5G applications, continue to promote smart factories and cloud management platforms to reduce costs, and invest in emerging technologies such as industrial computers, professional displays, and smart consumer devices.

Timeline of Strategic Transformation

According to FINDIT's study, Wistron's early-stage investments from 2015 to the first half of 2020 totaled 27, while 16 of these investments went into Taiwan-based startups. Wistron's total investment amount exceeded NT$1.7 billion over this time span. Taiwan-based startups received more than NT$690 million, accounting for 40% of the total investment amount. Dissecting Wistron's capital deployment strategy, its early-stage capital is mostly committed to healthtech and artificial intelligence. Particularly in the field of health technology, Wistron not only made annual investments from 2015 to 2019, the total investment amount in healthtech was more than NT$1.7 billion.

Looking into the Taiwanese healthtech companies in Wistron's portfolio, it includes Maya International Company, a SaaS startup that focuses on the development of clinical informatics, medical informatics, personal health management, and other healthcare-related information systems; Apollo Medical Optics, a MedTech startup that focuses on developing high-resolution optical imaging devices for tumor detection and medical beauty detection; FREE Bionics, a spinoff startup from the Industrial Technology Research Institute (ITRI) that develops powered exoskeletons, exo-suits, and bionic technology products; Aidmics Biotechnology, a company dedicated to developing a series of mobile microscopic systems applied to the biomedical field; HuKui BioTech, a startup focusing on medical electronics and handheld devices for digital healthcare and telemedicine; PELL Bio-Med Technology, the first biomedical company in Taiwan to specialize in the development of cell culture technologies and techniques for therapeutic applications; and VSense Co., a startup working on the development of diagnostic medical devices and biochips. It's worth noting that Maya International, HuKui BioTech, and PELL Bio-Med Technology received follow-on investments from Wistron.

In the field of artificial intelligence, Wistron has placed its investments in Umbo Computer Vision, an AI security surveillance company with a neural network-based artificial intelligence technology who received a follow-on investment in 2018; MoBagel, a startup with an artificial intelligence and machine learning platform that helps corporate data teams make more AI-driven business decisions.

Corporate Innovation Playbook

Collaborative Workspace | Corporate Accelerator | Incubation Space | Internal Innovation Competition | Internal R&D | M&A | Strategic Partnership

Key Investments

Lucid - Seed Round

Airdog - Series A as lead investor

Soundbrenner - Seed Round as lead investor

WiBASE - Series A as lead investor

SuitX - Series B as lead investor

MoBagel - Series A

ANIWARE - Seed Round as lead investor

iKala - Series B as lead investor

InfuseAI - Series A as lead investor

Jubo - Series A

Industry

Computer hardware, electronics

Year Founded

1988

Key Executive

Barry Lam (Founder and CEO)

Headquarters

Taoyuan City, Taiwan

Main Products and Services

Notebooks, Smartphones, Servers, Digital televisions

Number of Employees

Over 70,000 worldwide

Company Profile

Quanta

廣達

Company Background

Quanta Computer is a world leading electronics contract manufacturer based in Taiwan that is best known as the largest notebook computer producer in the world. Founded in 1988, Quanta Computer secured important customers in the early 1990s such as Apple and Gateway, paving the way for its later success. For years since 1996, Quanta Computer was a major contract manufacturer for Dell Computer Corporation. The company is also known for helping with the turnaround of Hewlett-Packard's notebook business in the late 90s. Fast forward two decades, Quanta Computer is now consistently ranked in the Fortune's Global 500 list and produces about a third of the world's notebook computers.

Quanta Computer now engages in the development and manufacturing of notebook PCs, servers, IoT products, HD encoding cameras, and industrial computers. The company also designs and manufactures wireless communication products, multimedia products, and global positioning system (GPS) products. Its major customers include Apple, Dell, Hewlett-Packard, Acer, Alienware, Amazon, Cisco, and more.

Current Strategic Transformation Focus

With the increase in notebook computer alternatives, Quanta has also extended its product lines to cloud computing business, enterprise network solutions, mobile communications products, smart home products, autotronics, smart healthcare, IoT, and AI applications.

In the next 3-5 years, Quanta is optimistic about the opportunities brought by artificial intelligence and 5G. Both cloud and IoT will grow substantially with the rise of artificial intelligence and 5G. In the next ten years, Quanta will focus on the integration opportunities of artificial intelligence, cloud, 5G, and IoT. Quanta will concentrate on what it calls the "New 3C" technologies and applications to continue the enhancement of its core capabilities – Cloud Computing, Connectivity Technology, and Client Devices – as the foundation of its future development.

Timeline of Strategic Transformation

From 2015 to the first half of 2020, Quanta made 9 early-stage investments. 5 of these went into early-stage Taiwanese companies. The total investment amount exceeded NT$490 million.

Quanta's early investments are highly concentrated in healthcare technology with a total of 6 investments in the field from the given time horizon above. Among them, the Taiwanese startups that have received investments from Quanta include OSTAR, a company dedicated to providing the best predictive patient monitoring systems for blood pressure; QT Medical, a medech company specializing in cloud-connected cardiac monitoring devices; aetherAI, a medical image AI startup with a special focus in digital pathology. aetherAI has grown exponentially since its funding in 2017. The company's staff number has grown from 4 to 55 within 3 years and its revenue tripled during the same time. aetherAI is not only collaborating with leading hospitals in Taiwan, but also partnering with top medical centers in the US including the University of Pittsburgh Medical Center, looking to get an FDA approval and penetrate into the US market in the near term. Currently, Quanta has already developed a smart electrocardiogram monitoring device that combines the synergistic applications of edge computing and cloud computing technologies. In addition, Quanta is currently working on a smart electronic stethoscope which could benefit telemedicine and long term home care practices.

In addition to healthcare technology, Quanta also invests in the AR/VR field. Quantum Optoelectronics, one of Quanta’s portfolio companies, produces opto-mechanical modules for smart glasses, covering various types of light sources, lighting system design, imaging lens, and virtual and real imaging system design and integration. Many of these AR-related production lines have been completed and started shipping in small batches. Quanta expects that in the 5G era, smart glasses and head-mounted displays will replace desktop computers, laptops, and mobile phones as the next-generation computing platforms. At the same time, the technology will also be integrated into Quanta’s smart medical roadmap through a high degree of integration in software, hardware and cloud architecture, providing solutions for hospitals or homes.

Corporate Innovation Playbook

External Innovation Competition | Internal Innovation Competition | Internal R&D | M&A | Strategic Partnership

Key Investments

Alventive - Venture Round

Lane15 Software - Series B

Mellanox Technologies - Series C

Nanosys - Series B

Tilera - Series C

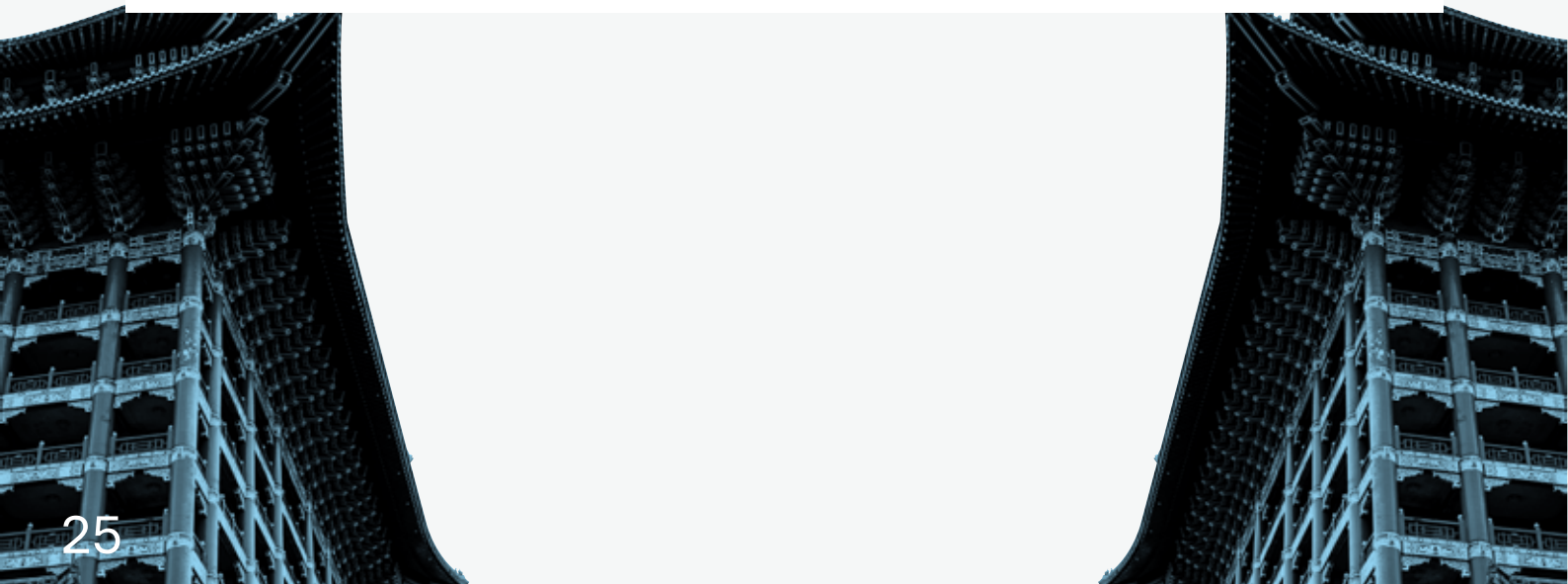
Moduware - Convertible Note

Lumus - Series C as lead investor

Tier IV - Series A as lead investor

aetherAI - Series A as lead investor

Plus - Series D



Industry

Computer hardware, electronics

Year Founded

1984

Key Executive

Rock Hsu (Chairman), Ray Chen (President & CEO)

Headquarters

Taipei City, Taiwan

Main Products and Services

Notebooks, PDAs, televisions

Number of Employees

Over 43,000 worldwide

Company Profile

Compal

仁寶

Company Background

Compal Electronics, Inc. is a leading Taiwanese original design manufacturer (ODM), producing notebook computers, monitors, tablets and televisions for a variety of clients around the world, including Apple Inc., Acer, Lenovo, Dell, Toshiba, Hewlett-Packard and Fujitsu. The company was founded in June 1984 and is headquartered in Taipei City, Taiwan. It has business presence in mainland China, the US, Vietnam, Brazil, Poland and Mexico, and has more than 6,000 employees. Compal stands as one of the top two largest contract laptop manufacturers in the world along with its Taiwanese peer Quanta Computer.

Compal started out as a computer peripherals supplier and slowly transitioned into a notebook computer assembler, being known for producing popular models for Dell (Alienware included), Hewlett-Packard and Compaq, and Toshiba. The company now engages in the research, development, design, production, and sale of computing, communications, and consumer products. Its products include notebook PCs, liquid-crystal display products, smart devices, ultrabook PCs, 2-in-1 PCs, all-in-one PCs, tablet PCs, servers, auto electronics, smart home products, public displays, smart phones, smart accessories, and wearable devices.

Current Strategic Transformation Focus

As part of Compal's efforts to expand, the company has been shifting away from its core PC business and venturing into the industrial computer and mobile device sectors. The company now engages in products such as servers, wearable devices, and automotive electronics, in which the relevant business segments have grown by more than multiples in the year of 2019. Compal's long-established smart IoT business has also shown strong growth momentum as the end market demand gradually emerges. It is worth noting that Compal is quite active in the investment and deployment in smart healthcare. According to its 2019 financial report, Compal has actively invested in medical technology teams and has targeted precision medicine and healthcare as the future direction of the company since 2015. Compal is currently collaborating with two hospitals to introduce 5G high-speed private network connectivity for precision medicine developments. In terms of healthcare services, Compal has established 20 locations and is looking to expand to 50 locations by the end of this year. Meanwhile, Compal will also invest heavily into immune cell therapies.

Timeline of Strategic Transformation

From 2015 to the first half of 2020, Compal made a total of 10 early-stage investments. Taiwanese startups received 7 investments. The total investment amount exceeded NT$260 million, while the Taiwanese companies invested received nearly NT$200 million.

Looking into the early-stage investment trends of Compal after 2015, investments in healthcare technology have the highest sustainability. The Taiwanese startups that attracted Compal's investments in 2016 include WowGoHealth, an AI health promotion and precision solution provider; and Global BioPharma, an immunotherapeutic vaccine maker. With healthcare big data at its core, WowGoHealth combines both its software and hardware capabilities into one cloud enabled platform, providing a complete IoT and health promotion solution. WowGoHealth has already been supporting various smart wellness centers with smart exercising solutions for elderly patients, bringing together the knowledge from rehabilitation doctors, psychiatrists, psychological counselors, and nutritionists to implement its product RINGOAL in their treatments. It helps the elderly increase muscles, women lose weight, and assist with muscle relaxation in sleep therapies. Global BioPharma is focused on developing immunotherapy that can stimulate the body's natural immune system to kill the human papillomavirus (HPV)-related diseases. It is reported that Global BioPharma will work with US biotech firm Advaxis in the United States for cervical cancer, anal cancer, and Phase II clinical trials for head and neck cancer and lung cancer. The second phase of its experimental plan for the use of ADXS-HPV immunotherapy to treat human papillomavirus non-squamous and non-small cell lung cancer has been accepted by the FDA.

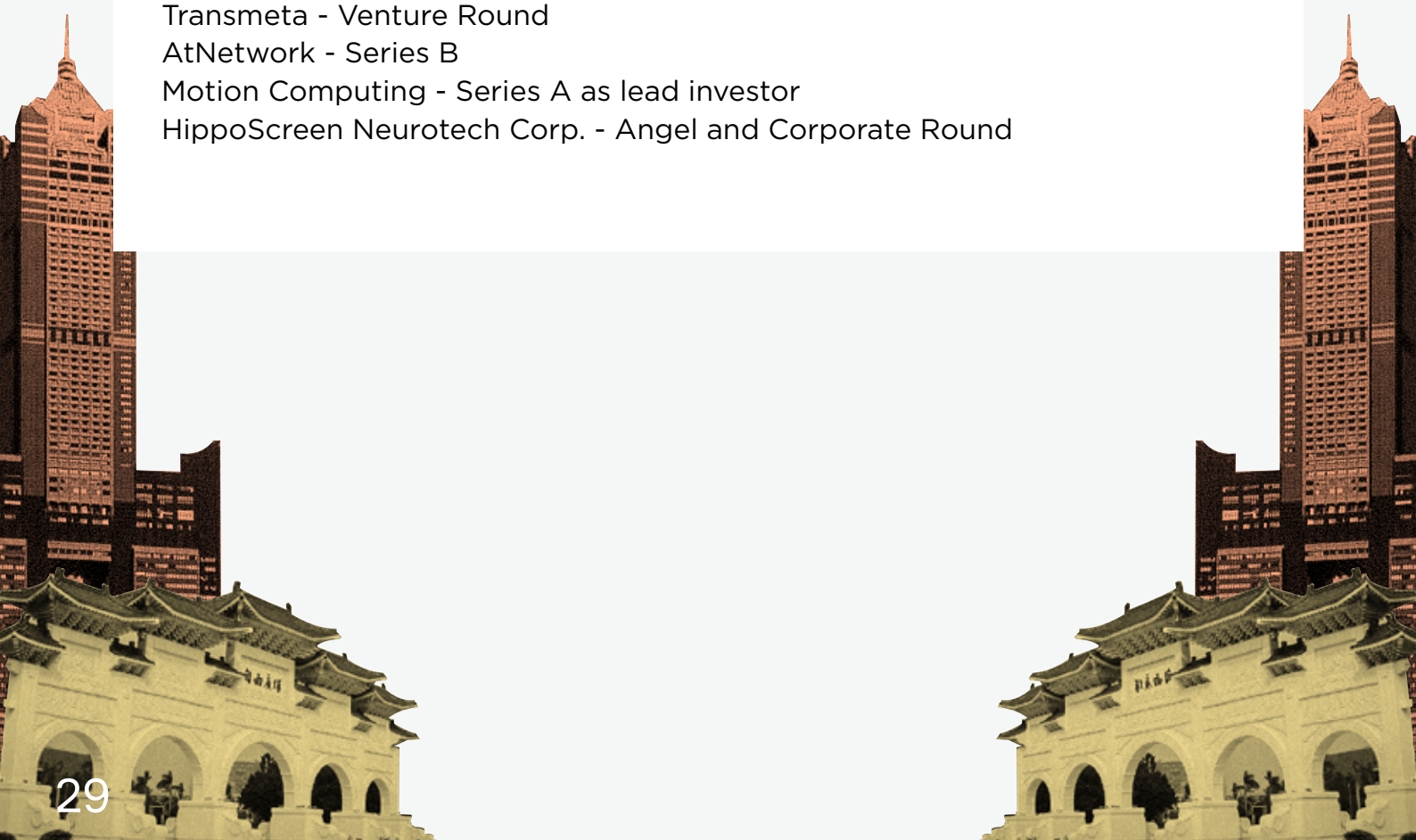
In 2019, HippoScreen Neurotech and Taiwan Intelligent Robotics Company both received Compal's investment. HippoScreen Neurotech is a company that specializes in brain wave signal processing, using artificial intelligence-assisted diagnosis technology at its core, and aims to develop brain wave diagnosing medical services that can effectively help doctors to determine the possibility of depression in patients in less than 90 seconds. Taiwan Intelligent Robotics Company is committed to developing high-performance, high-quality service-oriented robots or related products for automation in the service industry, which can be used in entertainment, medical, catering, security, and other fields.

Corporate Innovation Playbook

Internal Innovation Competition | Internal R&D | M&A | Strategic Partnership

Key Investments

Transmeta - Venture Round
AtNetwork - Series B
Motion Computing - Series A as lead investor
HippoScreen Neurotech Corp. - Angel and Corporate Round



Industry

Computer hardware

Year Founded

1975

Key Executive

Shiren Wen (Co-founder), Yeh Kuo-yi (Co-founder),

Cheng Ching-ho (Co-founder), Maurice Wu (President)

Headquarters

Taipei City, Taiwan

Main Products and Services

ODM for notebook computers, servers, and mobile devices

Number of Employees

Over 23,000 worldwide

Company Profile

Inventec

英業達

Company Background

Inventec is a Taiwan-based Original Design Manufacturer that engages in the research and development, manufacture and sales of various electronic products. Founded in 1975 as a manufacturer of electronic calculators, Inventec has grown to become one of China's largest exporters with its major development and manufacturing facilities located in China. The company is perhaps best known as the producer for electronic dictionary brand BESTA, which has been the leading provider in English/Chinese and English/Korean electronic dictionaries.

The company's main products include portable notebook computers, business computers, servers, storage devices, workstations, server management software, application software, learning tools software, cloud services software, and computer peripheral products. The Company also engages in the manufacture of solar cells and modules as well as the assembly and sales of communications and digital assistant products. Inventec now distributes its products to Asia, Europe and the Americas.

Current Strategic Transformation Focus

In the future, notebook computers and servers will remain Inventec's main product lines. However, in order to achieve technological and market breakthroughs, Inventec will accelerate innovation in the following aspects: (1) widening the integration and application of AI, 5G and Industry 4.0 technologies; (2) building smart manufacturing plants globally; (3) diversifying the layout of automotive electronics and smart medical devices.

Timeline of Strategic Transformation

Using Inventec's early-stage investments to speculate on the company's strategic direction in the next 3-5 years, it is shown that Inventec is heavily focused on building its artificial intelligence capabilities. The company made 17 early-stage investments from 2015 to the first half of 2020. 9 investments went into Taiwan-based companies. The total investment amount exceeds NT$370 million.

In 2015, Inventec placed its investments into DIITU and ucfunnel, both of which are AI marketing firms. Inventec has also been investing heavily into the electronics sector. In 2016, Inventec invested into New E Materials, a company that provides sales services to electronic chemicals used in manufacturing semiconductors, displays, and solar equipment. In 2020, Inventec invested in EMPass, which provides solutions for noise in high-speed electronic products. EMPass was originally established by a National Taiwan University team in 2016. Its main customers include both domestic and foreign brands and manufacturers of high-end electronic products, such as ASUS, Pegatron, DELL, etc.

As for the healthcare technology sector, Inventec is not as active as other major electronics brothers. In 2016 and 2017, it invested in LivingPattern, which is engaged in daily life pattern tracking of the elderly, including sleep and activity monitoring. The core technology of elderly care provided by the company includes behavioral pattern data analysis, central control management, individual monitoring, home automation, etc. The company won the runner-up of Chunghwa Telecom's IoT Platform Application Competition in 2018.

In terms of the amount of investment, the top three sectors for Inventec are clean technology, electronics, and artificial intelligence. Molekule, a US air purification startup established in 2014, received the highest single investment amount from Inventec, reflecting its optimism about the air purifier market going forward.

Corporate Innovation Playbook

External Innovation Competition | Internal Innovation Competition | Internal R&D | M&A | Strategic Partnership

Key Investments

ThinkMagic - Series A

ucfunnel - Angel Round

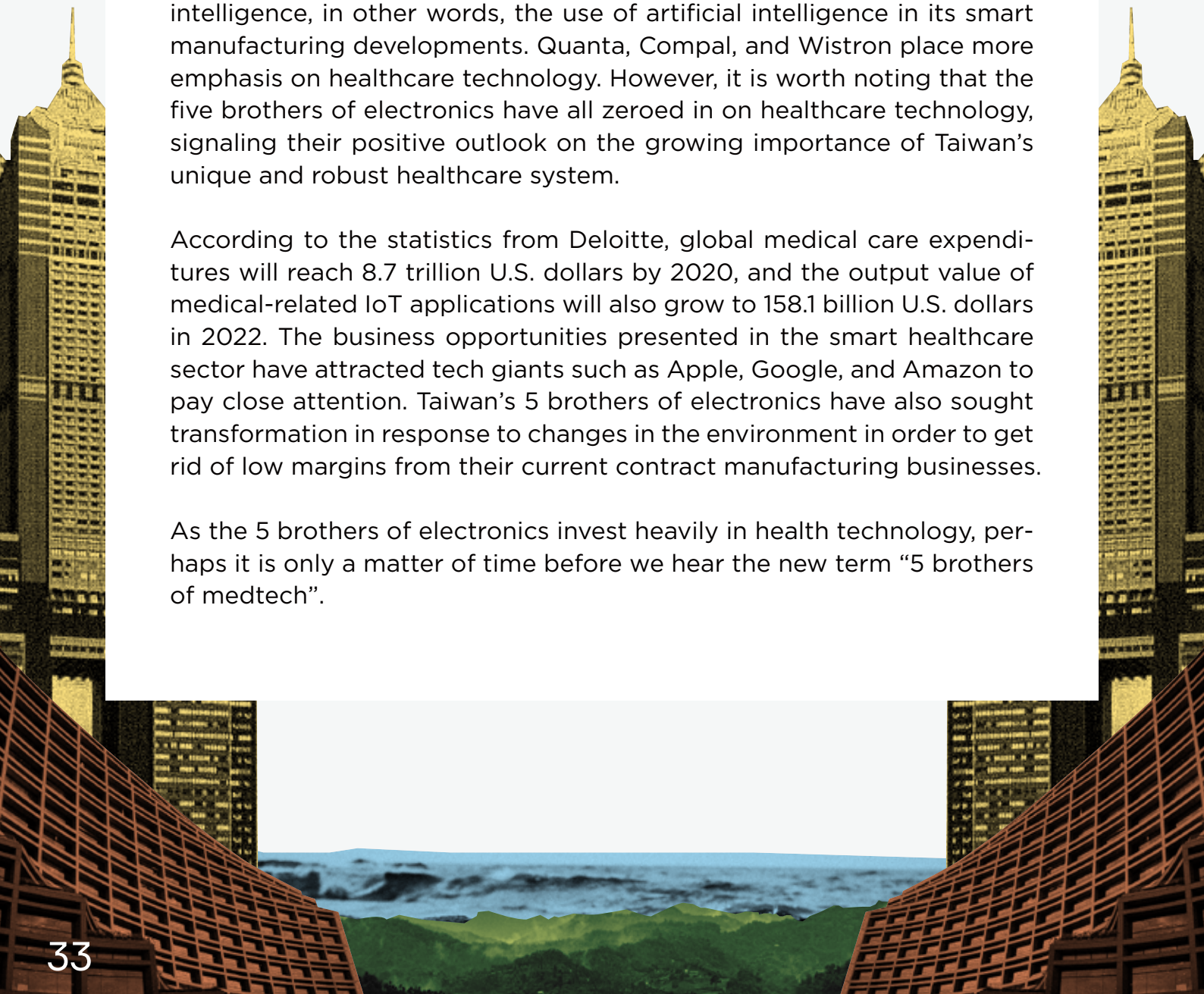
CloudMosa - Series A

Looking Ahead For the 5 Brothers of Electronics

Following the above case studies on the 5 brothers of electronics in Taiwan, it can be concluded that they share similar views on the importance of adopting emerging technologies within their businesses. AI, 5G, and IoT have become the primary focus of development for these major corporations going forward. Nonetheless, each brother is executing their strategy slightly differently. For example, Foxconn has committed to developing in-house automotive technology and intends to pivot to the mobility industry as its main focus. Inventec focuses more on industrial intelligence, in other words, the use of artificial intelligence in its smart manufacturing developments. Quanta, Compal, and Wistron place more emphasis on healthcare technology. However, it is worth noting that the five brothers of electronics have all zeroed in on healthcare technology, signaling their positive outlook on the growing importance of Taiwan's unique and robust healthcare system.

According to the statistics from Deloitte, global medical care expenditures will reach 8.7 trillion U.S. dollars by 2020, and the output value of medical-related IoT applications will also grow to 158.1 billion U.S. dollars in 2022. The business opportunities presented in the smart healthcare sector have attracted tech giants such as Apple, Google, and Amazon to pay close attention. Taiwan's 5 brothers of electronics have also sought transformation in response to changes in the environment in order to get rid of low margins from their current contract manufacturing businesses.

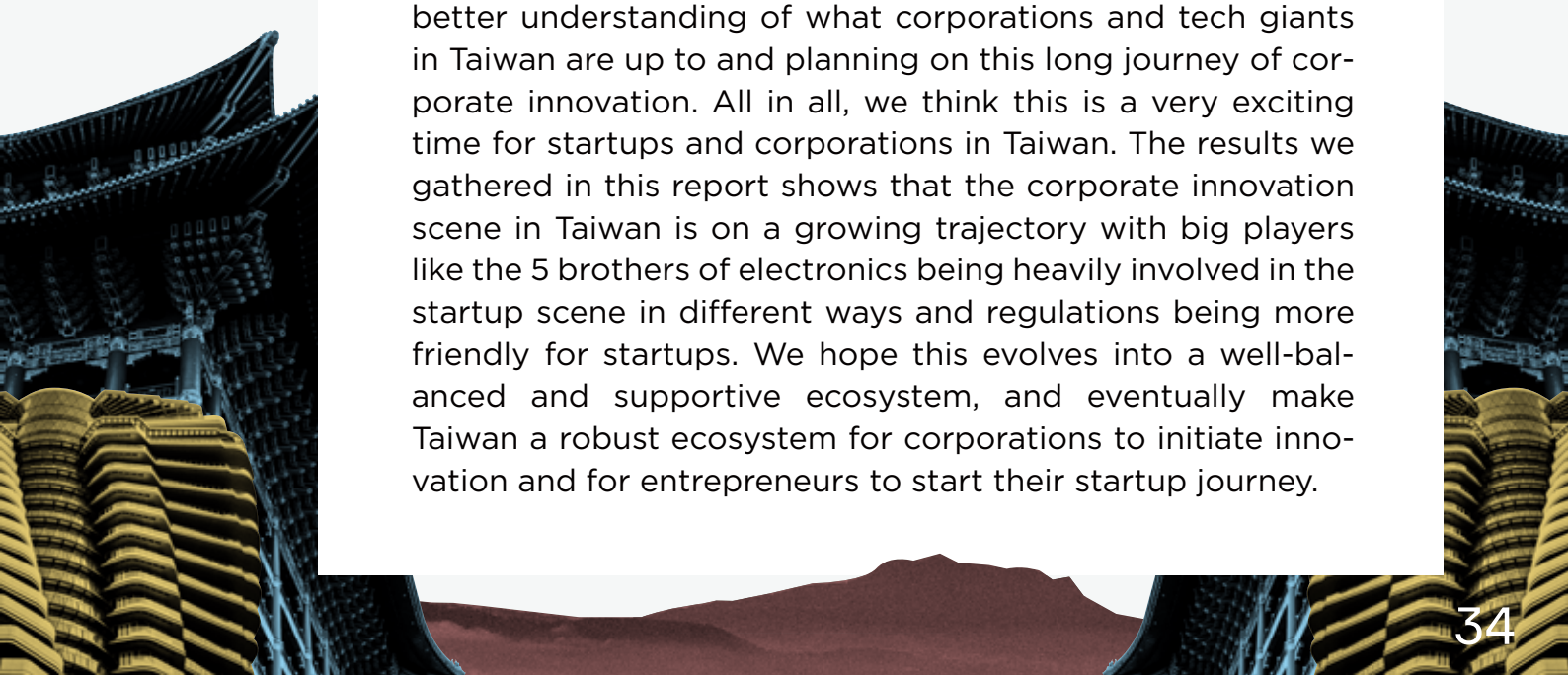
As the 5 brothers of electronics invest heavily in health technology, perhaps it is only a matter of time before we hear the new term "5 brothers of medtech".



Looking Into the Future of Taiwan's Corporate Innovation

Looking into the future of Taiwan, one thing we have noticed is that there is more and more corporate involvement in the startup ecosystem beyond just investments, they are gradually becoming more aggressive in working with startups, and have become more open-minded towards innovation. With the pandemic impacting the market severely, innovation and digital transformation is becoming the inevitable. With successful cases of corporate innovation like the 5 brothers of electronics, we are embracing a new era with more corporate involvement in the Taiwan startup and innovation scene.
Like mentioned in previous paragraphs, looking ahead, the fastest and most efficient way to engage upon digital transformation for corporations is to work with startups, adopt their innovative technologies, and most importantly incorporate their entrepreneurial spirit into their corporate culture and business. With this mindset, along with the strong semiconductor and technological foundations, we foresee a bright future for Taiwan corporate innovation scene.

We hope that through reading the report, you can get a better understanding of what corporations and tech giants in Taiwan are up to and planning on this long journey of corporate innovation. All in all, we think this is a very exciting time for startups and corporations in Taiwan. The results we gathered in this report shows that the corporate innovation scene in Taiwan is on a growing trajectory with big players like the 5 brothers of electronics being heavily involved in the startup scene in different ways and regulations being more friendly for startups. We hope this evolves into a well-balanced and supportive ecosystem, and eventually make Taiwan a robust ecosystem for corporations to initiate innovation and for entrepreneurs to start their startup journey.



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Startup Island TAIWAN

Startup Island TAIWAN is the national startup brand of Taiwan. The brand symbolizes a journey from a startup island to the international arena. It demonstrates to the world the strong ambition and capabilities of Taiwan startup companies as well as their intention and ability to contribute to other startup ecosystems around the world.