

CX THROUGH
TECH:

**FUTURE FACTORIES:
ASIA'S ROLE
IN GLOBAL
MANUFACTURING**

Smart Manufacturing

A PUBLICATION BY CXPOSÉ

FOREWORD

The manufacturing landscape in Asia stands at a pivotal crossroads. For decades, this region has been the world's factory, driving global economic growth and shaping international trade routes.

From the bustling industrial zones of China to the high-tech corridors of South Korea and the emerging powerhouses of Southeast Asia, the continent has cemented its position as a manufacturing juggernaut.

Asia has become the world's processing, manufacturing, and assembly hub, and its manufacturing sector value added increased from 29% to 53% of global total value added between 1992 and 2021.

However, the dawn of the 2020s has ushered in an era of unprecedented change and challenge.

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Stratus **SIEMENS**
A PENGUIN SOLUTIONS™ BRAND.

INTRODUCTION

The manufacturing sector in Asia now faces a complex tapestry of obstacles and opportunities, woven together by technological advancements, geopolitical shifts, and evolving consumer demands. Rising labor costs in traditional manufacturing hubs are reshaping competitive advantages. For instance, average manufacturing wages in China have more than doubled between 2012 and 2022 according to [Statista](#). Geopolitical tensions and trade disputes are forcing a reimagining of supply chains. Meanwhile, the urgent need for sustainable practices demands the industry edge towards a greener future, with Statista reporting that Asia produces more CO2 emissions from electricity generation than any other region in 2023. The industrial sector is the largest consumer of electricity globally.

Yet, amidst these challenges lie immense opportunities. The same forces disrupting the status quo are also opening new avenues for growth and innovation. The shift towards high-value manufacturing is elevating Asia's position in global value chains. Asia could account for more than half of global GDP by 2050 in line with the Asian Development Bank's idea of the Asian Century. Also, the relentless march of technology – from artificial intelligence and the Internet of Things to advanced robotics and additive manufacturing – is promising to revolutionize how goods are designed, produced, and distributed.

Another opportunity emerges from Asia as well, as the world becomes increasingly dependent on digital technologies. From the sprawling chip factories of Taiwan and South Korea to the emerging facilities in China, Japan, and Southeast Asia, the continent is not just participating in the global semiconductor supply chain—it's reshaping it driven by ambition to be the undisputed semiconductor hub. Asia-Pacific accounted for about 62% of global semiconductor share, according to Deloitte, with South Korea, Taiwan, Japan, and China, leading the pack.

The global chip shortage of 2020 has eased, but the wheels have been set in motion to build more robust and diversified semiconductor ecosystems. Voracious demand for advanced chips to power AI, 5G and 6G networks, quantum computing and more, must be fed, after all!

DIGITAL TRANSFORMATION IN OUR FACTORIES

CURRENT CHALLENGES IN ASIAN MANUFACTURING



1

RISING LABOUR COSTS

One of the most pressing issues facing Asian manufacturers is the steady increase in labor costs. Countries like China, once known for their low-cost workforce, have seen significant wage growth over the past decade. This trend is pushing labor-intensive industries to seek alternatives, either through relocation to lower-cost countries within Asia, increased automation, or revision of operational strategies with technologies at the heart of it.



In China, the average manufacturing worker's wage has more than doubled since 2012. Countries like Indonesia, Cambodia, and Vietnam have competitive wage costs for their respective manufacturing industries, but minimum wages across the Southeast Asia region are also expecting to rise. In Vietnam, they have risen an average of 6%, or 80% compared to over a decade ago.

2

SUPPLY CHAIN VULNERABILITIES

The COVID-19 pandemic exposed critical vulnerabilities in global supply chains, many of which are centered in Asia. Disruptions caused by lockdowns, transportation bottlenecks, and sudden shifts in demand have highlighted the need for more resilient and flexible supply chain strategies.

- No industry, or business was left untouched by the pandemic lockdowns. Supply chains were severely disrupted and exposed significant vulnerabilities in production strategies almost everywhere.
- An executive survey by Ernst & Young unveiled a crucial need for real-time visibility, resilience, and new agility. For example, many organizations are now seeing the value of building advanced analytics to do dynamic SKU rationalization rather than one off spreadsheet exercises when inventory levels have to be optimized.

Manufacturers are increasingly investing in digital supply chain technologies that can integrate to many players in the supply chain ecosystem. This requires the use of enabling technologies like IoT devices or sensors for tracking and monitoring, and cloud-based platforms for collaboration and orchestration.

3

TECHNOLOGICAL ADAPTATION

The rapid pace of technological advancement, particularly in areas like Industry 4.0, robotics, and artificial intelligence, presents both an opportunity and a challenge for Asian manufacturers. While these technologies offer the potential for increased efficiency and competitiveness, they also require substantial investment and workforce reskilling.

In the semiconductor manufacturing industry, there is a race to localize that is intensifying globally, and it leads to an unexpected issue - shortage of chip talent and skills. Over two million direct semiconductor employees in 2021, need to grow by an additional one million by 2030. In Asia, each country faces a unique set of challenges to grow their talent pool in skillsets all along the chip manufacturing value chain.



4

CHANGING CONSUMER DEMANDS

Asian manufacturers are also grappling with rapidly evolving consumer preferences, both in domestic markets and globally. The trend towards personalization, faster product cycles, and sustainable products is forcing manufacturers to become more agile and responsive.

The McKinsey Global Institute, or MGI, has also said, "Asia's rise has been swift. Home to more than half of the world's population, the region has climbed from low- to middle-income status within a single generation. By 2040, it is likely to generate more than 50% of world GDP and could account for nearly 40% of global consumption."

As global awareness of environmental issues grows, EY's executive survey discovered over 80% of respondents focused on environmental and sustainability goals (ESG), with cost savings, compliance, and pressure from customers, the workforce and suppliers being top motivators to do so.

E-commerce growth is driving demand for faster, more flexible manufacturing and logistics, with the Asia-Pacific eCommerce market expected to reach \$6.76 trillion by 2029 with a CAGR of 10% between 2024 till 2029. There's increasing pressure for transparency in manufacturing processes and supply chains

EMERGING TRENDS & OPPORTUNITIES RESHAPING MANUFACTURING IN ASIA

The manufacturing landscape in Asia is undergoing a significant transformation, driven by technological advancements, changing market dynamics, and evolving consumer preferences. Here are the key trends reshaping the industry:

1. SHIFT TOWARDS HIGH-VALUE AND ADVANCED MANUFACTURING

Asian manufacturers are moving up the value chain, and countries like Singapore has emerged as a global for high-tech manufacturing, attracting large MNCs with its strategic location, robust infrastructure, and business-friendly environment. China, the world's largest manufacturing economy, is now the leading producer of many advanced goods like electric vehicles, wind turbines, and smartphones, with India and Indonesia eyeing to do the same. Malaysia, not to be outdone, has approved \$26.6 billion worth of foreign direct investments (FDI) within the year 2023, particularly for manufacturing in the semiconductor sector. This spells good things for the region's potential to house hubs of innovation and research & development.



2. INCREASING AUTOMATION AND DIGITALIZATION

In Asia, as elsewhere, the digital revolution is rippling across industries, from retailing and banking to manufacturing and transportation," said a Senior Economist at the International Monetary Fund, Tahsin Saadi Sedik. Ageing populations in South Korea, Japan, and China have also led respective governments and businesses to recognize robotics and automation as feasible ways to maintain economic activity. According to Siemens, annual installations of industrial robots now exceed 500,00 units with Asian markets, accounting for about 75% of these installations. An underlying data model across an organization's software applications and processes, can ensure seamless robotics and automation that is smart and effective. High availability of applications and production systems is also critical in this sector and Stratus Technologies, a Penguin Solutions brand, lends its fault tolerance expertise to ensuring manufacturing environments as well as large AI deployments by the likes of Meta, Shell and Georgia Tech, are always up and running.

Sean Smiley, its VP of worldwide sales and services has observed that major industrial players including global energy companies like Shell are prioritizing the convergence of IT and OT systems.



Sean Smiley
VP, Sales and Services
Stratus Technologies

"We get all these disparate applications like SCADA, cybersecurity, and manufacturing execution systems (MES), consolidated into one machine by Stratus - this is very common today."

3. SUSTAINABILITY AND CIRCULAR ECONOMY INITIATIVES

The current linear economy have led to devastating effects like climate change and biodiversity loss. This is unsustainable and the manufacturing industry has to rethink how natural resources are transformed into products so they create value over time. Research shows that the circular economy offers a \$4.5 trillion economic opportunity from reduced waste, innovation, and employment with new business models focused on reuse, repair, remanufacturing and sharing models.

4. RESHORING AND NEARSHORING TRENDS

In response to supply chain disruptions, there's a growing trend of bringing manufacturing closer to end markets. The bulk of this movement seems to be away from China and towards the rest of Asia. Lower production costs, relative stability, and strategic location have seen Chinese companies like Jinko Solar, Growatt, and Hangzhou First Applied Material moving to attractive alternatives like Thailand and Vietnam.

Growing regional value chains, domestic markets, and changing consumer demands: The rise of the Asian middle class is creating vast new markets with Asia likely to generate over 50% of the world's GDP and potentially accounting for nearly 40% of global consumption.

According to the Asian Development Bank, strong intraregional trade and investment acts as a buffer for the region against uncertainties in global trade and economic growth. According to a HSBC global research, half the world's 10 fastest growing trade corridors sit within the region and nearly 60% of Asia's trade is conducted with regional trade partners, up from 53% in 2000. This is expected to rise to 65%, or \$400 billion per year till 2030.



5. SERVICITIZATION AND NEW BUSINESS MODELS

According to survey results shared in Microsoft's IoT Manufacturing Spotlight, manufacturers who responded said 33% of their revenue comes from smart connected products that generate data to drive other value-added services like sales and delivery of spare parts.. Over the next three years, respondents expect the penetration of smart products to increase to 47%.



DIGITAL TRANSFORMATION IN MANUFACTURING

Critical enabling technologies like cloud and data should come as no surprise for established ecosystem players.

According to a report by MarketsandMarkets, "the global cloud manufacturing market size is expected to grow from USD 45.5 billion in 2020 to USD 111.9 billion by 2026, at a Compound Annual Growth Rate (CAGR) of 16.3% during the forecast period. Cloud-based technologies are not just improving existing processes; they're enabling entirely new business models in manufacturing.

Equally crucial are the data models that offer a common data structure underlying the different systems and applications in an organization. They enable data sharing that facilitate smoother production processes, predictive maintenance, and resource optimization.

Siemens Digital Industries Software recognizes this and use its data model capability to carve out benefits internally as well as for their customers across startups to enterprises..

HIGH-AVAILABILITY EDGE COMPUTING PLATFORMS

Stratus' Sean Smiley also observed major industrial player Shell prioritising AI and cybersecurity initiatives. He noticed that facilities managers ultimately would also like to consolidate their many different specialised and disparate systems onto one hardware platform while software-focused vendors tend to want the hardware their applications reside on, to not fail.

"We get all these disparate applications like SCADA, cybersecurity, and manufacturing execution systems (MES), consolidated into one machine by Stratus – this is very common today," Sean said.

Foong Lin Hoe, Stratus Technologies' APeJ VP and MD explained that clients value its edge computing solutions also because of the typically harsh and remote environments they have to operate in, and the limited IT resourced they have readily available.

"To have to deploy IT individuals to these locations: it could be days or weeks before anything is restored."

"Clients value our edge computing solutions also because of the typically harsh and remote environments they have to operate in, and the limited IT resources they have readily available.



Foong Lin Hoe,
VP & MD, APeJ
Stratus Technologies

TRUE DIGITAL TRANSFORMATION WITH COMPREHENSIVE DIGITAL TWINS

VP and MD of Siemens Digital Industries Software in SEA, Alex Teo, strongly believes that true digital transformation and AI can give smaller players the edge they need to solve the skill gaps they currently experience.



Alex Teo, VP & MD SEA
Siemens Digital
Industries Software

"In most cases, digital transformation lacks a well-thought out plan. Companies often adopt fragmented solutions such as Product Lifecycle Management (PLM), Manufacturing Execution Systems (MES), or various supply chain software solutions. When these systems are developed in isolation, they create data silos and disjointed processes. This fragmentation, undermines the objectives of digital transformation."

SIEMENS XCELERATOR

The benefits of organization-wide data sharing is being amplified with the Siemens Xcelerator platform. It provides a plug-and-play type of experience and customers can leverage the pre-built frameworks and functionalities without having to start from scratch. Besides integrating with the broader ecosystem of Siemens partners, services, and support, it can accelerate a company's digital transformation journey, and is also incredibly instrumental in helping startups like ION Mobility and VinFast, create products and services in the least amount of time and at lower-than-usual cost.



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