

FOOD | INDUSTRY MANUFACTURING DIGITAL PLAN

A Guide for Small and Medium Enterprises (SMEs) to Assess Their Digital Readiness and Opportunities to Go Digital



Sector Lead:

**Enterprise
Singapore**

In Support of:

SG: DIGITAL

Supported by:

**Food Innovation
& Resource Centre**
SINGAPORE POLYTECHNIC

SFMA
新加坡食品工业联合会
Singapore Food Manufacturers' Association

**Singapore
Manufacturing
Federation**
新加坡制造商会

SKILLSfuture SG

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01 SINGAPORE'S FOOD MANUFACTURING INDUSTRY

Singapore is home to a thriving food manufacturing industry that supplies high quality food products that meet safety standards for local consumption, while offering the unique taste of Singapore to consumers around the world. Singapore's food manufacturing industry consists of approximately **1,000** food manufacturers across **10** sub-sectors and houses established MNCs, home-grown heritage brands and an increasing number of food-tech startups attracted by our strong ecosystem. In 2018, the food manufacturing industry employed about **50,500** employees and contributed more than **S\$10.7 billion** in output of which about **60%** was exported globally.



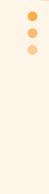
10 Sub-sectors:



02 TRENDS IMPACTING FOOD MANUFACTURING INDUSTRY

Changing consumer preferences to buy online and sustainable products

Importance of online channels to reach new customer markets, and digitalisation to enable food traceability for sustainable products



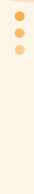
Growing importance of manpower and supply chain resilience in a post-COVID world

Increased need to build resilience through productivity improvements and spare capacity, as well as cope with manpower shortage by creating higher value roles



Evolving workforce profile and aspirations

Increased importance to attract young local talents and meet higher workforce expectations for more value-added jobs enabled by digitalisation



Industry Transformation Map (ITM)

The Food Manufacturing Industry Transformation Map (ITM) aims to develop Singapore into the leading food and nutrition hub in Asia with globally competitive food companies.

To continue thriving in the intensely competitive food industry, local manufacturers need to continually adapt and differentiate themselves from competition. Adoption of digital technology is one crucial means for businesses to improve productivity, reach out to new customer segments and make better business decisions.



Click [here](#) or scan this QR code for more details on the Food Manufacturing ITM

THE FOOD MANUFACTURING VALUE-CHAIN

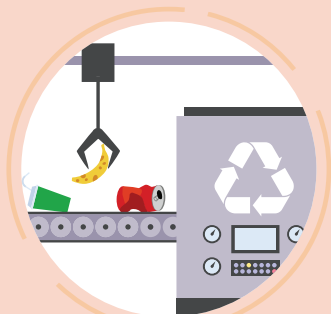
The food manufacturing value-chain covers a wide spectrum of activities, from procuring ingredients from responsible sources, processing food for safe consumption, to marketing food products in both local and overseas markets. Digital solutions used appropriately for each of these activities can help SMEs increase productivity, reduce errors and improve their bottom lines.



VALUE PROPOSITION OF DIGITALISATION

Digitalisation can automate labour-intensive tasks and scale up businesses. With advanced technology and integrated platforms, the industry can improve productivity and identify new business opportunities.

Sourcing



Reduce wastage, downtime and inventory costs due to streamlined sourcing and production processes



Improve traceability, accountability and brand confidence

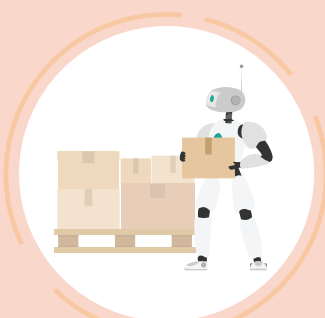
Food Processing



Automate procedures to reduce manual checks and human error



Provide real-time data insights to optimise operations



Automate menial and labour-intensive tasks and create higher-value roles for workers

Sales & Distribution



Provide access to new customers



Optimise utilisation of resources to enhance productivity and efficiency

03 SMEs GO DIGITAL

Aligned to the ITM, the Industry Digital Plan (IDP) is part of the SMEs Go Digital programme that helps to make going digital simple for SMEs.



SMEs GO DIGITAL

3 STEPS TO GO DIGITAL



For more information

Scan the QR code or visit
www.imda.gov.sg/SMEsGoDigital

Support available

- Pre-Approved Solutions
- Start Digital Pack
- Grow Digital
- Consultancy Services (SME Digital Tech Hub)
- Government Grants (e.g. Productivity Solutions Grant (PSG); SkillsFuture Enterprise Credit (SFEC))
- Digital Resilience Bonus
- Advanced Digital Solutions

1

Is your business digital-ready?

Find out using the Industry Digital Plan (IDP) for your sector.

2

How do you get started?

Take up pre-approved solutions with grant support.

3

Where can you get help?

Contact your nearest SME Centre for support.

INDUSTRY DIGITAL PLAN (IDP)

Guide on digital solutions and training required for each stage of your business growth.

START DIGITAL PACK

Foundational digital solutions for new SMEs, to help you get a head start in going digital.

GROW DIGITAL

Business-to-Business (B2B) and Business-to-Consumer (B2C) e-commerce platforms you can leverage to go global.

CONSULTANCY SERVICES (SME DIGITAL TECH HUB)

Expert advice you can tap on, to transform your business using digital technologies.

PRE-APPROVED SOLUTIONS

Proven SME-friendly digital solutions pre-approved by IMDA to meet your business needs. Government grants, e.g. Productivity Solutions Grant (PSG), are available for the adoption of these solutions.

DIGITAL RESILIENCE BONUS

Bonus for uplifting the digital capabilities of Food Services and Retail enterprises to emerge stronger after the circuit breaker period.

ADVANCED DIGITAL SOLUTIONS

Advanced and integrated digital solutions to help you strengthen business continuity and build longer term resilience.

04 DIGITAL ROADMAP FOR FOOD MANUFACTURING INDUSTRY

This digital roadmap serves as a guide for your company to embark on your digitalisation journey. Digital solutions that are interoperable will enable integrated processes and information flow.

STAGE 01

GETTING READY FOR THE DIGITAL ECONOMY

Streamlined Operations,
Optimised Resources



Quality Assurance

ENTERPRISE RESOURCE PLANNING



Inventory Management



Fleet Management



Sales/ Order Management



Workforce Management

STAGE 02

GROWING IN THE DIGITAL ECONOMY

Integrated Assets,
Connected Ecosystems



e-Commerce



Manufacturing Analytics



Manufacturing Operations
Management (MOM)



Overall Equipment
Effectiveness (OEE)
through Internet of
Things (IoT)



Product Authentication

STAGE 03

LEAPING AHEAD

Autonomous Operations,
Intelligent Business



Augmented Reality (AR)
for Training and
Inspection



Supervisory Control and
Data Acquisition (SCADA)
Plant Management



Predictive Maintenance
using Big Data/
Artificial Intelligence
(AI)



Augment Manpower
using Autonomous Robots

BUSINESS CAPABILITIES

Customer Relationship Management, Human Resource, Payroll, Accounting






Note: This roadmap will be updated over time as digitalisation of the industry progresses and new technologies are introduced to the industry.



GETTING READY FOR THE DIGITAL ECONOMY

Streamlined Operations, Optimised Resources

Automate labour-intensive tasks with easy-to-implement solutions to improve productivity.






DIGITAL SOLUTION	SOLUTION DESCRIPTION	BENEFITS
 Quality Assurance	Facilitate quality assurance through recording and monitoring key parameters. Help workers comply with food safety standards through providing digital checklists and food safety procedures.	<ul style="list-style-type: none">• Minimise manual checks and ensure rectifications are performed in a timely manner• Automate record keeping of key parameters to comply with safety standards• Analyse data collected to improve productivity or quality of food products
 Inventory Management	Provide real-time information on inventory levels and the expiry dates of stocks kept across multiple locations. Recommend which stocks should be used first and when.	<ul style="list-style-type: none">• Receive alerts on expiring stocks• Avoid wastage arising from expired products or overstocking• Optimise storage space and reduce inventory cost
 Fleet Management	<p>Monitor driver's condition and provide safety alerts such as when there are signs of fatigue.</p> <p>Automatically adjust the ambient conditions such as temperature and humidity, based on the types of food product being transported.</p>	<ul style="list-style-type: none">• Track fleet's location and utilisation in real-time• Optimise the storage conditions of food products in transit
 Sales/ Order Management	Automatically generate commercial documents such as quotations and invoices. Track and analyse customer profiles as well as product and price information.	<ul style="list-style-type: none">• Track and manage sales effectively to capture new business opportunities• Convert customers' purchase orders to sales orders seamlessly• Eliminate human errors commonly found in manual and paper-based processes
 Workforce Management	<p>Schedule the deployment of workforce across the production lines to meet specific requirements.</p> <p>Track the certifications and skill sets required for specific roles to perform the tasks.</p>	<ul style="list-style-type: none">• Improve workforce productivity• Collect data and monitor staff attendance easily• Plan workers' schedules easily







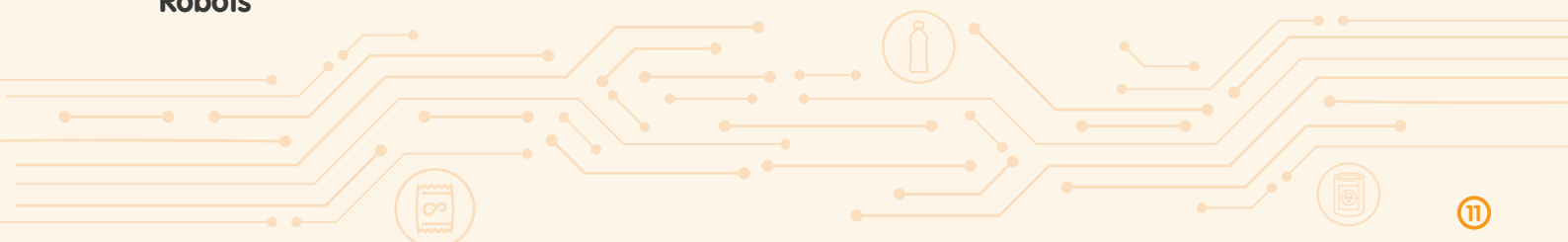
GROWING IN THE DIGITAL ECONOMY

Integrated Assets, Connected Ecosystems

Scale business reach and access new opportunities through integrated platforms and optimised operations.

DIGITAL SOLUTION	SOLUTION DESCRIPTION	BENEFITS
 e-Commerce	Enable customers (local/overseas) to make purchases online.	<ul style="list-style-type: none">• Increase product awareness through online channels• Enable customers to make purchases conveniently any time, anywhere• Access new customers and markets
 Manufacturing Analytics	Consolidate and facilitate analysis of data captured across the manufacturing cycle.	<ul style="list-style-type: none">• Identify problems at source affecting the quality, freshness and safety of food• Provide demand forecast for products based on trend analysis
 Manufacturing Operations Management (MOM)	Streamline production operations to ensure realistic delivery commitment and meet customer expectations. Manage operations on the shop floors through the Manufacturing Execution System (MES).	<ul style="list-style-type: none">• Increase productivity, quality and compliance with safety standards• Enable real-time visibility of production status and performance to optimise operations• Improve traceability and accountability• Reduce wastage from overproduction
 Overall Equipment Effectiveness (OEE) through Internet of Things (IoT)	Monitor and measure equipment utilisation and efficiency using IoT sensors. Integrate checklists and data logs from different operational functions in the factory.	<ul style="list-style-type: none">• Improve the performance of equipment• Save time by replacing paper records with digital checklists• Facilitate corrective actions by comparing data variations over different time periods• Increase equipment uptime and reduce manufacturing cost
 Product Authentication	Allow customers to authenticate the unique identity of the product or item.	<ul style="list-style-type: none">• Protect brand against counterfeits and imitations• Build brand confidence amongst customers

DIGITAL SOLUTION	SOLUTION DESCRIPTION	BENEFITS
 <p>Augmented Reality (AR) for Training and Inspection</p>	<p>Use AR tools to simulate real-world scenarios in a safe and controlled environment based on the training-on-demand model.</p>	<ul style="list-style-type: none"> • Enhance new employees' training experience and shorten their learning curve • Reduce errors by listing the inspection tasks during food production / processing through AR goggles
 <p>Supervisory Control and Data Acquisition (SCADA) Plant Management</p>	<p>Monitor and control production equipment and resources using a common digital platform integrated across the production line.</p>	<ul style="list-style-type: none"> • Improve supervisory monitoring and control across the production line • Enable real-time situational updates
 <p>Predictive Maintenance using Big Data/ Artificial Intelligence (AI)</p>	<p>Identify utilisation patterns to recommend maintenance activities across the production line.</p>	<ul style="list-style-type: none"> • Optimise resources and reduce cost through scheduled maintenance of equipment • Reduce equipment downtime through pre-emptive maintenance
 <p>Augment Manpower using Autonomous Robots</p>	<p>Use autonomous robots to assist workers with manual operations and facilitate seamless transition between different manufacturing processes.</p>	<ul style="list-style-type: none"> • Increase productivity and improve safety standards • Allow employers to re-deploy resources and create higher-value roles



05 DIGITAL SKILLS NEEDED

Job roles in the food manufacturing industry will evolve to meet the changing needs of customers and support the growth of companies. Upskilling of workers is key to enable companies to harness the potential of digital technologies and remain competitive and relevant.

All Users

Require broad-based digital literacy and awareness

"TECH BASICS" COURSES

Broad-based innovation mindset and digital literacy/awareness

SkillsFuture Singapore (SSG) funded broad-based courses e.g. SkillsFuture for Digital Workplace

Advanced Users

Require higher proficiency digital skills

"TECH ADVANCED" COURSES

Higher proficiency level digital skills

Training mapped to the Skills Framework for food manufacturing

Job Roles (Examples)



Operations Executive

Contributes to food production operations by setting up work stations and handling the equipment within the plant to prepare ingredients, food products and packaging.



Operations Director / General Manager

Oversees the food production, processes and automation engineering functions to ensure that all manufacturing objectives are achieved in a timely and cost-effective manner.



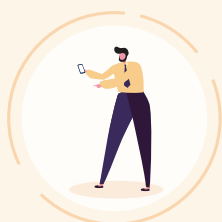
Supervisor

Supervises the daily operations of the food production function to ensure that production targets are met and food products meet required production standards.



Data Analyst

Identifies business needs from the organisation's data to initiate and drive the development of new food products and processes.



Operations Manager

Oversees all operations of the food production plant, with a focus on simplifying work processes, reducing costs and increasing efficiency.



Safety Specialist / Manager

Oversees quality and safety strategies, policies and processes while maintaining oversight of the operational status.

05 DIGITAL ROADMAP ON TRAINING

This training roadmap serves as a guide to prepare companies' workforce to adopt digital solutions at each of the three stages of growth. For more information, please refer to [MySkillsFuture Portal](#).

	STAGE 01	STAGE 02	STAGE 03
"TECH BASICS" All employees in the industry	GETTING READY FOR THE DIGITAL ECONOMY <ul style="list-style-type: none"> • Smart Industry Readiness Index (SIRI) Implementation • Data Analytics for Workplace • Assurance and Governance - A Practical Approach • Safer Foods Through Rapid Technology • Design Thinking 101 • Effective Digital Marketing And Sales • Transport Management • Procurement & Materials Management • Human Resource Management • Digital Intelligence: Opportunity Identification • Starting an Online Business 	GROWING IN THE DIGITAL ECONOMY <ul style="list-style-type: none"> • Social Media Marketing Strategies for Startups • Machining Analytics • e-Commerce for Starts-ups: All You Need to Know • E-Payments Made Easy • Machine Learning in Finance • The Economics of Supply Management in the Sharing Economy • Creating an Interactive Web Presence for Digital Marketing • Digital Manufacturing Essentials • Automation & Digitalisation in Food Manufacturing • Smart IoT Basics • Strategies for Effective Data and Information Management • Sensor Technology and Traceability for Digital Manufacturing • Design Thinking & Innovation 	LEAPING AHEAD <ul style="list-style-type: none"> • Create Your Own Augmented Reality (AR) Applications • Introduction to Predictive Analytics for Maintenance • Application of Robotics
"TECH ADVANCED" Employees that use or are exploring advanced tech in their work / organisation	<ul style="list-style-type: none"> • Robotic Process Automation (RPA) for Executives • Benefits of using Analytics for Start-ups • Predictive Analytics • Cyber Security for Non-IT Professionals 	<ul style="list-style-type: none"> • Augmented Reality Design and Development • IoT for Engineers • Immersive Experiences: Introduction to AR, VR and 360 Media Creation • Developing Your First Chatbot 	<ul style="list-style-type: none"> • Python for Robotics • Cloud Computing Awareness • Data Visualisation - Beyond the Basics • Deep Learning with Python

Training programmes aligned to **Skills Framework** and emerging areas under **SkillsFuture Series**

06 GET STARTED TODAY

You will be supported at every stage of your digital journey, through three simple steps:

1 Is your business digital-ready?

Find out if you are digital-ready by using the IDP resources [here](#) or scan the QR code.



Industry Digital Plans

2 How do you get started?



GoBusiness Gov Assist

Visit [GoBusiness Gov Assist](#), for the contact information of pre-approved solution providers. If funding support is required, apply for the Productivity Solutions Grant (PSG) on the Business Grants Portal, before purchasing and implementing digital solutions.

3 Where can you get help?



SME Centre



SME Digital Tech Hub

Make an appointment with a Business Advisor at your nearest [SME Centre](#) for digital advice, or be referred to the Principal Consultants at the [SME Digital Tech Hub](#) for more advanced digital needs.

07 ADDITIONAL INFORMATION

For SMEs

DIGITAL SOLUTIONS

SMEs Go Digital

<https://imda.gov.sg/SMEsGoDigital>

GoBusiness Gov Assist

<https://govassist.gobusiness.gov.sg/>

ESG Website

<https://www.enterprisesg.gov.sg/foodmanufacturing>

Be Safe Online

<https://www.csa.gov.sg/news/publications/be-safe-online>

Enterprise Jobs and Skills Portal

<https://www.enterprisejobskills.gov.sg>

BUSINESS ADVISORY & DIGITAL CONSULTANCY

SME Centres managed by Trade Associations:

- SME Centre@ASME
- SME Centre@SCCCI
- SME Centre@SICCI
- SME Centre@SMCCI
- SME Centre@SMF

www.enterprisesg.gov.sg/smecentre

Enterprise Infoline: +65 6898 1800

SME Digital Tech Hub

<http://www.digitaltechhub.sg>

For Individuals

CAPABILITY UPGRADING AND CAREER FACILITATION

Course Directory (MySkillsFuture Portal)

<https://www.myskillsfuture.gov.sg/content/portal/en/index.html>

Skills Framework for Food Manufacturing

<https://www.skillsfuture.gov.sg/skills-framework/foodmfg>

TechSkills Accelerator (TeSA)

<https://www.go.gov.sg/TeSA>

WSG's Careers Connect

<http://www.wsg.gov.sg/career-services.html>

WSG's Professional Conversion Programme

<https://www.wsg.gov.sg/programmes-and-initiatives/professional-conversion-programmes-individuals.html>

WSG's MyCareersFuture

<https://www.mycareersfuture.sg>

e2i's Career Guidance

<http://e2i.com.sg/app>

For ICM Vendors

SMEs Go Digital

<https://imda.gov.sg/SMEsGoDigital>

Vendors Self-Assessment Checklist

<https://imda.gov.sg/icmvendors>

This Industry Digital Plan is part of the SMEs Go Digital programme.

For programme information and feedback: <https://www.imda.gov.sg/SMEsGoDigital>

#SGDIGITAL

Singapore Digital (SG:D) is a nation-wide movement to unify Singapore's digitalisation efforts. Whether it is help for different industries to start their digitalisation journeys, or creating new ecosystems, opportunities and capabilities for the future, SG:D is set to take us ahead as a leading digital global node. The :D smiley face icon in the logo signifies the optimism of Singaporeans advancing together with digital innovation. As we progress into the digital economy, it is all about the people – the heart of all we do.



imda.gov.sg/sgdigital
enterprisesg.gov.sg



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facebook.com/enterprisesg



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youtube.com/IMDAsg
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instagram.com/IMDAsg



linkedin.com/company/IMDAsg
linkedin.com/company/enterprisesg



t.me/SMEsGoDigital

The content of this guide is provided for informational purposes only and is correct as of March 2021.

Enterprise
Singapore

INFOCOMM
MEDIA
DEVELOPMENT
AUTHORITY