

AI PRODUCTIVITY ROADMAP

NAVIGATING PRODUCTIVITY OF THE INDUSTRY
IN THE DIGITAL AND AI ERA

AUTOMOTIVE INDUSTRY



AI PRODUCTIVITY ROADMAP : NAVIGATING PRODUCTIVITY OF THE INDUSTRY IN THE DIGITAL AND AI ERA FOR AUTOMOTIVE INDUSTRY

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Foreword



“To boost national productivity, we must harness the power of AI and digital technologies—every sector, every individual has a role to play by equipping themselves with the right knowledge, skills, and competencies to stay ahead.”

Datuk Zahid Ismail Director General, Malaysia Productivity Corporation

“Integrating digitalisation into existing manufacturing systems enables the adoption of various AI applications that enhance work efficiency, productivity, and sustainability within an organisation. Digital transformation is a technological evolution, not an option.”



Dato' Ir. Abdul Rashid Musa Champion, Automotive Productivity Nexus



“Adopting digital technologies and AI in the automotive sector is not just an option—it's a necessity. By driving innovation across our supply chains, we can elevate productivity, strengthen Malaysia's industry leadership, and meet the challenges of the global marketplace.”

Encik Bakri Haji Alias Co-Champion, Automotive Productivity Nexus

Digitalisation: Industry Snapshot & Key Challenges

The Malaysian automotive industry is a significant economic sector, encompassing a wide value chain that includes Original Equipment Manufacturers (OEMs), Tier 1 and Tier 2 suppliers, parts manufacturers, aftermarket services, logistics providers, and digital solution integrators. This interconnected ecosystem supports both local and global automotive production and distribution.

Industry Overview (Automotive)

Number of Establishment: **Number of Employees:**

Over 38 OEMs/assemblers and more than 700 vendors and **60,000** aftermarket businesses

700,000

Key Sub sectors:

Upstream

Downstream

Vehicle manufacturing

(passenger cars, commercial vehicles)

Component manufacturing

(engines, transmissions, electronics)

Aftersales services and end of life

Automotive Contribution to GDP:

RM40 billion (4-5%)

Productivity Level/Growth:

RM 273,665 (2024)

Challenges In Digitalisation

High Costs

Industry 4.0 adoption remains costly, limiting SMEs' digital transformation.

Legacy Systems

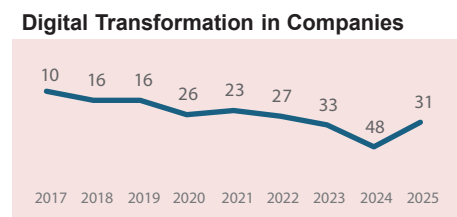
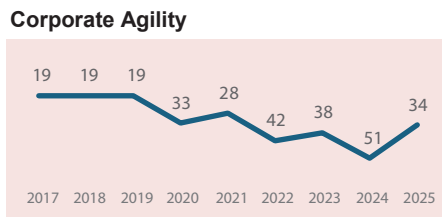
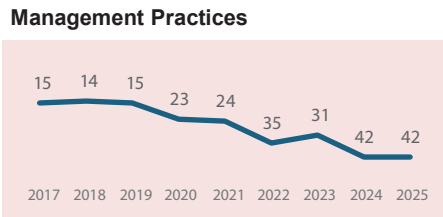
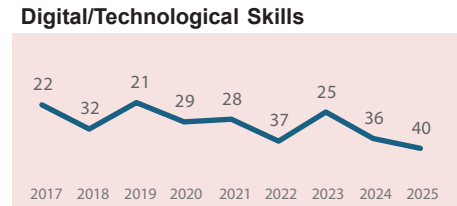
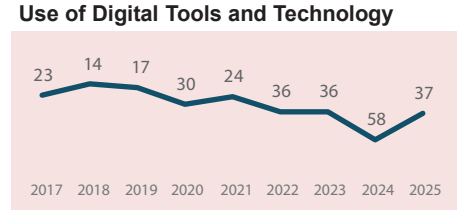
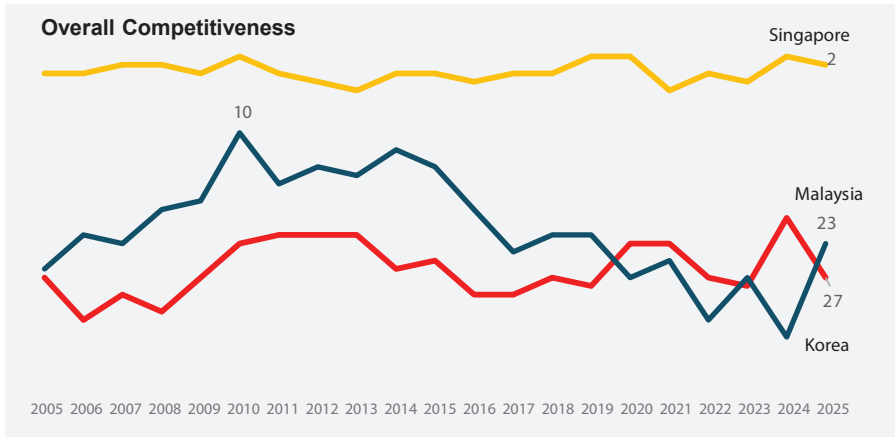
Outdated infrastructure hinders seamless tech integration.

Local Skilled Talent Shortage

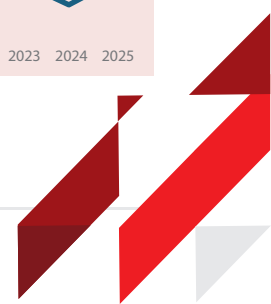
Limited expertise in advanced digital technologies slows implementation.

Accelerating Technology Adoption to Enhance National Competitiveness

Malaysia must urgently accelerate technology adoption to achieve its aspiration of becoming one of the top 12 most competitive nations by 2033.



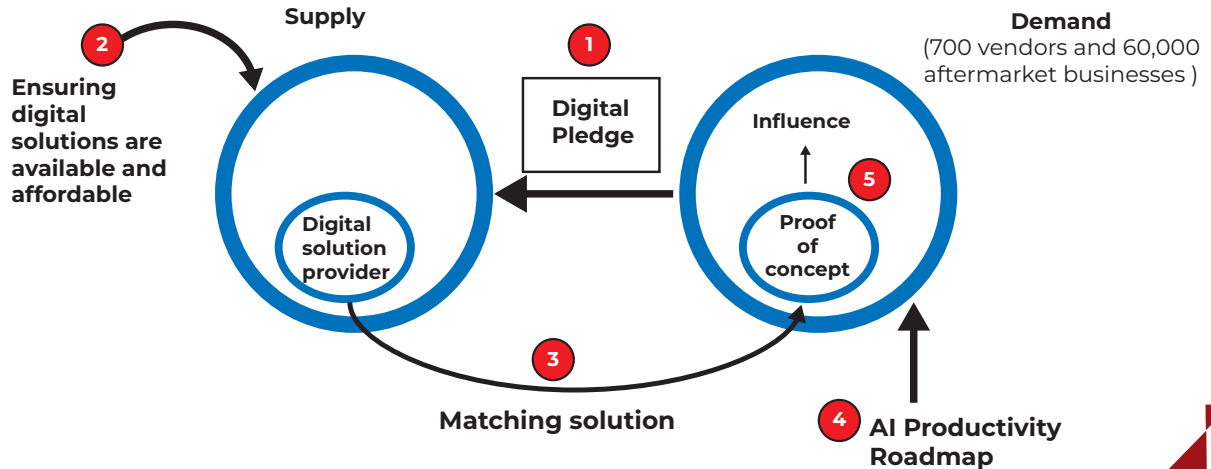
Source: World Competitiveness Yearbook



Accelerating Productivity through Digitalisation via MPC's Digital Platform Network+

Business leaders can enhance productivity and strengthen the ecosystem by leveraging MPC's Digital Platform Network+ (DPN+), which provides access to affordable digital solutions and promotes skills enhancement to drive digital transformation.

Steps 1	Steps 2	Steps 3	Steps 4	Steps 5
Digital Pledge (Business Leader/-CEO): Commit to digital transformation and prioritize it in the business strategy.	Supply (Digital Solution Providers): Ensure digital solutions are available, affordable, and scalable for businesses.	Matching Solution (MPC/Business Leader): Identify and match the right digital solutions to business needs.	AI Productivity Roadmap (Business Leader/CEO): Create a clear, actionable plan for integrating digital technologies.	Influence (Business Leader/CEO): Use proof of concept to drive adoption and build internal capacity for digital transformation.



Sectoral Transformation: 14 Industry-Specific Roadmaps

Each roadmap outlines the industry overview, digitalisation challenges, and adoption strategies across basic, intermediate, and advanced levels.

Level	Definition
Basic	Foundational tools to digitalise basic processes like record-keeping and sales
Intermediate	Integration of data-driven tools to optimise operations and improve traceability
Advanced	Automation and predictive systems leveraging AI and real-time analytics

It also includes recommended digital tools, real-world use cases, and proof-of-concept (POC) projects implemented by actual companies through Nexus collaborations.





UPSTREAM

AI and Digital Adoption in Automotive Industry

This table outlines the progressive stages of digital adoption across various functions in automotive, categorising them into **Basic, Intermediate, and Advanced** levels to illustrate the industry's transformation journey toward enhanced efficiency, automation, and AI-driven insights.

Category	Functions in Services	Basic	Intermediate	Advanced
Design & Development (D&D)	<ul style="list-style-type: none"> • Voice of Customer • Product • Conceptualisation • Process Optimisation / Improvement • Digital Styling • Knowledge Transfer • Management • Standards Management • Partner Management • Knowledge Management • Talent Management 	<p>Digital systems to support:</p> <ul style="list-style-type: none"> • Build to Print • Market research to identify customer needs • Scheduling • CAD/CAE/CAM • Prototyping • Shopfloor Layout 	<p>Integrated systems that support:</p> <ul style="list-style-type: none"> • CAD/CAM/CAE/ Simulation • Processes • Testing and Validation • Manufacturing Feasibility Analysis • Prototype Development and Testing • Supply Chain & Cost Analysis • Product Life-Cycle 	<p>Optimisation / Predictive enabler for:</p> <ul style="list-style-type: none"> • Alternative Energy Solutions • Lightweight Material Inclusion • Autotronics Development • Sustainable and Eco-Friendly • Customisation
		<p>Suggested Tools</p> <ul style="list-style-type: none"> • Basic CAD systems • Computer-based Production planning • Digitised Manual Production Logs • Prototype Manufacturing Capabilities 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • 3D modelling, simulation • Real/virtual testing • Mass-production Validation • Improve Product Performance • Material and Components Sourcing Matching Pricing • IoT Integration, and Embedded Systems Platforms • IoT-enabled Sensors and Devices for Real-time Production Monitoring 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • AI & Autonomous Driving Simulation • EV & Battery Optimisation • Composite Material Simulation Software • Human-machine Interface (HMI) Design Software • Digital Twins for Production Simulation • Real-time Predictive Scheduling Used in Malaysia's High-Tech Automotive Assembly Plants

AI and Digital Adoption in Automotive Industry

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Category	Functions in Services	Basic	Intermediate	Advanced
Supply Chain Management and Production Planning	<ul style="list-style-type: none"> • Input from D&D • Procurement and Vendor Management • Production Planning • Inventory Management and Control • Customer Demand • Partner Management • Knowledge Management • Talent Management 	Digital systems to support: <ul style="list-style-type: none"> • Production Scheduling • Raw Material and Finished Product Logistics & Warehousing • Cost Monitoring & Procurement 	Integrated systems that support: <ul style="list-style-type: none"> • Supply Chain Optimisation • Demand Forecasting • Supplier Risk Management • Production Line Efficiency Improvement • Transportation & Distribution Planning • Automated & Smart Warehousing • EDI 	Optimisation / Predictive enabler for: <ul style="list-style-type: none"> • Sustainable Supply Chain Management • Digital Twin Technology
		Suggested Tools <ul style="list-style-type: none"> • Manual Supplier Coordination • Digitising Manual Inventory Records • Manual Inventory & Warehouse Management • Supplier & Procurement Management Tools • Production Scheduling Software Quality Control & Inspection Software • Logistics & Transportation Management Systems (TMS) • Cost Analysis & Financial Tools 	Suggested Tools <ul style="list-style-type: none"> • Cloud-based Inventory Tracking • Digital Procurement System • Automated Stock Alerts that Improve JIT Processes • Supply Chain Data Insights & Analytics • RFID/IoT-powered Real-time Tracking 	Suggested Tools <ul style="list-style-type: none"> • AI-based Inventory Optimisation • Automated Warehouse • Blockchain-enabled Supply Chain Management • Digital Twin Technology for Supply Chain Simulation

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Production Line Manufacturing and Assembly	<ul style="list-style-type: none"> • 4M • Assembly Line Processes • Machinery Operations • Process Optimisation • MES/OEE • Production Target Management • Partner Management • Knowledge Management • Talent Management 	<p>Digital systems to support:</p> <ul style="list-style-type: none"> • Manual Assembly Line • Human-controlled Machinery • Limited Automation 	<p>Integrated systems that support:</p> <ul style="list-style-type: none"> • Robotics • PLC (Programmable Logic Controller) • Automated Material Handling • Overall Equipment Efficiency (OEE) • Joint Venture/Tech Agreement Management • IoT-enabled Machine Monitoring 	<p>Optimisation / Predictive enabler for:</p> <ul style="list-style-type: none"> • Smart Factory Concept • AI-powered Robotics • Machine Learning for Process Optimisation
		<p>Suggested Tools</p> <ul style="list-style-type: none"> • Spreadsheet to Carry out Basic Tracking of Production Processes • Applications that Support Digitising Production Logs & Workflows • Basic Conveyor Belt Systems (Low-cost Automation used by SMEs) 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • Robotics – Applied in Robotic Arms for Assembly Lines, Improving Precision and Efficiency in Automotive Production. • PLC (Programmable Logic Controller) • Automated Material Handling Systems • Real-time Production Data Insights Analytics • IoT-enabled Machine Monitoring 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • Smart Factory Concept (Industry 4.0) • AI-powered robotics like those commonly used in Automated Welding, Painting, and Assembly Processes • Machine Learning for Process Optimisation

AI and Digital Adoption in Automotive Industry

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Category	Functions in Services	Basic	Intermediate	Advanced
Quality Control and Inspection	<ul style="list-style-type: none"> Prevention and Detection Quality Audits Compliance Reporting Knowledge Management Talent Management 	Digital systems to support: <ul style="list-style-type: none"> Manual Quality Inspection Paper-based Reporting 	Integrated systems that support: <ul style="list-style-type: none"> Integrated Defect Reduction Automated Quality Checks with IoT Sensors Digital Traceability System Smart Defect Tracking 	Optimisation / Predictive enabler for: <ul style="list-style-type: none"> AI-driven Image Processing for Defect Detection Predictive Quality Analytics Blockchain-enabled Compliance Tracking
		Suggested Tools <ul style="list-style-type: none"> SPC Application for Digitising Manual Inspection Workflows Barcode Scanners for Defective Parts Tracking Software for Basic Statistical Process Control and Quality Analysis 	Suggested Tools <ul style="list-style-type: none"> ERP-integrated Quality Management Systems IoT-enabled Sensors for Real-time Quality Monitoring Data-driven Quality Analytics Automated Defect Detection with Machine Vision often Implemented in Assembly Plants 	Suggested Tools <ul style="list-style-type: none"> AI-powered Defect Detection Predictive Quality Analytics for Proactive Defect Prevention Compliance Tracking for Traceability Augmented Reality (AR)-based Defect Resolution

AI and Digital Adoption in Automotive Industry

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Category	Functions in Services	Basic	Intermediate	Advanced
Predictive Maintenance and Asset Management	<ul style="list-style-type: none"> • Indirect Material Management • Machinery Maintenance • Spare Parts Management • Mold, Tools and Dies • Jigs and Fixtures • Knowledge Management • Talent Management 	Digital systems to support: <ul style="list-style-type: none"> • Preventive Maintenance Schedule by Supplier • Reactive Maintenance (fix when broken) • Manual Equipment Logs 	Integrated systems that support: <ul style="list-style-type: none"> • Preventive Maintenance Schedules • Automated Spare Parts Procurement • IoT-enabled Condition Monitoring 	Optimisation / Predictive enabler for: <ul style="list-style-type: none"> • AI-driven Predictive Maintenance • Digital Twins for Asset Lifecycle Management
		Suggested Tools <ul style="list-style-type: none"> • Digitised Maintenance Logs • Basic Preventive Maintenance Schedules on Spreadsheet • Tools and Sensors i.e. Camera, Laser 	Suggested Tools <ul style="list-style-type: none"> • Preventive Maintenance Schedules like those used by Malaysia's mid-sized Suppliers • Real-time Monitoring of Maintenance Trends • Automated Spare Parts Procurement used for Just-in-Time (JIT) Maintenance • IoT-enabled Condition Monitoring 	Suggested Tools <ul style="list-style-type: none"> • AI-driven Predictive Maintenance • Digital Twins / Augmented Reality for Asset Lifecycle Management

AI and Digital Adoption in Automotive Industry

This table outlines the progressive stages of digital adoption across various functions in automotive, categorising them into **Basic, Intermediate, and Advanced** levels to illustrate the industry's transformation journey toward enhanced efficiency, automation, and AI-driven insights.

Category	Functions in Services	Basic	Intermediate	Advanced
R&D into New Frontiers (New emerging Technologies)	<ul style="list-style-type: none"> • Predictive capability into Technology Trends • Firm Absorptive and Explorative Capability • Focus on Customer, Trends • IP Generation • Knowledge Management • Talent Management 	<p>Digital systems to support:</p> <ul style="list-style-type: none"> • Trend Analysis • Data collection & Market intelligence • Ideation and Concept Development • Basic Prototyping and Experimentation 	<p>Integrated systems that support:</p> <ul style="list-style-type: none"> • Technology Scanning and Horizon Scanning • Scenario Planning & Road Mapping • Simulation and Feasibility Studies • Industry Collaboration and Open Innovation Management • IP Management and Patent Analytics 	<p>Optimisation / Predictive enabler for:</p> <ul style="list-style-type: none"> • Computational Modelling and AI Integration • Technology Valuation and Business Strategy Development • Experimental Design • Advanced Prototyping • Strategic Investment & Venture Creation
		<p>Suggested Tools</p> <ul style="list-style-type: none"> • Spreadsheet-based tracking • Publication Semantic Analytics • Emerging Tech and Competitor Analytics 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • Systematic Analytical Tools for Identifying and Assessing Upcoming Tech Advancements • Predictive Modelling Capability • Future-oriented Models • Partnership Management Systems 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • AI-tools for Predictive Analytics and Relevant Automation • Commercial Viability Analytics • Scale Up and Refinement Tools for Prototypes • Investment Frameworks for Disruptive Technologies • Large-scale Policies Analytics and Conversion to Firm-level Strategy

AI and Digital Adoption in Automotive Industry

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Category	Functions in Services	Basic	Intermediate	Advanced
Safety, Health and Environment	<ul style="list-style-type: none"> • Safety Monitoring • PPE Enforcement • Hazard Identification • Safety Procedure Development • Risk Assessment • Knowledge Management • Talent Management • Compliance to Standards • ESG 	<p>Digital systems to support:</p> <ul style="list-style-type: none"> • Workplace Safety Protocol Implementation • Occupational Health & Safety Training • Customer Product Safety Compliance • Incident Reporting & Risk Assessment • Regulatory Awareness & Initial Compliance Checks • Facility & Equipment Safety Inspections 	<p>Integrated systems that support:</p> <ul style="list-style-type: none"> • Safety Monitoring & Hazard Prevention Compliance • Auditing & Certification Management • Supplier & Partner Safety Compliance Monitoring • Product Recall & Defect Analysis • Sustainability & Environmental Safety Initiatives • Workforce Safety Culture Development 	<p>Optimisation / Predictive enabler for:</p> <ul style="list-style-type: none"> • AI & IoT-Driven Workplace Safety Monitoring • Automated Regulatory Compliance Management Systems • Global Compliance Alignment & Cross-border Safety Standards • Predictive Analytics for Workplace Risk Mitigation • Blockchain-based Supplier Safety Verification • Eco-Friendly & Sustainable Compliance Programmes
		<p>Suggested Tools</p> <ul style="list-style-type: none"> • Track Workplace Safety Guidelines & Incident • Platforms Documenting Workplace Accidents • Tools to Monitor Adherence to OSHA, ISO • Applications that help Conduct Routine Safety Checks for Facilities • Systems that Monitor and Distribute PPE Supplies 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • Systems for Real-time Tracking of Workplace Hazards • Platforms that Streamline Regulatory Adherence and Audits • Solutions ensuring Vendors meet Required Safety Standards • Platforms to Track Faulty Automotive Parts and Initiate Recalls • Software to Manage Emissions Reduction and Sustainability • Digital Learning Platforms for Continuous Workforce Education • IoT-enabled Wearables for Safety Tracking 	<p>Suggested Tools</p> <ul style="list-style-type: none"> • AI-powered Hazard Detection • Augmented Reality (AR) for Safety considered in OEM Training Centers • Transparent Digital Ledgers for Supplier Compliance Tracking • Digital Systems for Real-time Legal Tracking and Reporting • Big Data Platforms to Anticipate Compliance Risks & Optimise Processes • AI-driven Models for Ethical Labour Standards and Sustainability Tracking



DOWNSTREAM

AI and Digital Adoption in Automotive Industry

This table outlines the progressive stages of digital adoption across various functions in automotive, categorising them into **Basic, Intermediate, and Advanced** levels to illustrate the industry's transformation journey toward enhanced efficiency, automation, and AI-driven insights.

Category	Functions in Services	Basic	Intermediate	Advanced
Aftersales Support and Service	<ul style="list-style-type: none"> Parts Traceability CRM Warranty Knowledge Management Talent Management 	Digital systems to support: <ul style="list-style-type: none"> Customer Feedback Preventive Maintenance Schedule by Supplier Reactive Maintenance (fix when broken) Manual Product / Equipment Logs Supplier Communication and Returns 	Integrated systems that support: <ul style="list-style-type: none"> Predictive Parts Demand Forecasting Automated Service & Order Tracking Systems. Customer Feedback & Satisfaction Analysis Product Reconditioning & Quality Enhancement Supply Chain Optimisation for Aftermarket Parts IoT-enabled Condition Monitoring 	Optimisation / Predictive enabler for: <ul style="list-style-type: none"> AI-driven Predictive Maintenance Blockchain-based Warranty & Service Tracking Sustainable & Eco-friendly Parts Management Subscription-based Maintenance Plans Global Distribution & Advanced Logistics Management
		Suggested Tools <ul style="list-style-type: none"> Digitising Maintenance Logs Basic Preventive Maintenance Schedules on Spreadsheets 	Suggested Tools <ul style="list-style-type: none"> Tools using historical data to predict future needs AI-driven platforms to answer routine queries Software that offers live shipment tracking Sentiment analysis and review collection platforms Platforms that streamline part sourcing and procurement Digital training modules for dealers and mechanics IoT-enabled Condition Monitoring or HUMS 	Suggested Tools <ul style="list-style-type: none"> AI-driven Predictive Maintenance Secure Digital Records for Warranty Claims and Parts Performance History Green Manufacturing and Recycling Programme Tailored Maintenance Services / Replacement Parts International Supply Chain Management with AI-driven Logistics

AI-Powered Digital Transformation Journey

Supply Chain Management and Production Planning

01



BASIC

Basic Digital Enabler

Digital systems that support supplier coordination, inventory records, and manual inventory & warehouse management using paper-based forms, manual data entry, and isolated spreadsheets. Data accessible via computer, and (fairly) accurate.

02

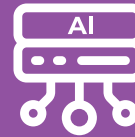


INTERMEDIATE

Integrated, Real-Time Supply Chain Management

Integrated systems that support cloud-based inventory, digital procurement, and automated stock alerts is common among mid-sized manufacturers, helping improve JIT processes and supply chain in sights. Real-time dashboard : cobots, RFID, IoT.

03



ADVANCED

AI-enabled Business Intervention

Advanced manufacturers use AI for **optimisation, interventions and predictions**. This covers inventory optimisation, robotics for warehouse automation, while exploring blockchain and digital twin technologies for smarter supply chain management.

How to Get Started?

Start by scanning the QR code and signing the pledge DIGITAL PLEDGE



Pledge GO B.I.G WITH DIGITAL

BREAKTHROUGH. INTEGRITY. GOOD

I commit to Go B.I.G with Digital—to lead with integrity, embrace technology, and boost productivity. Digital is for everyone, and it starts with me.

Saya komited untuk Go B.I.G with Digital—memimpin dengan integriti, menerima teknologi, dan meningkatkan produktiviti. Digital untuk semua, dan ia bermula dengan saya.

Go B.I.G with Digital



Business Leader
(Organisation Leader)

Dato' Wei Chuan Beng
Champion
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NOTES



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