

DIGITAL PRODUCTIVITY ROADMAP

Pharmaceutical Productivity Nexus

OUTLINE

1. Foreword
2. Industry Overview and Digitalisation Challenges
3. Boosting Enterprise Productivity through Digital Roadmap
4. Building a Strong Digitalization Ecosystem for Enterprise Transformation
5. Digital Adoption In Pharmaceutical Service Industry
6. Digital Solutions for Enterprise Transformation
7. Digital Transformation Use Cases: Enhancing Operational Efficiency
8. Where and How to Start?

FOREWORD KP



Zahid Ismail
Director General
Malaysia Productivity Corporation

The Digital Productivity Roadmap for the Pharmaceutical Industry is a strategic initiative to accelerate digital adoption, enhance efficiency, and drive innovation across the sector. With the rapid evolution of global pharmaceutical markets, digital transformation is no longer an option but a necessity.

This roadmap provides a structured framework for pharmaceutical companies to leverage digital technologies—such as artificial intelligence, big data analytics, automation, and blockchain—to improve drug manufacturing, regulatory compliance, and supply chain management. Malaysia’s pharmaceutical sector plays a vital role in national healthcare security, providing essential medicines and biopharmaceuticals for domestic and international markets.

However, to remain competitive, the industry must embrace digital productivity to enhance R&D, streamline production processes, and optimize regulatory approval timelines. Digital solutions such as electronic batch records, AI-powered drug discovery, and blockchain-enabled supply chain tracking will be key enablers to ensure greater efficiency, compliance, and quality in pharmaceutical operations.

MPC is committed to supporting the pharmaceutical industry in this digital transformation journey. Through collaboration with stakeholders, policy advocacy, and capability-building programs, we will drive the adoption of digital best practices to enhance productivity and global competitiveness. I encourage all industry players to embrace this roadmap and work together towards a digitally-enabled, competitive, and resilient pharmaceutical sector.

FOREWORD CHAMPION



Mr Ch'ng Kien Peng
Champion
Pharmaceutical Productivity Nexus

Digital Productivity Roadmap for the Pharmaceutical Industry represents a crucial step in harnessing technology to enhance manufacturing efficiency, regulatory compliance, and overall industry resilience.

As global pharmaceutical markets undergo rapid digitalization, Malaysian manufacturers must adopt cutting-edge solutions to remain competitive. This roadmap provides a structured approach to integrating Industry 4.0 technologies, AI-driven drug research, and digitalized regulatory processes to streamline operations, reduce production costs, and enhance product quality.

With increasing demand for high-quality pharmaceuticals, biopharmaceuticals, and active pharmaceutical ingredients (APIs), digital adoption is essential to scale up production capabilities and meet international standards. By leveraging digital twins, smart manufacturing, and automated quality control, Malaysian pharmaceutical companies can improve R&D efficiency, optimize drug development cycles, and strengthen compliance with Good Manufacturing Practices (GMP).

Collaboration between industry players, regulatory bodies, and technology providers is crucial to realizing the full potential of digital transformation. This roadmap serves as a call to action for pharmaceutical leaders to invest in digital capabilities and foster a culture of continuous innovation. By embracing digital transformation, we can build a highly efficient, compliant, and globally competitive pharmaceutical industry that contributes to Malaysia's economic growth and healthcare resilience.

Industry Overview and Digitalisation Challenges

The pharmaceutical industry, supported by numerous of establishments and a skilled workforce, contributes to GDP through the production of medicines, biotechnology, and medical logistics. Its value chain spans from raw material sourcing and R&D to manufacturing, quality control, and distribution. While digital tools like AI and IoT enhance compliance and efficiency, challenges persist limited adoption among SMEs, fragmented digital systems, regulatory complexities, and cybersecurity concerns, all of which risk disrupting medicine supply and productivity.

INDUSTRY OVERVIEW

1. Number of Establishments: 51 (2024)
2. Number of Employees: 15,572 (2023)
3. Key Sub-Sectors: Biopharmaceutical Products, Generic Products, Health Supplement Products, Traditional Products, Cosmetic
4. GDP Contribution: RM38 billion
5. Value Chain / Supply Chain:
 - a. Raw Material Sourcing
 - b. R&D and Drug Development
 - c. Manufacturing & Formulation
 - d. Quality Control & Regulatory Compliance
 - e. Packaging & Distribution
 - f. Hospitals & Pharmacies
6. Productivity Level/Growth: 14.3% (RM 124,675) 2024

CHALLENGES IN DIGITALISATION

- Assess gaps in digital infrastructure, regulatory technology, and AI-driven R&D.
- Fragmented digital systems among R&D, production, regulatory, and distribution units slow down data integration and decision-making.
- Shortage of skilled workers in pharmaceutical data analytics, digital supply chain management, and AI-driven research.

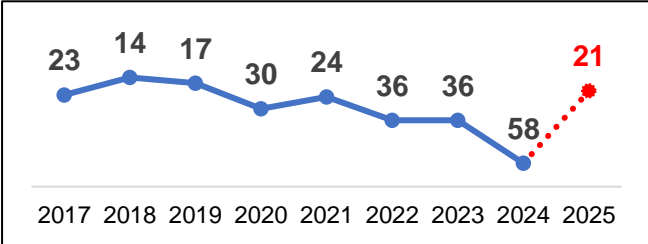
Boosting Enterprise Productivity Through Digital Roadmap

Malaysia's digital adoption has seen a worrying decline, as shown in the **Use of Digital Tools and Technologies, Digital Transformation in Companies, and Digital/Technology Skills** rankings. The **sharp drop in 2024** suggests businesses are struggling to adopt digital tools, scale transformation efforts, and build necessary skills. This downward trend highlights a growing gap in digital readiness, limiting enterprise competitiveness in an increasingly digital economy.

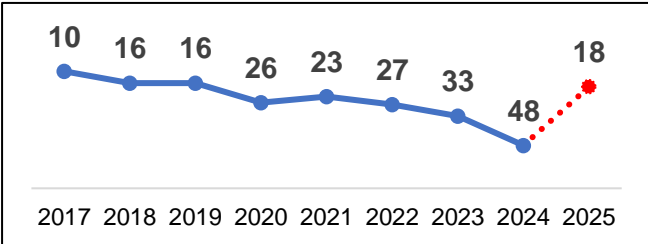
Key challenges include **high costs, lack of expertise, and inconsistent digital skills development**, which hinder businesses from fully embracing digitalisation. Without intervention, Malaysia risks falling behind global competitors. A structured approach is needed to support industries in adopting technology and strengthening their digital capabilities.

To tackle this, **MPC is launching the 'Boosting Productivity of Enterprises via Digital Roadmap' initiative**. This roadmap will provide guidance, industry-driven insights, and structured support to help businesses integrate digital solutions. By addressing gaps in **tools, transformation strategies, and workforce skills**, MPC aims to **revive digital adoption, enhance productivity, and drive Malaysia's enterprises toward global competitiveness**.

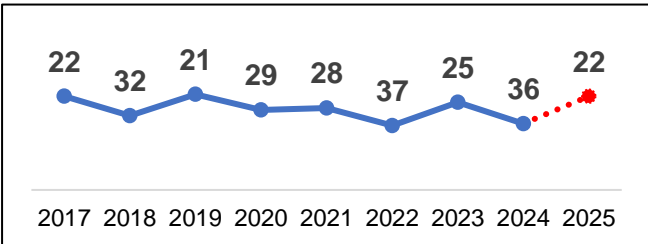
i) Use of Digital Tools and Technology



ii) Digital Transformation in Companies



iii) Digital/Technological Skills



Building a Strong Digitalization Ecosystem for Enterprise Transformation.

The figure illustrates a structured approach to strengthening the digitalisation ecosystem by aligning technology supply with industry demand.

Step 1 - The process begins with identifying the requirement profile of enterprises which is part of the 1.1million of overall number establishment in Malaysia, ensuring a clear understanding of industry needs

Step 2 - To address these needs, the availability and affordability of solution providers are assessed and strengthened through key enablers such as MDEC and KD

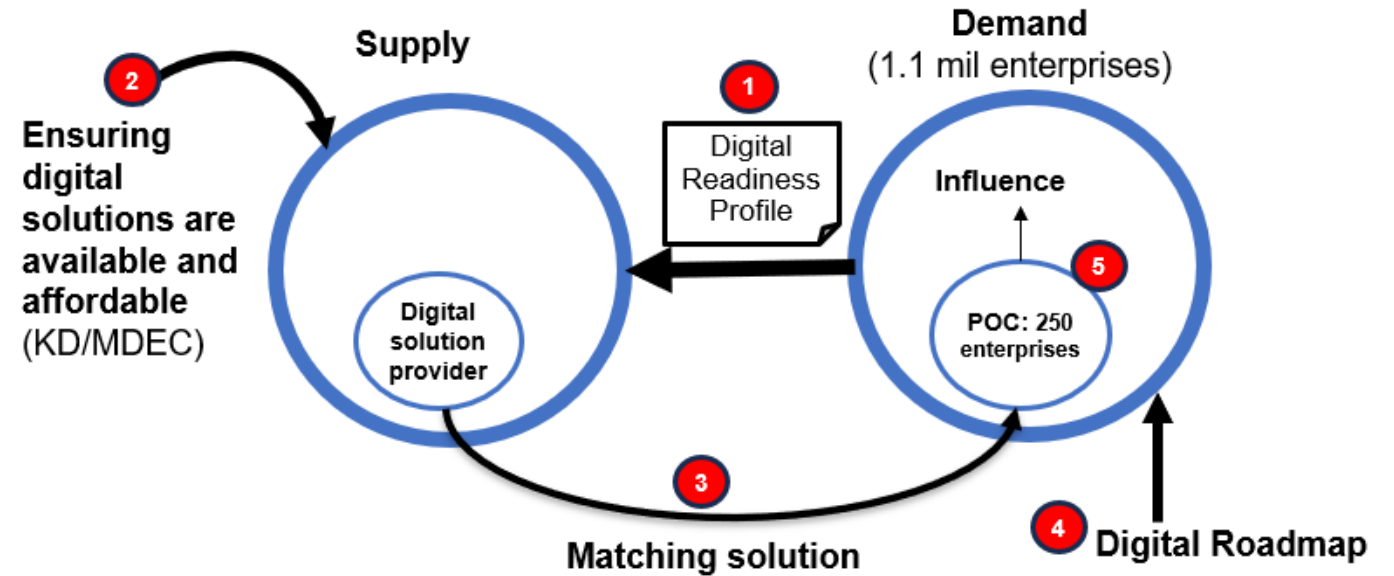
Step 3 - Digital solution providers then provide matching digital solutions tailored to industry demands, facilitating effective adoption.

Step 4 - To drive large-scale implementation, a Digitalization Roadmap is published to provide strategic guidance and best practices

Step 5 - A proof of concept (POC) involving 250 enterprises is conducted to demonstrate impact and influence broader industry adoption

This initiative fostering a robust ecosystem that accelerates digital transformation across enterprises.

Action: Improving the ecosystem to encourage adoption, transformation, and skill enhancement for technology utilization.



Digital Adoption In **Pharmaceutical** Industry

This table outlines the progressive stages of digital adoption across various functions in pharmaceutical industry, categorizing 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
Supply Chain & Inventory	<ul style="list-style-type: none"> Inventory Management Procurement & Supplier Management 	<ul style="list-style-type: none"> Manual stock tracking (Excel, paper-based) Traditional procurement (phone, email) Local supplier engagement without integration 	<ul style="list-style-type: none"> RFID/barcode tracking for real-time inventory visibility Supplier management platforms for digital procurement and automated workflows 	<ul style="list-style-type: none"> AI-powered demand forecasting to optimize inventory and reduce waste IoT-enabled smart warehousing for real-time monitoring Blockchain-based smart contracts for transparent, secure procurement
		<p><u>Suggested Tools</u> Excel, Google Sheets, email WhatsApp basic procurement systems</p>	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Barcode/RFID-based Tracking Inventory Management Software (Unleashed, TradeGecko) Supplier Management Platforms (SAP Ariba, Coupa) e-Perolehan modules 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> AI-driven Demand Forecasting IoT-enabled Smart Warehousing AI-driven Procurement Analytics, Blockchain-based Smart Contracts

For more info on the digitalisation tools, go here <https://www.mpc.gov.my/digitalplatformnetwork>

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Manufacturing & Formulation	<ul style="list-style-type: none"> • Batch Production • Equipment Monitoring • Process Optimization • Formulation Control 	<ul style="list-style-type: none"> • Manual batch records • Paper SOPs • Whiteboard scheduling 	<ul style="list-style-type: none"> • Supplier databases & ERP • Barcode/RFID tracking • Digital compliance checklists 	<ul style="list-style-type: none"> • AI-driven supplier risk scoring & predictive analytics • IoT-integrated smart warehousing systems • Blockchain-based traceability and authentication
		<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> - Microsoft Excel / Google Sheets - Manual filing systems - Email communication logs 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> - SAP ERP - Microsoft Dynamics 365 - Barcode/RFID Tracking Systems (e.g., Zebra Technologies, Honeywell) - Digital Compliance Checklists (e.g., MasterControl, Veeva Vault QMS) - Supply Chain Management Solutions (e.g., Oracle SCM Cloud, SAP Ariba) 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> - IBM Watson for Drug Discovery - IoT-Integrated Smart Warehousing Systems (e.g., Cognizant, Honeywell, Cisco) - Blockchain-Based Traceability & Authentication (e.g., VeChain, IBM Food Trust Blockchain) - AI-Driven Supplier Risk Scoring & Predictive Analytics (e.g., Predictrics, Pega Systems) - Advanced Manufacturing Execution Systems (e.g., Siemens Opcenter, Rockwell Automation)

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Customer & Sales Management	<ul style="list-style-type: none"> Customer Relationship Management (CRM) Digital Marketing & Sales 	<ul style="list-style-type: none"> Customer data stored manually in spreadsheets or paper records Sales and marketing rely on cold calls, emails, and basic social media presence. 	<ul style="list-style-type: none"> CRM systems for automated customer tracking and engagement E-commerce platforms and digital advertising to expand sales channels 	<ul style="list-style-type: none"> AI-powered CRM with chatbots for automated customer interactions Predictive analytics for sales forecasting and personalized marketing
		<p><u>Suggested Tools</u></p> <p>Spreadsheets, Email-based Tracking</p> <p>Basic Website, Social Media Presence</p>	<p><u>Suggested Tools</u></p> <p>CRM Software (Salesforce, HubSpot)</p> <p>E-commerce Platform (Shopify, WooCommerce), Digital Advertising (Google Ads)</p>	<p><u>Suggested Tools</u></p> <p>AI-powered CRM, Chatbots for Customer Support</p> <p>AI-driven Personalization, Marketing Automation, Predictive Analytics</p>

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Category	Functions in Services	Basic	Intermediate	Advanced
Human Resource & Training	<ul style="list-style-type: none"> Workforce Management Skills Development & Training 	<ul style="list-style-type: none"> Manual attendance tracking and payroll processing with paper-based records Employee training through printed manuals and in-person sessions 	<ul style="list-style-type: none"> HRMS (Human Resource Management Systems) for digital record-keeping and payroll automation E-learning platforms for online training and skill development 	<ul style="list-style-type: none"> AI-driven workforce optimization for productivity tracking and automated scheduling AR/VR-based training simulations for immersive and hands-on learning
		<p><u>Suggested Tools</u></p> <p>Manual Attendance Tracking, Paper-based Records</p> <p>Manual Training Materials (PDFs, Printed Manuals)</p>	<p><u>Suggested Tools</u></p> <p>HRMS (Human Resource Management System) (HRIS)</p> <p>E-learning Platforms (Coursera for Business)</p>	<p><u>Suggested Tools</u></p> <p>AI-driven Workforce Optimization, AR/VR Training Solutions</p> <p>AI-powered Adaptive Learning, VR-based Training Simulations</p>

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Finance & Compliance	<ul style="list-style-type: none"> Accounting & Financial Management Compliance & Reporting 	<ul style="list-style-type: none"> Manual bookkeeping and financial reporting using spreadsheets Compliance tracking via physical records and manual filing 	<ul style="list-style-type: none"> Cloud accounting software for automated financial management Digital compliance management tools to streamline regulatory reporting 	<ul style="list-style-type: none"> AI-driven financial forecasting and fraud detection for better decision-making Blockchain for secure transactions and automated compliance monitoring
		<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Manual Bookkeeping (Excel, Paper-based) Manual Report Filing (Excel, Paper-based) 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> Cloud Accounting Software (Xero, QuickBooks) Digital Compliance Management (ISO Software, Regulatory Tools) 	<p><u>Suggested Tools</u></p> <ul style="list-style-type: none"> AI-driven Financial Forecasting, Blockchain for Secure Transactions AI-driven Compliance Monitoring, Blockchain-based Audit Trails

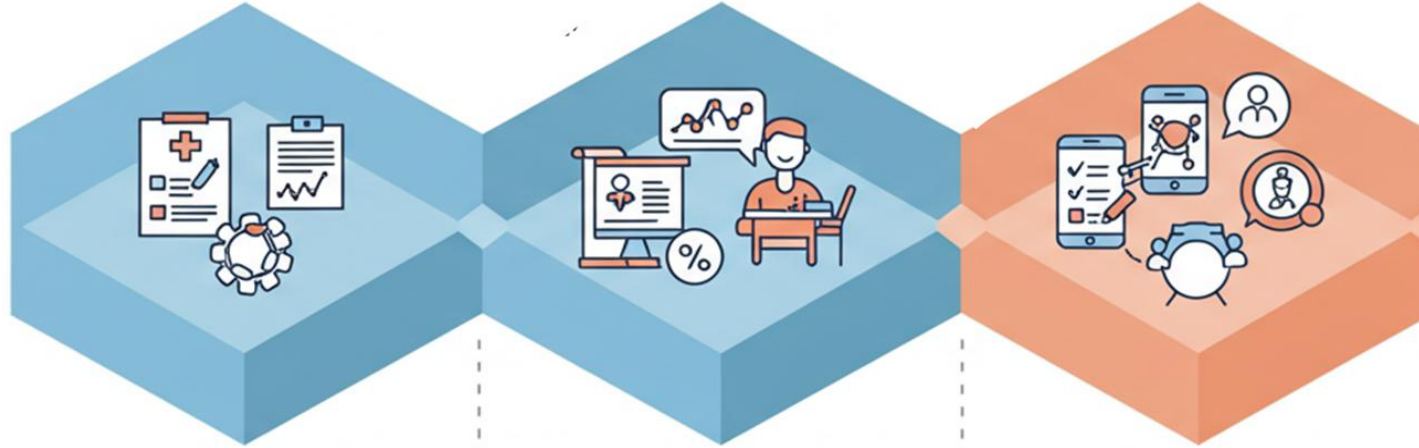
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Digital Transformation Journey

Pharmaceutical Manufacturing Journey



Basic

Manual tracking of inventory, procurement, and supplier activities using spreadsheets, paper logs, email, or phone; local supplier engagement without system integration.

Intermediate

Digitalization of inventory and procurement records: Use of Enterprise Resource Planning (ERP) systems, barcode/RFID tracking to monitor inventory, batch records, procurement, and supplier management; integration with platforms like e-Perolehan.

Advanced

AI, IoT, and blockchain technologies: AI-powered demand forecasting, IoT-enabled smart warehousing for real-time monitoring, and blockchain integration to achieve full supply chain transparency, ensuring traceability of raw materials, APIs, and finished products from suppliers to end-users.

HOW TO START?

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



For more info

<https://www.mpc.gov.my/digitalplatformnetwork>

THANK YOU