

DIGITAL PRODUCTIVITY ROADMAP

Chemicals & Chemical Products Productivity Nexus

Industry Overview and Digitalisation Challenges

The chemical industry in Malaysia is rapidly adopting digital technologies, integrating automation, AI, and data-driven solutions to boost efficiency, productivity, and sustainability. As a key contributor to manufacturing, healthcare, agriculture, and consumer goods, digitalisation enhances supply chain management, regulatory compliance, and cost efficiency. The **Chemical Industry Roadmap 2030 (CIR 2030)** drives Industry 4.0 adoption, positioning Malaysia as a regional leader in smart chemical manufacturing. However, challenges such as integration gaps, cybersecurity risks, and workforce skill shortages persist. Government incentives, industry collaboration, and workforce upskilling are essential to accelerating digital transformation, ensuring competitiveness, resilience, and long-term sustainability in the evolving global market.

INDUSTRY OVERVIEW

1. **Number of Establishment:** Projected to be around 2,660
2. **Number of Employees:** 293,000
3. **Key Subsectors:** Petrochemicals, Oleochemicals, Specialty Chemicals, Fertilizers & Industrial Gases, Pharmaceutical Chemicals, Agrochemicals, Paints, Coatings, and Inks, Consumer Chemicals
4. **GDP Contribution:** RM38.847 billion (2024)
5. **Value chain/Supply Chain:** Upstream, Midstream, Downstream, End –User Applications,
6. **Productivity Level/Growth:** RM 313,588

CHALLENGES IN DIGITALISATION

1. Limited financial capacity among SMEs hampers the adoption of automation and AI, widening the digital divide.
2. Shortage of skilled talent in AI, IoT, and data-driven manufacturing slows digital adoption.
3. Exposing companies to significant cybersecurity risks and costly regulatory compliance challenges.

Digital Adoption In Chemical Industry

This roadmap outlines the **progressive digital transformation stages** in a **manufacturing company** within the **chemical industry**, structured along the **value chain**. It categorizes digital adoption into **Basic, Intermediate, and Advanced** levels to drive **efficiency, sustainability, and competitiveness**.

Category	Functions in the Value Chain	Basic	Intermediate	Advanced
Raw Material Sourcing and Supply Chain Digitalisation	<ul style="list-style-type: none"> Sourcing raw materials (petrochemicals, oleochemicals, specialty chemicals) Sourcing main and secondary process supplier. Supplier and logistics performance and coordination. Environmental compliance & resource sustainability 	<ul style="list-style-type: none"> Manual procurement & supplier management via spreadsheets Paper-based inventory tracking and regulatory compliance Basic Enterprise Resource Planning (ERP) for procurement Manual supplier performance evaluation. Manpower development (e.g. Basic Excel, AI basic knowledge). 	<ul style="list-style-type: none"> IoT-based sensors for real-time monitoring of raw material availability & tracking. Cloud-based supplier management systems for automated procurement. Structure supplier performance evaluation Manpower development (e.g. Data Analytic, AI Knowledge) 	<ul style="list-style-type: none"> AI-powered demand forecasting for just-in-time procurement & cost efficiency. Digital twins for supply chain simulations, optimizing logistics & resource allocation. Sustainable sourcing analytics for real-time carbon footprint tracking AI tools to integrated supplier performance evaluation and improvement. Manpower development (e.g. Data Analytic, AI Knowledge)
		<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Spreadsheet for basic data tracking and analysis 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Automated procurement analytics Risk management AI Real-time tracking AI 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Demand forecasting AI Supplier risk prediction



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Manufacturing & Process Optimization	<ul style="list-style-type: none"> Chemical formulation & batch processing. Equipment maintenance & safety compliance. Energy & waste management 	<ul style="list-style-type: none"> Manual batch processing & quality control inspections. Machine performance and manufacturing process effectiveness (e.g. OEE) Paper-based reporting for equipment maintenance & safety. Traditional SCADA (Supervisory Control & Data Acquisition) for limited process control Manpower development (e.g. Basic Excel, AI basic knowledge). 	<ul style="list-style-type: none"> IoT-enabled sensors for real-time process monitoring & predictive maintenance. AI-driven quality control systems for error detection & yield optimization. Cloud-based compliance reporting & automated hazard monitoring AI-base machine performance and manufacturing process effectiveness (e.g. OEE). Manpower development (e.g. Data Analytic, AI Knowledge). 	<ul style="list-style-type: none"> Fully automated smart factories integrating AI-driven robotic process automation (RPA). Digital twins for process simulation & optimization, reducing energy & raw material waste. AI-powered sustainability tracking, ensuring compliance with carbon emissions & ESG reporting. Smart Manufacturing Solutions (e.g., Autonomous AGV) AI-base machine performance and manufacturing process effectiveness (e.g. OEE). Manpower development (e.g. Data Analytic, AI Knowledge)
		<p>Suggested Tools</p> <ul style="list-style-type: none"> Basic data visualization & process reporting 	<p>Suggested Tools</p> <ul style="list-style-type: none"> Real-time predictive maintenance Process simulation & optimization 	<p>Suggested Tools</p> <ul style="list-style-type: none"> Real-time simulation & plant optimization Advanced smart factory automation



Digital Adoption In Chemical Industry

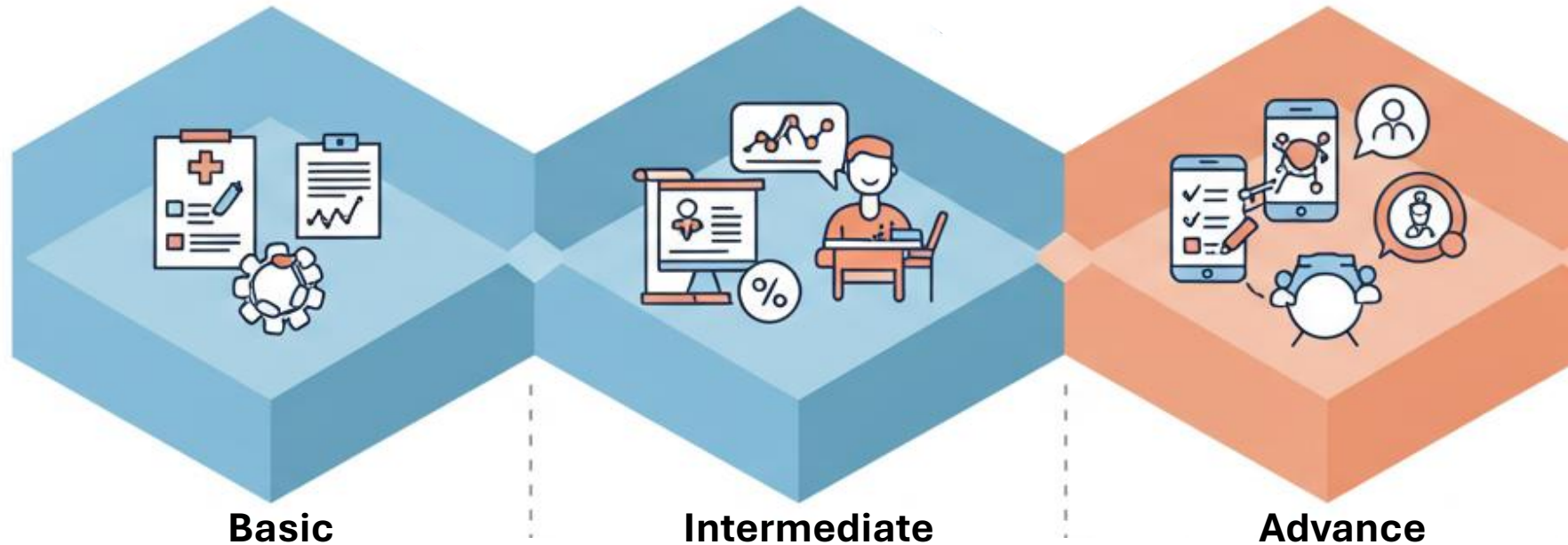
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Category	Functions in Services	Basic	Intermediate	Advanced
Distribution, Customer Engagement & Market Expansion	<ul style="list-style-type: none"> Warehousing & distribution logistics Customer engagement & digital marketing Regulatory compliance & reporting 	<ul style="list-style-type: none"> Manual warehouse management & inventory tracking. Basic CRM tools for customer service & product distribution. Paper-based regulatory documentation for hazardous chemicals & compliance Manpower development (e.g. Basic Excel, AI basic knowledge). 	<ul style="list-style-type: none"> Automated inventory tracking using RFID & IoT sensors. AI-driven customer analytics for market forecasting & product customization. Cloud-based compliance reporting integrated with global regulatory bodies Intelligence warehouse (e.g. Autonomous AGV) Manpower development (e.g. Data Analytic, AI Knowledge). 	<ul style="list-style-type: none"> Blockchain-enabled traceability systems for chemical product verification & compliance. AI-powered logistics automation, optimizing routes & reducing distribution costs within warehouse and to customers. Intelligence warehouse (e.g. Autonomous AGV) Omnichannel customer engagement platforms integrating AI chatbots & predictive analytics Manpower development (e.g. Data Analytic, AI Knowledge)
		<p>Available Tools</p> <ul style="list-style-type: none"> Basic CRM & sales automation Email marketing AI 	<p>Available Tools</p> <ul style="list-style-type: none"> Customer insights & demand forecasting Warehouse automation 	<p>Available Tools</p> <ul style="list-style-type: none"> Route optimization AI Omnichannel customer management



Digital Transformation Journey

Warehousing & distribution logistics



Manual warehouse management & inventory tracking.

Automated inventory tracking using RFID & IoT sensors.

Blockchain-enabled traceability systems for chemical product verification & compliance

Digital Transformation Use Cases: Enhancing Operational Efficiency

This page highlights real-world examples of **successful digital adoption** across industries, showcasing how automation and technology integration drive **operational improvements, cost savings, and enhanced customer satisfaction**.



CHUGOKU PAINT (M) SDN BHD

Chugoku Paints (Malaysia) focuses on the manufacturing and sales of various **paint products, including marine, industrial, wood, and container coatings**.

Problem

The company faced inefficiencies due to the **manual retrieval of job cards** required for production. Operators had to walk and wait to collect job orders daily, causing delays and inefficiencies. Additionally, supervisors had to manually prepare, print, and distribute job cards, further increasing operational inefficiencies.

Solution

Chugoku Paint implemented an **automating the job card retrieval process**. This eliminated unnecessary walking and waiting time, streamlining workflow and improving efficiency.

Impact

- **90% decreased** in job errors, minimizing production delays & reworks
- **30% faster** job order processing



Job Card

CHUGOKU PAINTS (MALAYSIA) SDN BHD

Item Code: 64700209 RFINISHED: 00000 NAME: CMP BIODIOLAN R PLUS PLUM DATE: 14/11/2024 MO Number: MA470004 RPNQ: MLTY: M225 Original F No: CHLP-0044305

LOT NO	NO.	R.M. CODE	RAW MATERIALS NO.	NO. OF TINS	PACK SIZE	BALANCE	WBOHT	ADD	
HC24Y15	1	0140	412301059	112	1.00	0.168	✓ 112.168		
17DQ4XDS	2	6010F	623301015		175.00	✓ 3.163	3.163		
18Q24Y09	3	2273	762690002		180.00	✓ 3.163	3.163		
21RQ4W07	4	6810	643001026		215.00	✓ 3.036	3.036		
80Q4X16	5	4800	594821015		80.00	✓ 42.384	42.384		
25Q24B16	6	3148	481301002		25.00	✓ 21.888	21.888		
20Q4T04	7	8023	52301002		20.00	✓ 16.560	16.560		
HC24Y15	8	0140	412301059	6	1.00	0.324	✓ 6.324		
HC24Y15	9	2171	458120002	1	18.00	✓ 2.218	18.218		
HC24Y15	10	0140	412301059	6	1.00	0.324	✓ 6.324		
17DQ4XDS	11	2132	467910002	✓ 14	17.00	✓ 16.897	244.897		
18Q24Y09	12	4121	467910002	✓ 4	18.00	✓ 16.847	78.847		
18Q24Y09	13	2170	488120002	✓ 2	18.00	✓ 0.437	36.437		
HC24Y15	14	0140	412301059	12	1.00	0.018	✓ 12.018		
HC24Y15	14	0140	412301059	6	1.00	0.324	✓ 6.324		
HC24Y15	14	0140	412301059	12	1.00	0.652	✓ 12.652		
						QC +10.200			
MIXING TANK NO.:						TOTAL	175.00	124.59	692.889
Mixing		Final							
Tank Height				Orinding Temperature					
				TIME		TEMPERATURE			
				9:30 am		53			
Filling Temperature 25C				10:30 am		45			
				11:20 am		49			
Remarks:				temperature: 25.4					
				humidity: 67.5					
Barcode Scanner Status				Tin Weight Result (Misake Not Counted)					
Start		Finished		TOTAL		EMPTY TIN		NET WBOHT	
QA	047 am	055 am		18.31	1.31	17.00			
Mixing	057 am	030 am		18.31	1.31	17.00			
Drind	030 am	1126 am		18.31	1.31	17.00			
QC	1421	1448		18.31	1.31	17.00			
Consumed Item				18.31		1.31		17.00	
LOT NO	SOURCE CODE	PRODUCT NAME	PUMP / DRUM	PURPOSE	WBOHT				

The Digital Lean Programme at Chugoku Paint **saved RM 244,440 annually** by reducing labor costs, improving administrative efficiency, minimizing errors, and cutting printing expenses, enhancing productivity and streamlining operations through automation.