CHEMICAL PRODUCTIVITY NEXUS

SUBSECTOR PRODUCTIVITY REPORT

CHEMICALS AND CHEMICAL PRODUCTS

ISSN 3009-0903

Subsector Productivity Report Chemicals & Chemical Products

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Moving forward, the chemical industry may need to focus on socio-geographical transformations including changing demographics, human health, as well as evolving consumer trends in order to develop strategic plans for the Chemicals and Chemical Products Subsector.

Executive Summary

The Chemicals and Chemical Products Subsector in Malaysia continues to be one of the major sources of manufactured exports. In 2022, exports of chemicals and chemical products increased by 14% to RM80.61 billion. Chemicals and chemical products is an important subsector of the manufacturing industry both domestically and internationally. The subsector includes goods that are used on a daily basis and serves as critical inputs to other manufacturing subsectors and industries. More than 90% of the industry participants in the subsector are small and medium-sized businesses. Under the Malaysia Productivity Blueprint (MPB) launched in 2017, Chemicals and Chemical Products Productivity Nexus (CPN) has been identified as one of the nine (9) priority subsectors. The Productivity Nexus covering the nine subsectors, led by industry champions, have been formed to drive the implementation of the initiatives.

This report provides comprehensive details of the productivity performance of Malaysia's Chemicals and Chemical Products Subsector, numerous industrial challenges and potential solutions to boost the subsector's productivity development. This report also details out the role of the Chemicals and Chemical Products Productivity Nexus (CPN), an industry-led establishment stipulated in Malaysia Productivity Blueprint (MPB) under the purview of Malaysia Productivity Corporation (MPC); led by industry associations and acting as change agent to drive the productivity trajectory of this subsector.

The COVID-19 pandemic, the effects of the geopolitical shift, lack of talent in the workforce, the slow adoption of technology and digitalisation, the need for sustainable practices in combating environmental issues and absence of business expansion plan among SMEs are some of the pertinent issues affecting the Chemicals and Chemical Products Subsector in Malaysia.

The report also includes the subsector's future projection, taking into account the pandemic's negative effects and impact. Industry integration, human capital development, sustainability in action as well as technology and innovation are among the recommendations provided in the report. Moving forward, the chemical industry may need to focus on socio-geographical transformations including changing demographics, human health, as well as evolving consumer trends in order to develop strategic plans for the Chemicals and Chemical Products Subsector. Public-private sector partnership is equally crucial in fostering future collaborations in order to tackle industry related issues such as regulations and human resource matters.

It is also vital to raise awareness among the SMEs on the importance of digitalisation and diversification of business in order to survive future crises. The pandemic has affected the Chemicals and Chemical Products Subsector in many ways; thus it is pertinent for industry players to develop agility in order to survive similar pandemic or threats in the future. Internalisation of business is another prominent area of concern for CPN as it is crucial for industry players to be able to diversify their business in order to avoid over-dependence on certain markets. Shifting geopolitical trends are having a profound impact on the business landscapes in recent times.

Message from the Director General, Malaysia Productivity Corporation

> **"The Subsector Productivity Report 2022 presents a roadmap for attaining sustainable productivity gains, fostering innovation, enhancing the overall competitiveness of our industries, and propelling Malaysia towards sustainable economic growth"**

Malaysia Productivity Corporation (MPC) plays a pivotal role in bolstering Malaysia's economic growth by driving productivity advancements across all sectors, as outlined in the Twelfth Malaysia Plan (12MP). Malaysia's economy demonstrated promising performance, with a remarkable 8.7 percent GDP growth in 2022, surpassing the 3.1 percent achieved in 2021. This growth can be attributed to the recovery of private spending and investment, a decline in unemployment rates, and the strengthening of the ringgit.

The year 2022 presented both opportunities and challenges for Malaysia's economic landscape. Our nation navigated through a dynamic global environment characterised by technological advancements, shifting market dynamics, and the ongoing recovery from the pandemic's impact. Amidst these circumstances, productivity emerged as a critical driver of economic growth and competitiveness, serving as a key pillar for Malaysia's sustainable development.

MPC strategically leverages the sectoral Productivity Nexus to drive significant productivity growth in the services, manufacturing, and agriculture sectors. These efforts are carried out in alignment with the Malaysia Productivity Blueprint (MPB), which outlines impactful initiatives since 2017, and key policies such as the New Industrial Masterplan 2030 and the 12MP Mid-Term Review. By maximising collaborative efforts across various platforms, MPC actively supports and facilitates the industry-driven initiatives of the Productivity Nexus.

We take pride in highlighting the remarkable achievements of our subsectors in enhancing productivity. Through innovative practices, strategic investments, and a collaborative approach, our industries have embraced initiatives for productivity improvement, charting for an optimistic goal for a labour productivity growth of 3.8% per annum for the remaining 12MP period.

The Subsector Productivity Report 2022 presents a roadmap for attaining sustainable productivity gains, fostering innovation, enhancing the overall competitiveness of our industries, and propelling Malaysia towards sustainable economic growth. We believe that this publication will inspire fruitful collaborations, catalyse meaningful change, and contribute to our nation's shared prosperity.

Encik Zahid Ismail
Director General
Malaysia Productivity Corporation (MPC)

Statement from the Champion, Chemicals and Chemical Products Productivity Nexus

The Chemicals and Chemical Products Subsector covers a wide range of goods, including chemicals and chemical products, pharmaceuticals, medicinal chemicals, and botanical products. It is one of the leading economic subsectors in Malaysia, accounting for 8.9% of Malaysia's total exports for manufactured goods.

The Chemicals and Chemical Products Productivity Nexus (CPN) was established in line with The Twelfth Malaysia Plan (12MP), aimed at fostering the subsector's vitality, development, and expansion. CPN is committed to strengthening the collaboration between industry players and educational institutions offering chemical-related courses, providing technical, digital and management support to enhance SMEs capabilities and establishing Chemicals Centre of Excellence built on clear strategies for the Chemicals and Chemical Products Subsector. In addition, CPN enables SMEs to move towards high value added components in the chemical value chain by providing relevant support to high potential SMEs to expand internationally.

Malaysia is moving closer to embracing the Fourth Industrial Revolution (4IR) as indicated in 12MP; the manufacturing sector will concentrate on moving up to more complex, varied, and high-valued products. Along with the electrical and electronics (E&E), machinery and equipment (M&E), and aerospace subsectors, the chemicals and chemical products industry is one of the important industries that will fuel the nation's economic expansion. According to the National Policy on Industry 4.0 (Industry4WRD), the future's emphasis will also be on using digital technology and reaping the rewards of disruptive innovations. The manufacturing sector is expected to increase overall by 5.7% annually over the course of the 12MP. One of the major contributors is the Chemicals and Chemical Products Subsector.

CPN is committed to contributing positively to the development of the Chemicals and Chemical Products Subsector through various initiatives designed carefully to address the needs and challenges faced by the industry. In 2023, CPN would continue implementing the Data Integration Enhances Road Safety, Security and Regulatory Compliance in the Chemical Industry Programme, Competency Programme for Professional Heavy Vehicle Drivers of Dangerous Goods for SME (Pro-HVD) and Productivity Step-Up Programme.

Moving forward, CPN focuses on the current challenges and trends in order to facilitate the development of the industry. Among the crucial key pointers which CPN focuses on are the evolving consumer trends and lifestyle, digitalisation, sustainability and Environmental, Social and Governance (ESG) practices.

Dato' Dr Mohamed Noor Sany
Champion
Chemicals and Chemical Products Productivity Nexus (CPN)

PART I

CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR PERFORMANCE

AN OVERVIEW

Global Performance of Chemicals and Chemical Products Subsector

The chemicals industry has largely been experiencing growth since the global financial crisis in 2009. The European Chemical Industry Council (Cefic) reported that global chemical sales climbed from EUR 1,172 billion in 2009 to EUR 3,669 billion in 2019. Although the industry was unavoidably impacted by the pandemic recession in 2020, which led to a slight decline in chemical production, growth in demand and production of chemicals are anticipated to pick up.

In 2021, the chemical industry's total worldwide revenue recorded 4.73 trillion U.S dollars, thus reaching the highest value of the last 15 years. It is forecasted that the industry will expand at a sustainable CAGR of 4.5% during the ensuing years. Over the coming ten years, significant emerging and evolving megatrends will have a notable impact on the industry, so it will be crucial for businesses to stay nimble and seize any new opportunities that present themselves in this shifting environment.

The world's chemical industry consists of the companies that produce industrial chemicals by converting raw materials such as fossil fuels, minerals and metals, and water into thousands of different products. The chemical industry overlaps with the plastic industry, as the majority of chemical companies are also plastic producers.

A substantial part of the world economy is played by the chemical industry. Every segment of the industry is anticipated to grow throughout the three years from 2021 to 2024, with an industry growth rate of 1.8% in 2024 as a whole. With a 2.1% estimate for growth in 2024, basic chemicals are anticipated to experience the highest growth of any chemical segment. By far, Asia holds the highest regional market share for chemicals worldwide. Since 2012, it has continuously represented more than 50% of the global chemicals market. As a result, Asian chemical businesses occupy important positions as well.

Products of the chemical industry are finding applications in almost all segments of the global economy; pharmaceuticals, detergents, packaging, fertilisers, fibres to name but a few. One of the most significant worldwide businesses, the chemical industry has contributed remarkably to the extraordinary advancement of mankind during the past century. Products made from chemicals offer a wide range of innovative applications.

Overview of Chemical Industry in Malaysia

Malaysia's economy has been able to grow as the Gross Domestic Product (GDP) increased by 7.0% in the fourth quarter (Q4) of 2022. This was made possible by persistently rising domestic demand, a persistent labour market recovery, resilient demand for electrical and electronic (E&E) products, and a revival in tourism activities. Agriculture, the automobile, construction, electrical, and electronics industries are just a few of the many sectors that gain from Malaysia's chemical industry's success by having access to high-quality chemicals and products that promote worldwide competitiveness. For instance, the chemical industry's plastics and synthetic rubber subsectors produce goods that are used in a variety of automobile applications. The presence of a robust local chemical industry, which serves as a vital source of raw materials, a facilitator of sustainability, and a partner in technology and innovation, benefits Malaysia's major manufacturing sectors as well.

Malaysia uses more chemicals per person than other nations with the same degree of development (Oxford Economics; German Chemical Industry Association (VCI); BCG). Similar results are seen in highly industrialized countries like South Korea and Germany, where exports for the significant automobile and electronics industries as well as downstream industries with high chemical consumption are the main drivers. As income rises in line with the general trend around the world, Malaysia is anticipated to continue increasing its chemical consumption.

The most recent World Bank analysis predicts that Malaysia's real GDP per capita will rise, putting Malaysia on track to become a developed country between 2024 and 2028, in line with the Shared Prosperity Vision 2030. Ken Research predicts that the Malaysian construction chemicals market, which expanded at a CAGR of about 3% from 2017 to 2022 and is expected to rise at a CAGR of about 5% from 2023 to 2027, would be driven by strong industry expansion and government assistance.

The development of the nation's socioeconomic system is also greatly accelerated by the chemical industry. In addition to providing roughly 430,000 Malaysians with direct employment (5% of the country's workforce), the industry also benefits other sectors of the economy (Statista Research Department, Mar 14, 2023).

According to the figures for 2020–2021, Malaysia's total exports are largely composed of chemicals and chemical products. The strategic geographic location of Malaysia and its network of important markets in the region and the Middle East, as well as the country's strong infrastructure and access to feedstocks like oil and gas, all contribute to its success.

The Malaysian economy ranks 35th globally and is the third-largest in Southeast Asia (after Thailand and Indonesia). Petrochemicals and oleochemicals are the main products of this sector, which play a significant role in the Malaysian economy. Fuels account for 22% of exports and 16% of imports in the nation, followed by chemicals (5% and 7%), plastics and rubber (7% and 5%), and vegetable byproducts, especially palm oil (8% and 3%), in that order.

Reformulating marketing and supply chain management strategies is another area of development, positioning the sector for increased market and raw material diversification. This will provide market participants more power to select from a variety of suppliers and target markets, giving them more flexibility and independence.

Malaysia's chemicals manufacturing revenue is expected to reach 8.9% of the country's manufacturing value added by 2026, down from 9.3% in 2021. This marks a 0.8% decrease year-on-year, and an overall drop of 1.3% since 1973.

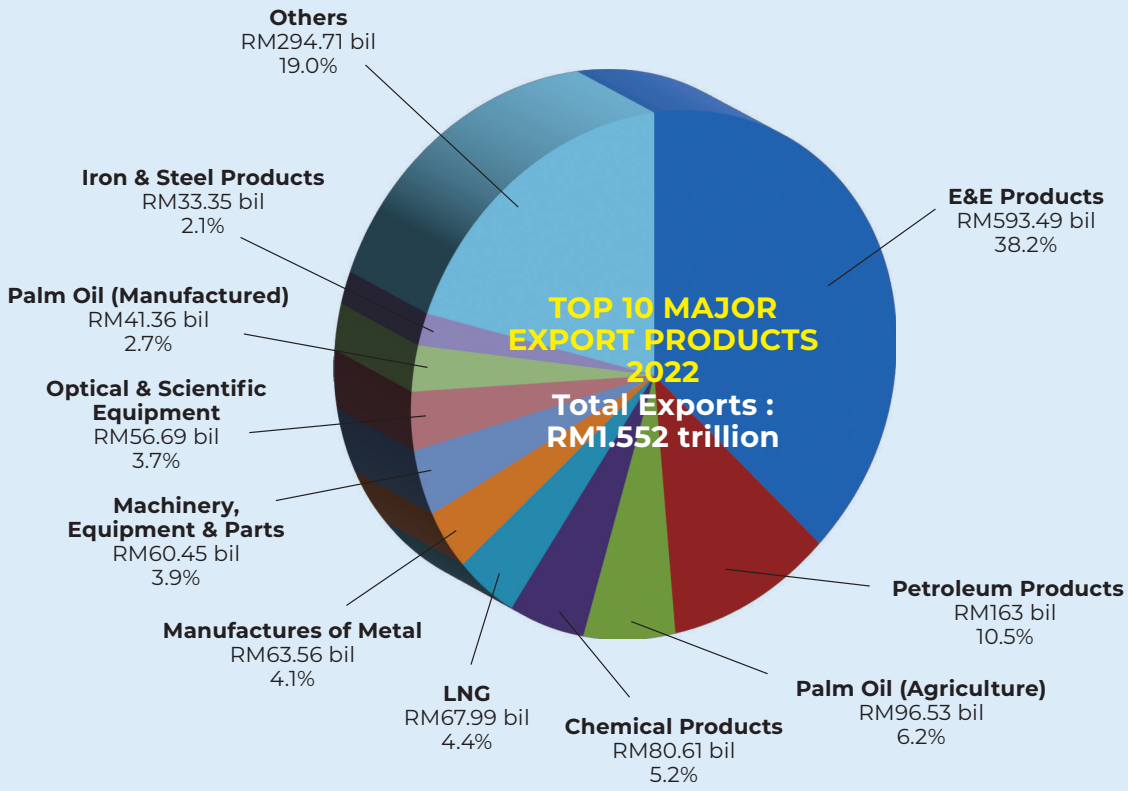
Malaysian chemicals and chemical products manufacturers include manufacture of basic chemicals, fertilizers and nitrogen compounds, plastic and synthetic rubber in primary form, manufacture of pesticide and other agrochemical products, manufacture of soap and detergents, cleaning and polishing preparations, manufacture of perfume and toilet preparations, and manufacture of other chemical products like inks as well as manufacture of man-made fibres.

PRODUCTIVITY PERFORMANCE OF CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR

The manufacturing sector stands as the highest contributor among the main economic sectors to Malaysia's exports, accounting for approximately RM 1,306.67 billion (84.2%). Figure 1 indicates that the chemicals and chemical products contributes a total of RM80.61 billion (5.2%) exports in 2022. The total exports for chemicals and chemical products recorded an increase of 14.0% in 2022 as compared to RM 70.68 billion in 2021.

Singapore and China were the major countries of destination in 2022 with a total contribution of 29.5% to Malaysia's exports (Malaysia External Trade Statistics, 2023). Exports supported by influx of foreign direct investments have been one of the most important factors driving Malaysia's GDP growth in recent years.

Figure 1 : Major Export Products of Malaysia in 2022

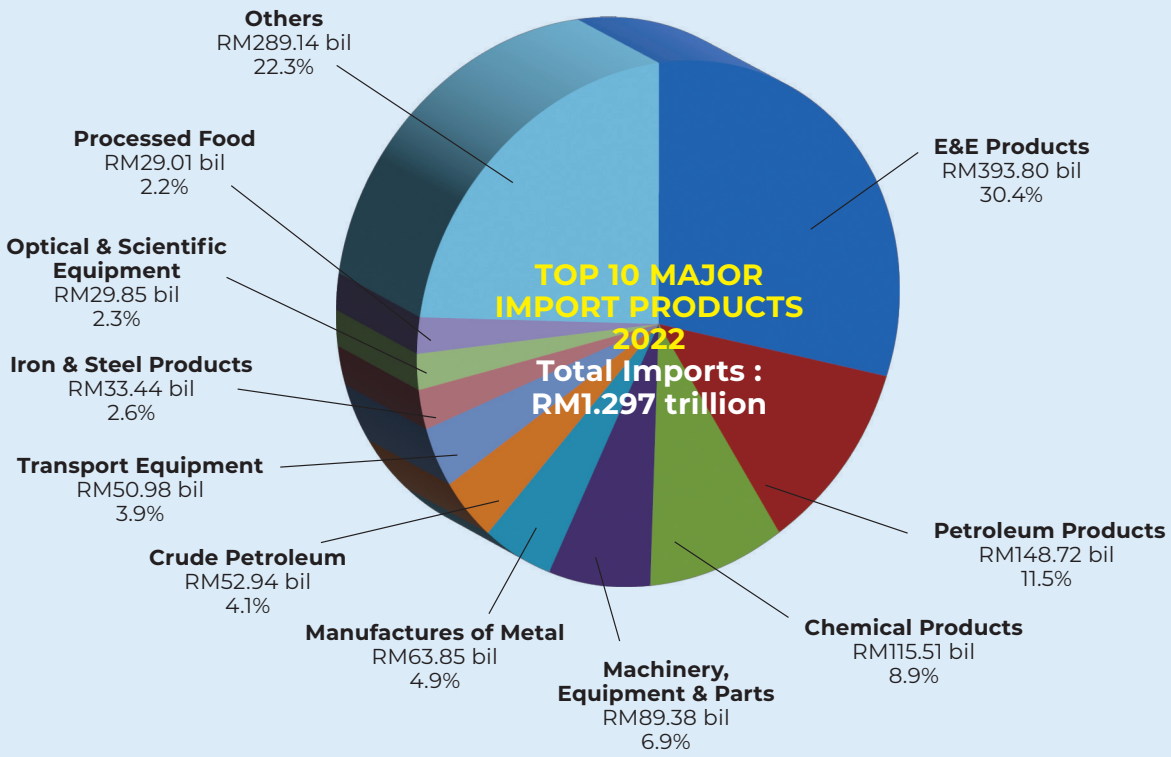


Source: Malaysia External Trade Development Corporation

Malaysia's total imports surged by 31.3% to a staggering RM1,296.63 billion in 2022, a significant increase from RM987.34 billion in 2021. Figure 2 highlights the substantial contribution of chemicals and chemical products to Malaysia's overall imports, accounting for 8.9% and valued at RM115.51 billion, a notable 19.6% increase from RM96.55 billion in 2021.

In 2022, notable export countries included Singapore, China, and the United States of America while significant import countries for Malaysia included China, Singapore, and Taiwan.

Figure 2 : Major Import Products of Malaysia in 2022



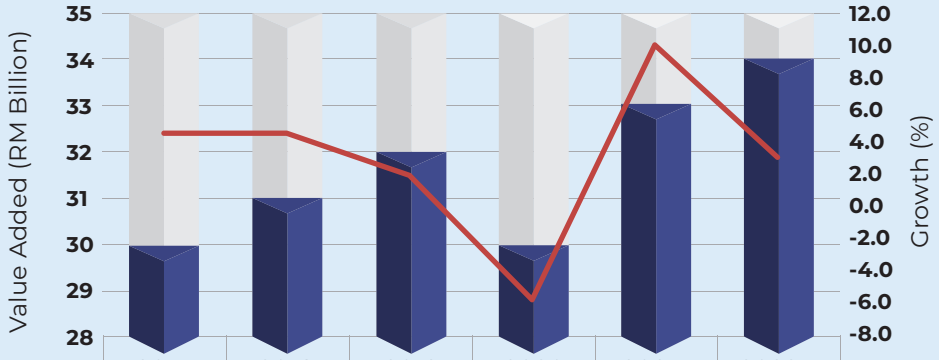
Source: Malaysia External Trade Development Corporation

Table 1 highlights the subsector's robust growth, with value added increasing from RM33 billion in 2021 to RM34 billion in 2022. This expansion surpasses pre-pandemic levels, representing a notable 13.3% increase since 2017. The subsector's strongest rebound occurred between 2020 and 2021, recording a 10% growth spurt.

Table 2 further underscores the subsector's resilience, indicating a 2.1% increase in productivity performance, measured in value added per employment, from RM305,206 in 2021 to RM311,496 in 2022. This growth is attributed to supportive government policies, programmes, and the subsector's adaptation to the post-pandemic landscape. Additionally, the subsector benefited from increased demand for industrial products, particularly those utilised in digital applications and driven by the adoption of advanced technologies.

While value added per employment increased, labour productivity per hour worked exhibited a slight decrease from RM133.2 to RM128.9 between 2021 and 2022, as depicted in Table 3. This suggests that optimised working hours may have played a role in this decline. However, the adoption of smart and sustainable automation solutions presents an opportunity to significantly improve labour productivity in the future. Technical skill development is also crucial for driving digital transformation initiatives within the industry.

Table 1 : Chemicals and Chemical Products Subsector Value Added, 2017-2022

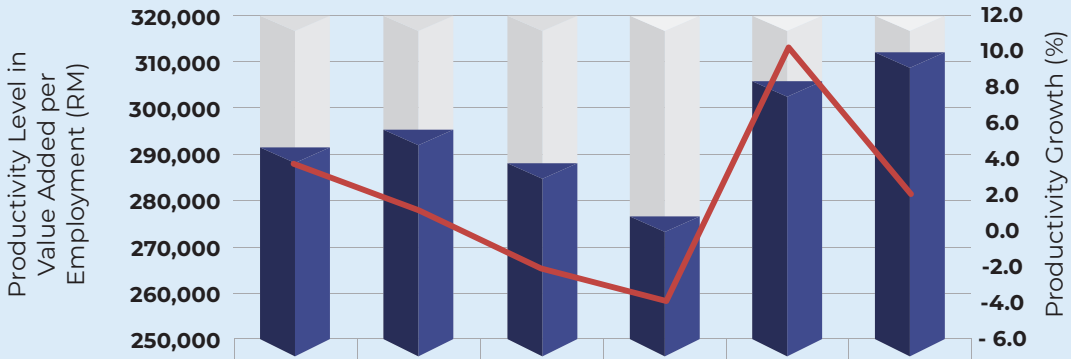


	2017	2018	2019	2020	2021e	2022p
Value Added (RM Billion)	30	31	32	30	33	34
Growth (%)	4.5	4.5	1.9	-5.8	10.0	3.0

Year

Source: Department of Statistics Malaysia (DOSM)

Table 2 : Labour Productivity in Value Added per Employment of the Chemicals and Chemical Products Subsector, 2017- 2022

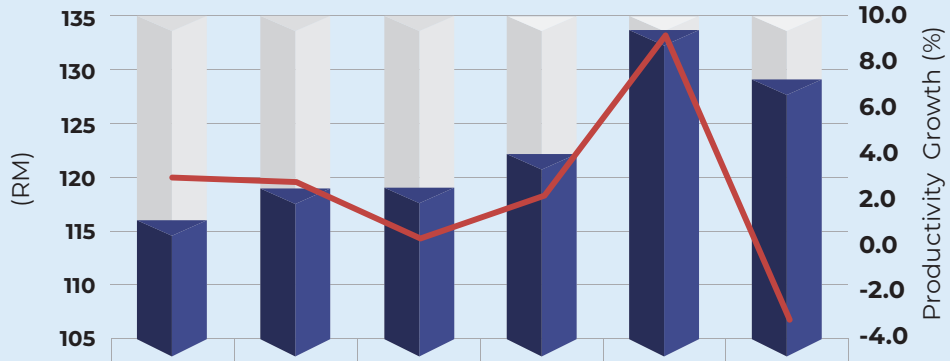


	2017	2018	2019	2020	2021e	2022p
Productivity Level in Value Added per Employment (RM)	291,100	294,621	288,306	276,827	305,206	311,496
Productivity Growth (%)	3.7	1.2	-2.1	-4.0	10.3	2.1

Year

Source: Department of Statistics Malaysia (DOSM)

Table 3 : Productivity in Value Added per Hour Worked of the Chemicals and Chemical Products Subsector, 2017- 2022



	2017	2018	2019	2020	2021e	2022p
Productivity Level in Value Added Per Hour Worked (RM)	116.0	119.0	119.3	121.9	133.2	128.9
Productivity Growth in Value Added Per Hour Worked (%)	3.0	2.8	0.3	2.2	9.2	-3.2

Year

Source: Department of Statistics Malaysia (DOSM)

Based on the presented data, it is evident that players in the subsector have demonstrated resilience and adaptability in the face of the pandemic. They have not only managed to recover but have also surpassed pre-pandemic levels, achieving a remarkable feat that would have necessitated substantial investments and well-conceived survival strategies. However, the global economic landscape remains uncertain, and the industry is not immune to these challenges. To thrive in this new era, where intelligence is industrialised and employed as a competitive advantage, a solid foundation in productive work philosophy, quality management, lean operations, and innovation practices is essential.

Strategic investments in effective labour upskilling and reskilling, coupled with trust and empowerment, could be the key to unlocking this potential. Additionally, the subsector needs to prioritise Environmental, Social and Governance (ESG) principles and integrate them seamlessly into a smart and sustainable operations management system that is not only unique to the subsector but also tailored to the specific needs of each player. By addressing these factors, Malaysia can foster an environment that promotes improved labour productivity in the Chemicals and Chemical Products Subsector.

PART II

CHALLENGES, INITIATIVES AND RECOMMENDATIONS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CHEMICALS AND CHEMICAL PRODUCTS PRODUCTIVITY NEXUS (CPN)

Chemicals and Chemical Products Productivity Nexus (CPN) aims to address the following Chemicals and Chemical Subsector's productivity challenges:

i. Mitigate the diversified issues in the chemical industry structure,
ii. Facilitate the transition of SMEs towards high-value-added components in the chemical value chain, and
iii. The internalisation of high potential SMEs

CPN focuses on the development of in-house competency-based upskilling training schemes in order to improve workforce productivity. Meanwhile, CPN also prioritises the digitalisation and modernisation of the chemical industry as part of its strategic initiative on technology and innovation. CPN is committed in managing challenges in the chemicals and chemical products industry in the following four areas:

i. **Workforce**: talent development, industry-academia collaboration, research and development
ii. **Technology**: investment in latest technology and digitalisation of the industry
iii. **Industry structure**: improving high value added segments within the industry
iv. **Ecosystem**: expansion of local SME business internationally

CHALLENGES WITHIN THE CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR

The Chemicals and Chemical Products Subsector plays a vital role in boosting the local economy and driving advancements in healthcare, agriculture, energy, and technology. However, it also poses risks such as pollution, health hazards, and accidents, which is why the industry is subject to strict regulations and safety standards. In recent years, the Chemicals and Chemical Products Subsector has encountered various challenges, including fluctuating raw material prices, shortages of skilled workers, the aftermath of the COVID pandemic, the need for digitalisation, and the demand for sustainable practices.

According to a survey by the Federation of Malaysian Manufacturers (FMM), the manufacturing industry faced a shortage of approximately 22,000 workers in 2021, particularly in subsectors like electrical & electronics, food and beverages, chemicals and chemical products, fabricated metal, and rubber products. Urgent action is required to address this shortage as it could hinder the recovery of industries, impede order fulfilment, and disrupt expansion plans. This shortage also has implications for global supply chains, considering Malaysia's role as a key manufacturing and supply hub in the region.

In the United States, a UKG Workforce Activity Report reveals that 54% of firms find it challenging to recruit employees with the required skill sets, especially in the chemical industry. To attract young, technologically savvy talent, chemical industry players need to embrace digital transformation and offer more than just high wages, including flexible work arrangements and ongoing education opportunities. Implementing advanced technologies like smart devices, embedded intelligence, and data analytics require skilled personnel who can harness the potential of the generated data.

Digitalisation has emerged as a major concern for chemical industry owners, with 65% expecting significant business impact. The CEO's emphasis on digitalisation to achieve sustainability goals is observed in four out of every ten chemical businesses (EY DigiChem SurvEY 2022). As the world economy recovers from the COVID pandemic, chemical sector firms are increasing their investment in digitalising operations. However, challenges from the pandemic, geopolitical uncertainties, supply chain limitations, and rising material and labour costs have hindered the expansion and profitability of chemical companies.

Looking ahead to 2023, the chemical industry will continue to face challenges stemming from China's response to COVID, high energy prices in Europe, and the conflict between Russia and Ukraine. These circumstances occur against a somewhat gloomy economic backdrop, as concerns of a global recession persist. Downstream players in the chemical industry will grapple with the volatility and costs associated with raw materials.

In conclusion, the Chemicals and Chemical Products Subsector plays a crucial role in the local economy, but it faces challenges such as fluctuating prices and a shortage of skilled workers. Addressing these issues is essential for industry recovery and maintaining global supply chain commitments. Achieving sustainability goals through digital transformation is a top priority for chemical industry owners. Overall, the chemical sector will continue to innovate and strive for sustainable growth in the future.

CPN'S PAST INITIATIVES TO CATALYSE PRODUCTIVITY GROWTH, 2022

Professional Certificate for Chemical Process Technician Programme

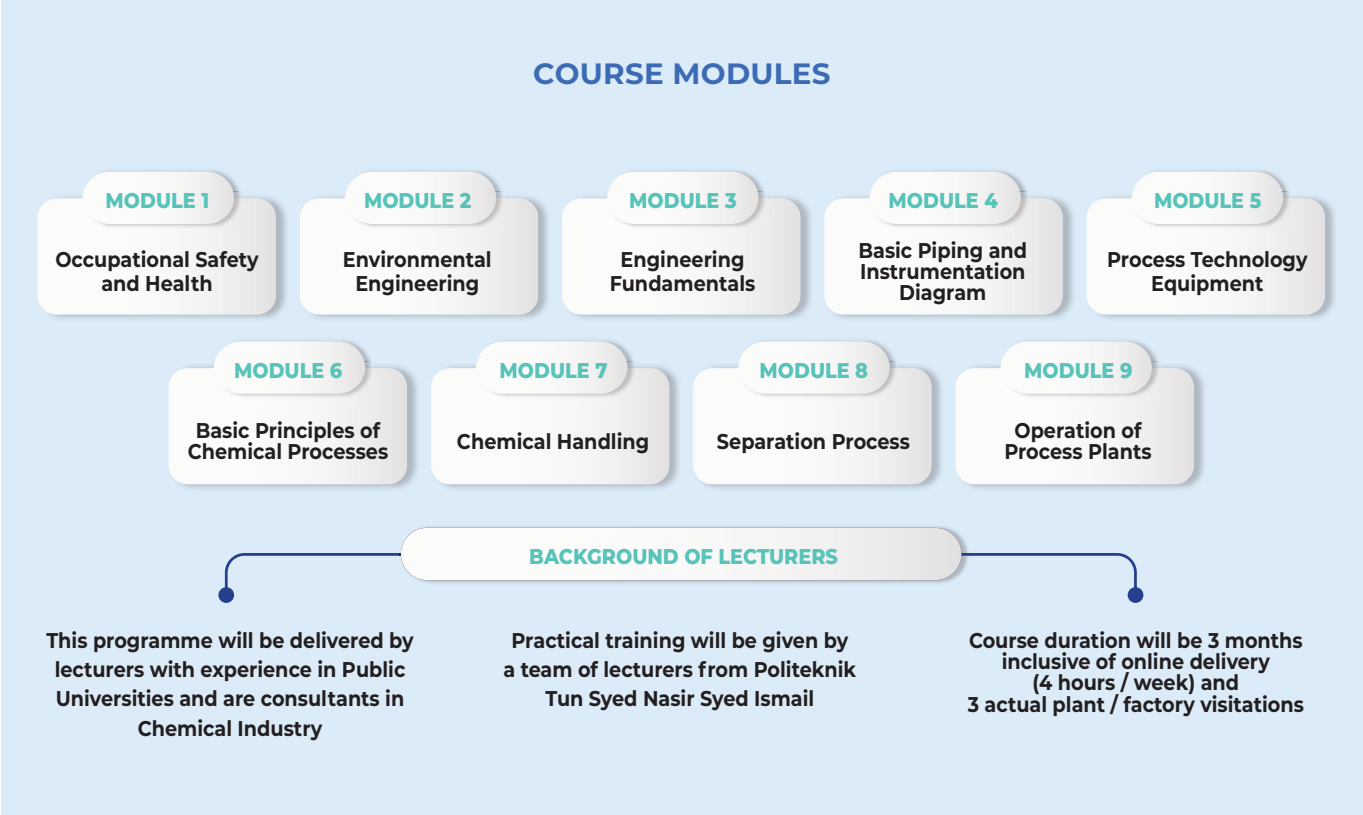
The Certification for Chemical Process Technician programme was initiated to nurture talents and enhance skills (upskilling) of factory floor workers without tertiary education to increase productivity of the chemical industry. CPN addressed the need of the chemical industry in Malaysia through collaborating with few stakeholders, mainly Genovasi University College (GUC), Politeknik Tun Syed Nasir (PTSN) and Malaysia Productivity Corporation (MPC) by developing the Professional Certificate for Chemical Process Technician Programme.

Factory floor employees are identified as those working in factories without any formal tertiary education/certified skills and in need of a certificate programme which enables them to reach their full potential and contribute effectively to the company's productivity. Their skills which have not been certified are a loss of opportunities for the organisation; therefore it is crucial to provide them an opportunity to upskill themselves and improve their earning capacity.

The Chemical Process Technician Certification Programme is an initiative by MPC, PTSN & GUC to produce certified skilled process technicians as well as to recognize experienced technicians in the industry. The certification programme serves as a solution to rectify shortage of skilled labour and low productivity. The resources for the certification programme were provided by academic institution partners and experienced trainers from the industry.

The 3-months programme was conducted by industry practitioners through training and coaching the factory floor employees on much needed competencies in HSE, equipment, design and operations. The training covered both theory and practical elements with 3 cluster modules customised to cater to the need of more experienced talents.

The instructional design of the training consists of 9 modules targeted for Diploma holders and below working in the chemical-based industries. The programme covers, among others, modules on occupational safety and health, environmental engineering, engineering fundamentals, basic piping and instrumentation diagram, process technology equipment, basic principles of chemical processes, chemical handling, separation process, and operation of the process plant. The programme has been approved by the HRDC under the HRDC claimable programme.



Enterprise Improvement Programme (EIP)

In September 2022, a collaborative effort was inked between CPN and Malaysian Bioeconomy Development Corporation for the Enterprise Improvement Programme (EIP). The objectives of the programme are to diagnose pain points and to recommend implementable solutions to overcome challenges and barriers for companies' growth and expansion. In addition, the programme is designed to support chemical industry capacity and to rebuild the business by developing suitable intervention programmes to address the gap.

The EIP programme addresses industry concerns on poor succession planning, high staff turnover, unstable sales and slow growth and potential of technology adoption in the industry. EIP identifies gaps in skills, technology adoption, financial, regulatory and product marketability. Companies will receive guidance and access to participate in numerous development programmes including training on product development and technology facilitation.

EIP utilises the Malaysia Business Excellence Framework (MBEF) as reference and focuses on 6 areas; Leadership, Strategy, Information, Customers, Workforce and Process. Twenty bio-chemical based companies have successfully participated in the programme.

Workshop for the Enterprise Improvement Programme

IN-PROGRESS INITIATIVES TO ADDRESS CURRENT INDUSTRY CONCERNS

Through various initiatives of the Industry Working Group (IWGs) established under CPN, several programmes are ongoing to benefit the SMEs primarily in the industry to boost productivity growth.

Data Integration Enhances Road Safety, Security and Regulatory Compliance in the Chemical Industry

CPN aspires to construct a comprehensive database between the public and private sectors to boost national business competitiveness. The project aims to tackle various issues, including safety and security concerns, reliance on unreliable third-party transport service providers, lack of integration in government agencies' systems, and control over unauthorised chemical transporters. This programme addresses the need for a data sharing platform between the public and private sectors in order to optimise operations and address safety concerns in chemical transportation.

Currently, data acquisition is done manually, resulting in inefficiency and time-consuming processes. The absence of data connectivity between regulators and the industry poses challenges in achieving full regulatory compliance. Industry players lack access to crucial information on drivers and vehicles, such as records of blacklisted individuals, outstanding summonses, invalid licences, drug offences, criminal involvement, and habitual traffic offenders. This lack of verified information and data exposes the industry to the risk of hiring non-compliant drivers and deploying unfit vehicles.

The pilot project kick-started in March 2022 with the presentation to the Special Taskforce to Facilitate Business (PEMUDAH) chaired by the former Minister in Prime Minister's Department. The meeting agreed that the initiative is in line with the government's aspirations in the 12MP to encourage the data sharing between regulatory bodies and industry. A number of engagements have been conducted with JPJ, Ministry of Transport (MOT), Jabatan Perlindungan Data Peribadi (JPDP) and the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) to gain feedback and inputs on the initiative. This is followed by developing simulation for data integration, workshops and cost study with the stakeholders. About 10-15 companies from MNCs, GLCs and SMEs have been identified to become pioneers in this pilot project.

Successful implementation of the data integration project is anticipated to bring about self-regulation in road transport operations, with the goal of reducing

risks associated with transporting high-risk cargoes and encountering road hazards. Additionally, it aims to establish a governing body that permits only experienced hauliers, skilled drivers, and suitable vehicles that meet the requirements for transporting dangerous loads. CPN will collaborate with other relevant government bodies and agencies like PDRM, DOSH, and DOE in the long run to lead the programme towards achieving industry-wide self-regulated compliance in the transportation of chemicals within the country, aiming to establish a visionary standard.

Engagement session with Jabatan Pengangkutan Jalan (JPJ)

Competency Programme for Professional Heavy Vehicle Drivers of Dangerous Goods for SME (Pro-HVD)

Human factors were identified as the main contributor of road accidents involving chemical tanker crashes in highways (International Road Transport Union). This is due to lack of knowledge, competency, experience and attitude among the heavy vehicle drivers as there is no standardisation of quality and competency-based assessment conducted at national level for truck drivers.

CPN initiated the Professional Heavy Vehicle Drivers (Competency-based) programme aimed to identify the gaps and needs of the industry and to propose solutions in order to tackle human factor issues causing road accidents involving trucks in Malaysia. The current training only addresses defensive driving and no competency assessment is conducted. CPN addresses the need to include fatigue management, vehicle understanding, load dynamics and mindset awareness and behaviour of the drivers in the new training module. The training syllabus includes driver and driving skills as the main area of focus.

The training methodology includes adult learning approach, group dynamics strategy sessions, one-to-one coaching, theory and practical lessons, demonstrations and on-the-road assessment. The drivers will be trained on their type of vehicles at the logistics provider's location. Each driver will go through five levels of training sessions and would be able to progress to the next level only upon passing each step. Re-training will be conducted every 3 years in order to maintain the quality of the drivers.

The module and syllabus for Pro-HVD Programme was developed in 2022, collaborating with industry players and the National Institute of Occupational Safety and Health (NIOSH). The Pro-HVD programme aims to set a consistent standard and quality training for all Heavy Vehicles drivers nationally and to protect public and road user safety and minimise losses

through road incidents. This is in line with one of the objectives of the Malaysia Productivity Blueprint; to enhance sustainability and competitiveness through a national workforce upskilling training programme.

For 2023, CPN seeks to empower 100 participants in improving public safety and safeguarding the environment against potential risks associated with accidents in chemical transportation. If effectively implemented, the programme has the potential to enhance employment opportunities within the chemical industry and contribute to increased productivity levels. CPN would also collaborate with HRDCorp to ensure that the Pro-HVD Programme is registered under the HRDCorp claimable programme.

Productivity Step-Up Programme

The Productivity Step-Up Programme was initiated in 2023 targeting 50 companies to participate. The objectives of the programme are outlined as follows:

i. To assist companies in assessing their current productivity levels, technological capabilities, and identifying specific challenges within their operations.

ii. To provide training to companies on the implementation of new technologies and software systems, enabling automation and streamlining processes to reduce errors and enhance productivity.

iii. To support companies in adopting Industry 4.0 practices within the local industries.

iv. To offer guidance, coaching, and preparation to participating companies for carrying out improvement projects within their own organisations.

CPN, in collaboration with a training centre, has developed the programme called "Productivity Step-Up," which encompasses three key components: Diagnostics, Process Analysis, and Intervention in order to elevate productivity at the enterprise level.

i. Diagnostics: The initial phase of the programme aims to identify the challenges faced by companies and understand the specific problem areas. Through Productivity and Technology Assessment, companies can gain insights into their overall performance and readiness for adopting new technologies.

ii. Process Analysis: The programme's second phase involves analysing the existing processes within companies. Key processes are examined to identify problem areas and challenges before proposing appropriate solutions.

iii. Intervention: During the third phase of the programme, solutions are introduced through process interventions and the utilisation of technology within relevant indicators such as cost, waste, time, and capital. Companies are expected to develop a project report outlining their proposed solution, which may involve digitalisation (e.g., dashboards, IoT, big data, AI) or other process improvement measures.

RECOMMENDATIONS TO INCREASE THE PRODUCTIVITY OF CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR

Chemicals and Chemical Products Productivity Nexus would continue its initiatives introduced in 2022 while addressing the challenges for each programme and initiatives. Most of the pilot projects initiated in 2022 are expected to be completed in 2023, taking into consideration the internal and external factors contributing to the progress of each programme. The following are upcoming trends and key pointers which could shape CPN initiatives for 2023 and beyond. It is imperative for CPN to address the following in its future initiatives in order to improve the productivity of the stakeholders within the Chemicals and Chemical Products Subsector.

Evolving Consumer Trends and Lifestyle

Purpose-driven consumers, who choose products and brands based on how well they align to their values, now represent the largest segment (44%) of consumers, expecting companies to cater to their needs and live up to their social and environmental responsibility claims.

COVID-19's disruption has advanced sustainability and health trends, which in turn are influencing consumer behaviour. There is a constant increase in pressure for vegan and gluten-free diets, as well as the surge in demand for products with organic, clear, and clean labels that have a smaller environmental effect. Additionally, it emphasises on the growing necessity for corporate strategy change, including product innovation, branding, and marketing, in order to keep organisations ahead of the business curve. Personal health and environmental health are the focal points for today's generation of customers; with focus on health awareness, clean label, animal welfare and environmental awareness.

Sustainability in Action

The automobile industry's embrace of electric engines is seen as a significant step towards the decarbonisation of transportation. The manufacture of batteries and the effect of battery raw materials on the environment and society as a whole have raised concerns from regulatory organizations and end users, though. In order to effectively combat climate change, chemical manufacturers may play a critical role. Chemicals and materials are everywhere in contemporary life, thus chemical firms will need to undertake fundamental adjustments to remain competitive in a changing geopolitical environment on a global scale. These changes might be proactive or reactive. Chemical firms will probably need to prepare for difficulties in the upcoming year, such as global inflation and oil price instability. In light of these factors, 2023 may be a pivotal year for a change in strategy. Controlling plastic pollution and persistent pollutants and improving the management of commercial substances will top the international policy agenda for chemicals this year.

Digitalisation

Greater focus should be emphasised on utilising digitalisation to create robust supply networks in order to allow connectivity within the subsector. Chemical industry players seek to establish a strong digital business. According to EY DigiChem SurvEY 2022, improved data analysis (35%) and integration (30%) are among the high potential areas for chemical players, followed by digital security (30%) as chemical players face increasing challenges such as data theft and malware which cannot only compromise confidential data but also halt operations. By utilising machine learning, artificial intelligence, and predictive models, chemical businesses may automate a significant portion of their back-end processes, allowing scenarios like touchless order fulfilment and lights-out manufacturing and advancing the idea of the autonomous company.

The drive for digital transformation in the chemical industry generates the following key advantages:

Digital transformation technology like digital twins/ simulation software is crucial in optimising the performance of assets in the chemical manufacturing processes. Furthermore, data analytics technologies can optimise maintenance schedules and spot abnormalities in the behaviour of assets to increase asset dependability through predictive maintenance. Players in the chemical sector can decrease unexpected downtime, which can lower production output by up to 20%, thanks to these timely solutions.

Digitalisation technology like augmented reality (AR) reduces labour shortage and enables new workers to receive real-time training while enhancing the productivity of senior staff. Top engineers can now provide directions to workers remotely, chemical companies may lessen their dependence on flying them out to facilities. The same could also be applied in on-site assessment which now could be conducted online. This reduces the cost of travelling as well as ensures standard operating procedures are met all the time.

Chemical manufacturing environment can be dangerous, as it poses various risks to the environment and the workforce. It is therefore pivotal for companies to find ways to reduce risk to employees. Investment in analytics assists to analyse dangerous situations/incidents thus avoiding potentially risky circumstances and reducing losses.

Chemical facilities may become more robust to adversity through digital transformation since these technologies offer a wide range of alternatives to keep operations running. The ability to remotely access business networks, data, and operations, automate chemical processes, and maintain high levels of connection are a few examples of the benefits of digitalised solutions.

Geopolitical Shifts

Life expectancy is rising while birth rates are falling in many nations. The change of relative wealth from the West to the East, on the other hand, has a considerably stronger influence on our lives than any other demographic development. China alone already makes up for more than 30% for chemical demand and supply, and the 40% mark appears to be in reach. The Chemical Subsector must deal with varying standards in supply chains and other economic constraints as a result of the rise in political instability.

The recent Russia-Ukraine crisis is a major contributor to various pertinent issues affecting the industry and its subsectors. The biggest change in geopolitical relations since the conclusion of the Cold War was brought about by the war in Ukraine. The conflict and its effects will still be quite unpredictable in 2023, with substantial regional and worldwide political and economic repercussions. Every substantial escalation in the conflict would probably result in more sanctions against Russia from developed markets, which would have a greater negative effect on the economies of sanctioning nations.

WAY FORWARD FOR THE CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR

The global economy is still recovering from the pandemic and facing a challenging international environment, leading to slower overall economic development. Factors such as inflation, interest rates, investment decline, geopolitical crises, China's Covid response, and rising oil prices impact the situation. Global chemical output is projected to increase by 2.9% in 2023, with Western Europe's production gradually recovering and the Asia/Pacific region rebounding.

In Malaysia, the chemical industry's success has positively impacted sectors such as agriculture, automobile, construction, and electrical and electronics, enhancing their competitiveness through access to high-quality chemicals. The presence of a robust local chemical industry, which serves as a vital source of raw materials, a facilitator of sustainability, and a partner in technology and innovation, benefits Malaysia's major manufacturing sectors as well.

The future of the chemical industry will be shaped by various factors, including ongoing issues in Europe, China's regulatory changes, changing demographics, evolving consumer trends, technological advancements, and shifting global perspectives on sustainability and the environment.

To remain competitive and address global concerns such as climate change, the industry players of chemicals and chemical products need to adapt their strategies and embrace innovation to ensure business expansion and the industry’s growth. Efforts to accelerate the growth of Malaysia’s chemical and chemical products industry must align with the government agenda and national strategy to create a significant impact to the subsector’s sustainability.

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Appendix

CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR CATEGORY

The Chemicals and Chemical Products Subsector covers a wide range of products from agricultural chemicals or agrochemicals, industrial gases, inorganic chemicals, organic chemicals, paints, soaps and detergents, cosmetics, and toiletries as well as other chemical products.

Base chemicals and intermediates

Fertilisers
Composed of nitrogen, phosphorus, and potassium compounds. Commonly applied to soil or to plant tissues to supply plant nutrients.

Oleochemicals
Chemicals derived from natural sources such as plant fats, i.e., palm oil, palm kernel oil, and other palm products as major feedstocks. These are core building blocks for personal and home care products such as shampoo, detergent, toothpaste, and moisturisers. Oleochemicals have particularly strong synergies with care chemicals.

C1 intermediates
Chemical intermediates originating from the methane (C1) chain with methanol, urea, and formaldehyde as building blocks. Major chemicals include acetic acid, polyvinyl acetate (PVA), formaldehyde, and urea formaldehyde (UF) resins, used for various industrial purposes such as base materials for acrylic plastic, paints, clothing fibres, and agrochemicals.

Plastics and polymers

High-performance composites
Composite materials include reinforcement, such as fibres and fillers, alongside matrix polymers and metals. Primarily, they are used as advanced materials for the aerospace, high-end automotive, and construction industries.

Synthetic rubber
Polymers with high viscoelasticity are synthesised from petroleum by-products to manufacture tyres, automotive parts, as well as medical equipment such as gloves.

Plastics
An enabler in the supply chain that provides support to many other major sectors, including electrical and electronics, food and beverage, automotive, and construction. There are three major types-commodity plastics, engineering plastics, and high-performance plastics—all of which have distinct mechanical and thermal properties that dictate their applications.

Specialty chemicals

Agrochemicals
Chemical products utilised in agriculture to improve crop yield and control populations of agricultural pests and divided into two areas of crop protection, i.e., pesticides such as herbicides, insecticides, fungicides and seeds.

Care chemicals
Chemicals are used to make various home care, personal care, and industrial cleaning products such as soaps, detergents, moisturisers, etc. Care chemicals such as surfactants and emollients use oleochemicals as feedstock, creating strong synergies with Category 1.

Nutrition chemicals
A wide range of formulated food-related chemicals, including flavour and fragrances such as aroma chemicals, food additives such as emulsifiers and sweeteners, feed additives such as parasite removers and digestion enhancers, and nutraceuticals such as probiotics and liver supplements.

Electronic chemicals
Chemicals are used in the electronic industry to manufacture semiconductor-related components. It includes chemicals used in wafer production, such as silicon and specialty gases, integrated circuit packaging with various resins, and printed circuit board manufacturing, such as ceramic substrates and epoxy-based encapsulants.

Construction chemicals
Chemical formulations are used for cement, concrete, or other construction materials to increase durability, improve performance and reduce the use of the natural resources. Key sub-segments include concrete admixtures, adhesives, and sealants. Typical precursors include carboxylic acids, polyurethane, and various epoxies.

Source: Chemical Industry Roadmap 2023

CHEMICALS AND CHEMICAL PRODUCTS SUBSECTOR MSIC CODE

Table below lists the Malaysia Standard Industrial Classification (MSIC) code for Chemicals and Chemical Products Subsector.

No.	Manufacturing Industry	MSIC Code
1.	Liquefied or compressed inorganic industrial or medical gases	20111
2.	Basic organic chemicals	20112
3.	Inorganic compounds	20113
4.	Other basic chemicals n.e.c	20119
5.	Fertilizers	20121
6.	Associated nitrogen products	20129
7.	Plastic in primary forms	20131
8.	Synthetic rubber in primary forms: synthetic rubber, factice	20132
9.	Mixtures of synthetic rubber and natural rubber or rubber - like gums	20133
10.	Pesticides and other agrochemical products	20210
11.	Paints, varnishes and similar coatings ink and mastics	20221
12.	Printing ink	20222
13.	Soap and detergents, cleaning and polishing preparations	20231
14.	Perfumes and toilet preparations	20232
15.	Photographic plates, films, sensitized paper and other sensitised unexposed materials	20291
16.	Writing and drawing ink	20292
17.	Other chemical products	20299
18.	Man-made fibres	20300