FOOD MANUFACTURING

A Guide for Small and Medium Enterprises (SMEs) to Assess Their Digital Readiness and Opportunities to Go Digital
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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.
Increased need to build resilience through productivity improvements and spare capacity, as well as cope with manpower shortage by creating higher value roles.

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

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.

Source: Food Manufacturing Industry Transformation Map
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.
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.

3 STEPS TO GO DIGITAL

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.

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

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

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.
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
- 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. | • 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. | • Receive alerts on expiring stocks  
• Avoid wastage arising from expired products or overstocking  
• Optimise storage space and reduce inventory cost  

Fleet Management | Monitor driver's condition and provide safety alerts such as when there are signs of fatigue. Automatically adjust the ambient conditions such as temperature and humidity, based on the types of food product being transported. | • 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. | • 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 | Schedule the deployment of workforce across the production lines to meet specific requirements. Track the certifications and skill sets required for specific roles to perform the tasks. | • Improve workforce productivity  
• Collect data and monitor staff attendance easily  
• Plan workers' schedules easily  

### SOLUTION DESCRIPTION

#### Quality Assurance

- 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

- Receive alerts on expiring stocks
- Avoid wastage arising from expired products or overstocking
- Optimise storage space and reduce inventory cost

#### Fleet Management

- Track fleet's location and utilisation in real-time
- Optimise the storage conditions of food products in transit

#### Sales/Order Management

- 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

- 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.

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<th>DIGITAL SOLUTION</th>
<th>SOLUTION DESCRIPTION</th>
<th>BENEFITS</th>
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<tbody>
<tr>
<td><strong>e-Commerce</strong></td>
<td>Enable customers (local/overseas) to make purchases online.</td>
<td>• Increase product awareness through online channels&lt;br&gt;• Enable customers to make purchases conveniently any time, anywhere&lt;br&gt;• Access new customers and markets</td>
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<tr>
<td><strong>Manufacturing Analytics</strong></td>
<td>Consolidate and facilitate analysis of data captured across the manufacturing cycle.</td>
<td>• Identify problems at source affecting the quality, freshness and safety of food&lt;br&gt;• Provide demand forecast for products based on trend analysis</td>
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<tr>
<td><strong>Manufacturing Operations Management (MOM)</strong></td>
<td>Streamline production operations to ensure realistic delivery commitment and meet customer expectations. Manage operations on the shop floors through the Manufacturing Execution System (MES).</td>
<td>• Increase productivity, quality and compliance with safety standards&lt;br&gt;• Enable real-time visibility of production status and performance to optimise operations&lt;br&gt;• Improve traceability and accountability&lt;br&gt;• Reduce wastage from overproduction</td>
</tr>
<tr>
<td><strong>Overall Equipment Effectiveness (OEE) through Internet of Things (IoT)</strong></td>
<td>Monitor and measure equipment utilisation and efficiency using IoT sensors. Integrate checklists and data logs from different operational functions in the factory.</td>
<td>• Improve the performance of equipment&lt;br&gt;• Save time by replacing paper records with digital checklists&lt;br&gt;• Facilitate corrective actions by comparing data variations over different time periods&lt;br&gt;• Increase equipment uptime and reduce manufacturing cost</td>
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<tr>
<td><strong>Product Authentication</strong></td>
<td>Allow customers to authenticate the unique identity of the product or item.</td>
<td>• Protect brand against counterfeits and imitations&lt;br&gt;• Build brand confidence amongst customers</td>
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### LEAPING AHEAD

**Autonomous Operations, Intelligent Business**

Leverage advanced technology to level up capabilities.

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| **Augmented Reality (AR) for Training and Inspection** | Use AR tools to simulate real-world scenarios in a safe and controlled environment based on the training-on-demand model. | • Enhance new employees’ training experience and shorten their learning curve  
• Reduce errors by listing the inspection tasks during food production / processing through AR goggles |
| **Supervisory Control and Data Acquisition (SCADA) Plant Management** | Monitor and control production equipment and resources using a common digital platform integrated across the production line. | • Improve supervisory monitoring and control across the production line  
• Enable real-time situational updates |
| **Predictive Maintenance using Big Data/Artificial Intelligence (AI)** | Identify utilisation patterns to recommend maintenance activities across the production line. | • Optimise resources and reduce cost through scheduled maintenance of equipment  
• Reduce equipment downtime through pre-emptive maintenance |
| **Augment Manpower using Autonomous Robots** | Use autonomous robots to assist workers with manual operations and facilitate seamless transition between different manufacturing processes. | • Increase productivity and improve safety standards  
• Allow employers to re-deploy resources and create higher-value roles |
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.

**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.

**Supervisor**

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

**Operations Manager**

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

**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.

**Data Analyst**

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

**Safety Specialist / Manager**

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

**DIGITAL ROADMAP ON TRAINING**

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<td>• Smart Industry Readiness Index (SIRI) Implementation</td>
<td>• Social Media Marketing Strategies for Startups</td>
<td>• Create Your Own Augmented Reality (AR) Applications</td>
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<td>• Data Analytics for Workplace</td>
<td>• Machining Analytics</td>
<td>• Introduction to Predictive Analytics for Maintenance</td>
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<td>• Assurance and Governance - A Practical Approach</td>
<td>• e-Commerce for Start-ups: All You Need to Know</td>
<td>• Application of Robotics</td>
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<td>• Safer Foods Through Rapid Technology</td>
<td>• Machine Learning in Finance</td>
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<td>• Design Thinking 101</td>
<td>• The Economics of Supply Management in the Sharing Economy</td>
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<td>• Effective Digital Marketing And Sales</td>
<td>• Creating an Interactive Web Presence for Digital Marketing</td>
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<td>• Transport Management</td>
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<td>• Procurement &amp; Materials Management</td>
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<td>• Human Resource Management</td>
<td>• Smart IoT Basics</td>
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<td>• Digital Intelligence: Opportunity Identification</td>
<td>• Strategies for Effective Data and Information Management</td>
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<tr>
<td>• Starting an Online Business</td>
<td>• Sensor Technology and Traceability for Digital Manufacturing</td>
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**“TECH BASICS”**

All employees in the industry

**“TECH ADVANCED”**

Employees that use or are exploring advanced tech in their work / organisation

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<td>• Augmented Reality Design and Development</td>
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<td>• Benefits of using Analytics for Start-ups</td>
<td>• IoT for Engineers</td>
<td>• Cloud Computing Awareness</td>
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<td>• Predictive Analytics</td>
<td>• Immersive Experiences: Introduction to AR, VR and 360 Media Creation</td>
<td>• Data Visualisation - Beyond the Basics</td>
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<tr>
<td>• Cyber Security for Non-IT Professionals</td>
<td>• Developing Your First Chatbot</td>
<td>• Deep Learning with Python</td>
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Training programmes aligned to Skills Framework and emerging areas under SkillsFuture Series.
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.

2. **How do you get started?**
   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?**
   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.
### For SMEs

**DIGITAL SOLUTIONS**

- **SMEs Go Digital**
  [https://imda.gov.sg/SMEsGoDigital](https://imda.gov.sg/SMEsGoDigital)

- **GoBusiness Gov Assist**
  [https://govassist.gobusiness.gov.sg/](https://govassist.gobusiness.gov.sg/)

- **ESG Website**

- **Be Safe Online**

- **Enterprise Jobs and Skills Portal**
  [https://www.enterprisejobskills.gov.sg](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


- **Enterprise Infoline:** +65 6898 1800

- **SME Digital Tech Hub**
  [http://www.digitaltechhub.sg](http://www.digitaltechhub.sg)

### For Individuals

**CAPABILITY UPGRAADING AND CAREER FACILITATION**

- **Course Directory (MySkillsFuture Portal)**

- **Skills Framework for Food Manufacturing**

- **TechSkills Accelerator (TeSA)**
  [https://www.go.gov.sg/TeSA](https://www.go.gov.sg/TeSA)

- **WSG’s Careers Connect**

- **WSG’s Professional Conversion Programme**

- **WSG’s MyCareersFuture**
  [https://www.mycareersfuture.sg](https://www.mycareersfuture.sg)

- **e2i’s Career Guidance**
  [http://e2i.com.sg/app](http://e2i.com.sg/app)

### For ICM Vendors

- **SMEs Go Digital**
  [https://imda.gov.sg/SMEsGoDigital](https://imda.gov.sg/SMEsGoDigital)

- **Vendors Self-Assessment Checklist**
  [https://imda.gov.sg/icmvendors](https://imda.gov.sg/icmvendors)

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This Industry Digital Plan is part of the SMEs Go Digital programme. For programme information and feedback: [https://www.imda.gov.sg/SMEsGoDigital](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.

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