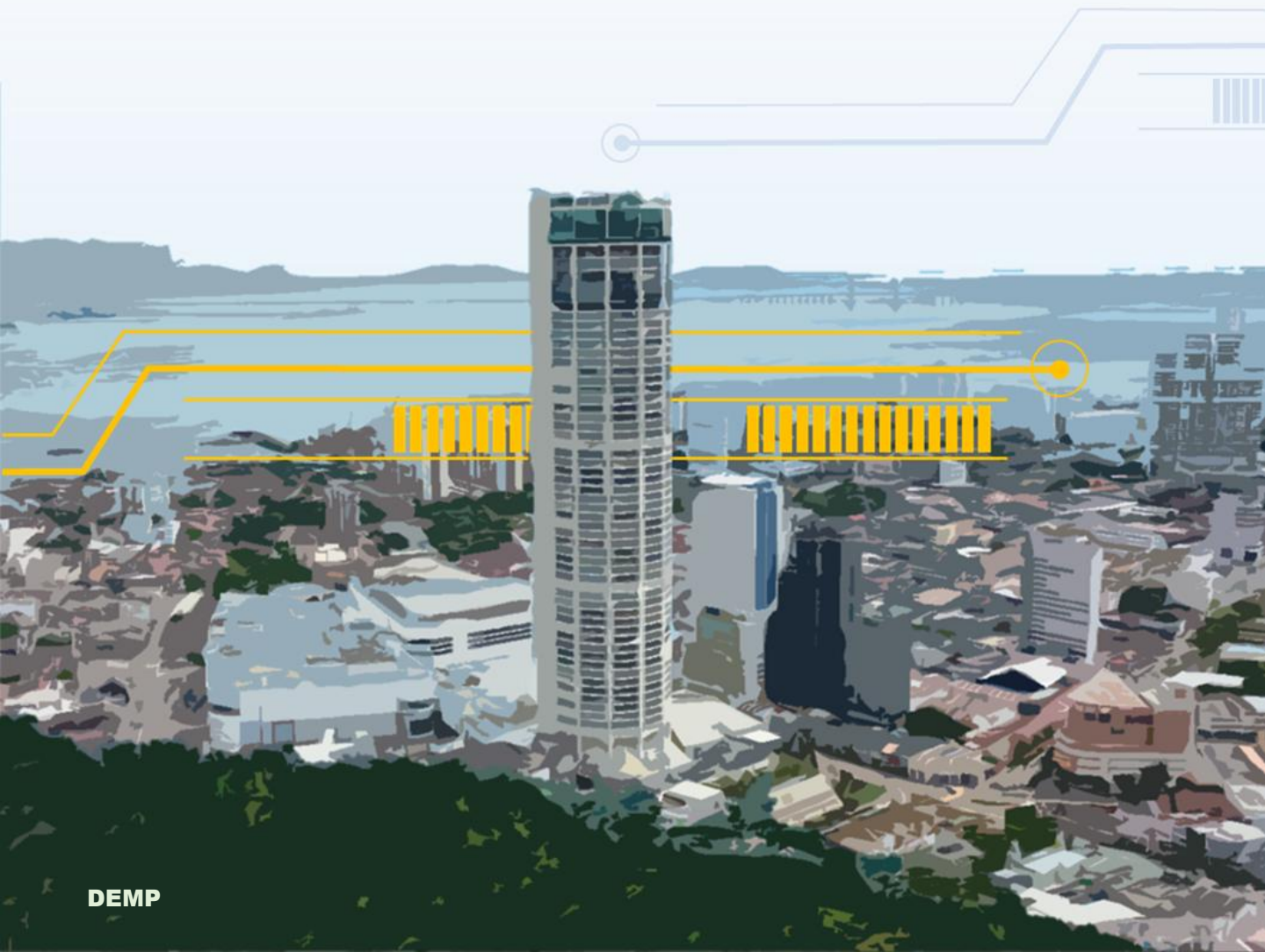
DIGITAL ECONOMY MASTER PLAN

Digital Penang

DEMP
2025-2030



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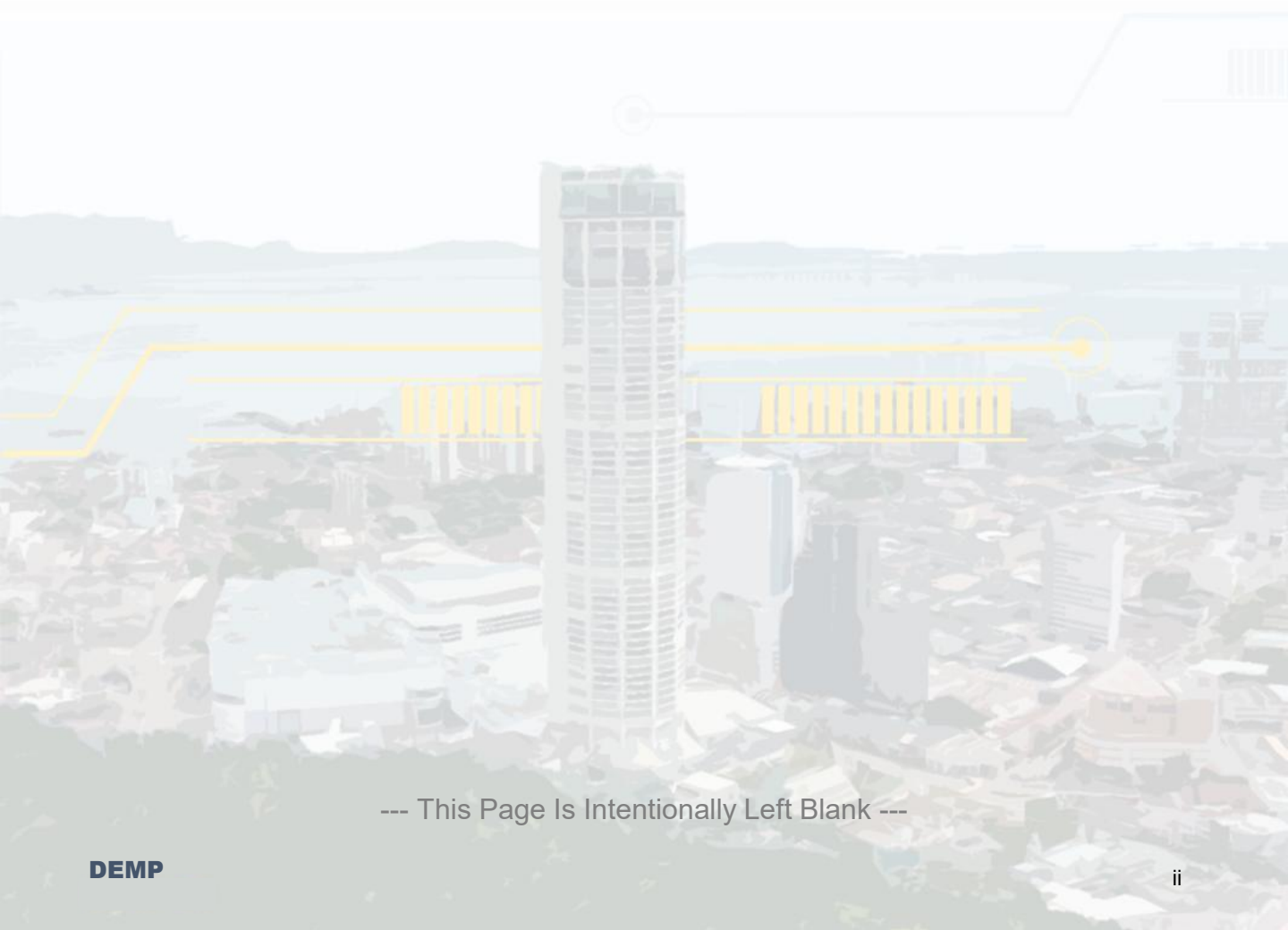

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FOREWORD

United in our purpose, we spark innovation, bridge digital divides and pave the way for an inclusive, sustainable digital future for Penang

YAB Tuan Chow Kon Yeow
Chief Minister of Penang

Penang embarks on a transformative new chapter with the launch of the Digital Economy Master Plan (DEMP), a strategic blueprint that expands on the solid foundations laid by the Digital Transformation Master Plan (DTMP) 1.0. Rooted in the Penang2030 vision of 'A Family-Focused Green and Smart State that Inspires the Nation', DEMP is thoughtfully engineered to catalyse inclusive and sustainable digital growth across the state.

By nurturing a people-centric digital ecosystem, DEMP seeks not only to bridge the digital divide and empower communities but also to drive the rapid growth of digital businesses, ensuring that every citizen has equitable access to the vast opportunities of the digital era. With a comprehensive strategy that prioritizes innovation, sustainability and strategic partnerships, Penang reaffirms its steadfast commitment to cultivating a resilient, dynamic and future-ready economy.

Ultimately, this master plan stands as a resounding testament to the unified vision and collaborative spirit of our government, industry and community. Together, we are crafting a vibrant digital future where inclusive progress and flourishing opportunities converge and where our rich heritage and pioneering drive unite to lay the foundation for a thriving ecosystem that benefits all.

FOREWORD

It's time to accelerate digital progress — let's unite, leverage on DEMP's initiatives and create a smarter, inclusive and innovative digital future for Penang

YB Zairil Khir Johari
Penang State Executive Councillor (EXCO)
Infrastructure, Transport & Digital

The Digital Economy Master Plan (DEMP) is a roadmap for Penang's transformation into a digitally empowered state. Aligned with the Penang2030 vision and developed in line with the Ministry of Digital's mission to position Malaysia as a leading Digital Nation, DEMP aims to strengthens Penang's digital economy by enhancing infrastructure, services and innovation.

Focusing on startups, SMEs and a thriving digital ecosystem, DEMP promotes inclusivity and economic growth through strategic initiatives in Digital Government, Digital Economy, Digital Society and Digital Foundation. By integrating these elements, we strive to position Penang as a regional digital economy powerhouse and a premier hub for innovation, entrepreneurship and startups.

With a growing ecosystem of over 200 startups across diverse industries, Penang is on track to becoming a centre of digital excellence, shaping the future of Malaysia's digital economy.

FOREWORD

State agencies are urged to embrace digitalisation, bridging people to opportunities and a better quality of life

YB Dato' Haji Zulkifli Long
Penang State Government Secretary

The Digital Economy Master Plan (DEMP) reflects Penang's ambition to enhance civil services and strengthen the delivery of government functions through digital transformation. Coordinated by Digital Penang, this plan aligns with the Penang Public Sector Digitalisation Strategic Plan and Penang Smart State Agenda which reinforces collaboration with city councils to build a digitally driven and inclusive state.

Through its four strategic pillars—Digital Government, Digital Economy, Digital Society and Digital Foundation—DEMP focuses on whole-of-government approach which bringing services closer to the people by streamlining processes, enhancing accessibility and ensuring efficient service delivery to meet community needs.

We also reaffirm our commitment to enhancing public service efficiency by promoting cashless payment adoption among businesses and the public through the Penang Government Agencies Cashless Day Campaign. This initiative marks a significant milestone in our pursuit of seamless, inclusive and forward-thinking digital governance.

FOREWORD

Businesses must digitalise for competitiveness, communities must upskill to thrive — together, we can strengthen Penang's digital ecosystem and lead the regional digital economy

Ts. Kwang Ming Ng
Chief Executive Officer
Digital Penang

The Digital Economy Master Plan (DEMP) marks the next phase of Penang's digital transformation, building on the success of DTMP 1.0 and aligned with Digital Penang's mission to drive innovation and sustainable growth.

DEMP strengthens Penang's digital ecosystem through key initiatives that nurture startups, digitalise MSMEs for global competitiveness, increase cybersecurity awareness and improve digital literacy. These efforts are designed to foster an inclusive community and ensure a resilient digital future for all.

Developed through the collective efforts of stakeholders, from industry to government including the investor community and federal agencies, DEMP represents a shared vision for Penang's digital economy. Digital Penang remains dedicated to collaborating with these partners to bring this vision to life and begin a new chapter of growth and innovation.

CONTENTS

Abbreviations

12MP	12th Malaysia Plan
13MP	13th Malaysia Plan
4IR	Fourth Industrial Revolution
5G	5th Generation Mobile Network
AI	Artificial Intelligence
AR	Augmented Reality
ASM	Akedemic Sains Malaysia
B2B	Business-to-Business
B2C	Business-to-Consumer
BDA	Big Data Analytics
BKT	Bahagian Kerajaan Tempatan
BPEN	Bahagian Perancang Ekonomi Negeri
BPSM	Bahagian Pengurusan Sumber Manusia
BTMKN	Bahagian Teknologi Maklumat Dan Komunikasi Negeri
CAGR	Compound Annual Growth Rate
CD2	Creative Digital District
CMI	Chief Minister of Penang Incorporated
CO2	Carbon Dioxide
Comm	Communication
CREST	Collaborative Research in Engineering, Science & Technology
DEFA	Digital Economy Framework Agreement
DEMP	Digital Economy Master Plan
DP	Digital Penang
DTMP	Digital Transformation Masterplan
E&E	Electrical and Electronics
EDW	Enterprise Data Warehouse
ESG	Environmental, Social and Governance
EV	Electric Vehicle
FDI	Foreign Direct Investment
FoF	Fund of Funds
G2E	Government-to-Employees
GBS	Global Business Services
GDP	Gross Domestic Product
GenAI	Generative Artificial Intelligence
GLCs	Government-Linked Companies
IC	Integrated Circuit
ICT	Information and Communication Technology
IHL	Institutes of Higher Learning
IMTGT	Indonesia-Malaysia-Thailand Growth Triangle
Industry 4WRD	National Policy on Industry 4.0
IoT	Internet of Things
IP	Invest Penang
IPO	Initial Public Offering
IT	Information Technology
JENDELA	Jalinan Digital Negara
JKN	Jabatan Kewangan Negeri
JKPeGG	Mesyuarat Jawatankuasa Pemandu Electronic Good Governance
JPBD	Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia
JPWK	Jawatankuasa Pembangunan Wanita dan Keluarga
KPI	Key Performance Indexes
LLM	Large Language Model
M&A	Mergers and Acquisitions
MBAN	Malaysian Business Angel Network
MBPP	Majlis Bandaraya Pulau Pinang
MBSP	Majlis Bandaraya Seberang Perai
MCMC	Malaysian Communications & Multimedia Commission
MDEB	Malaysia Digital Economy Blueprint
MDEC	Malaysia Digital Economy Corporation
MGTC	Malaysian Green Technology And Climate Change Corporation
ML	Machine Learning
MNCs	Multinational Companies
MOIC	Multiple on Invested Capital
MOSTI	Ministry of Science, Technology & Innovation
MSC	Multimedia Super Corridor
MSME	Micro, Small & Medium Enterprises
MyDigital	Malaysia Digital Economy Blueprint
NADI	National Information Dissemination Centre
NCIA	Northern Corridor Implementation Authority
NESR	National E-Commerce Strategic Roadmap
NFT	Non-fungible Token
NGOs	Non-Governmental Organisations
NIMP	New Industrial Master Plan 2030
OECD	The Organisation for Economic Cooperation and Development
P2P	Peer-to-Peer
PBT	Pihak Berkuasa Tempatan
PCEB	Penang Convention and Exhibition Bureau
PCG	Penang Green Council
PCMP	Penang Connectivity Masterplan
PDC	Penang Development Corporation
PeGIS	Penang Geographic Information System Centre
PG	Penang
PI	Penang Institute
PMO	Project Management Office
PPPs	Public-private Partnerships
PSC	Penang Science Cluster
PSDC	Penang Skills Development Centre
PSOC	Penang Security Operation Centre
PSUKPP	Pejabat Setiausaha Kerajaan Negeri Pulau Pinang
PWDC	Penang Women's Development Corporation
PYDC	Penang Youth Development Corporation
QoS	Quality of Service
R&D	Research and Development
ROI	Return on Investment
SDG	Sustainable Development Goals
SEA	Southeast Asia
SEDG	Simplified ESG Disclosure Guide
SMEs	Small and Medium Enterprises
STEM	Science, Technology, Engineering and Mathematics
SUK	Setiausaha Kerajaan
TIG	Thoughts In Gear
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VC	Venture Capital
VR	Virtual Reality

EXECUTIVE SUMMARY

DEMP: a master plan designed to drive Penang's digitalisation ambitions and serve as a strategic framework, integrating multiple sub-plans that collectively address the state's digital priorities

As the world continues to embrace the digital revolution, the digital economy has emerged as a transformative force driving economic growth and development. This shift is fueled by the widespread adoption of digital technologies and electronic communication, significantly reshaping how businesses and industries operate.

According to the Organisation for Economic Corporation and Development's (OECD) Trade Union Advisory Committee and the World Economic Forum, the digital economy is a networked ecosystem that spans various sectors, including e-commerce, digital marketing, digital financial services, software development, gaming and cloud services. It is enabled by information and communication technology (ICT), broadband and the Internet of Things (IoT), which foster collaboration with global stakeholders.

The Digital Economy Master Plan (DEMP), formerly known as the Digital Transformation Masterplan (DTMP), is a framework that encompasses multiple sub-plans outlining digitalisation ambitions and goals aimed at creating a connected, creative and competitive society in Penang. Launched in 2021, DTMP 1.0 supported Penang2030 vision, incorporating both digital and physical strategic initiatives designed to strengthen Penang's digital ecosystem, promote innovation and ensure social inclusivity.

DTMP has since been rebranded as DEMP to better reflect the state's commitment to fostering a digitally empowered economy and sustainable growth through digital innovation. DEMP represents a critical milestone in Penang's digital transformation, building on the foundations of DTMP 1.0 and advancing Penang2030 vision.

Aligned with global, national and state initiatives, DEMP establishes a robust digital foundation that empowers industries, governments, businesses and communities to leverage digital technologies for enhanced efficiency, innovation and sustainability. Collectively, these efforts aim to position Malaysia as a leader in the global digital economy and manufacturing sectors.

DEMP is structured around four strategic pillars: **Digital Government, Digital Economy, Digital Society and Digital Foundation**. It is supported by 16 strategic initiatives and focuses on driving a digitally empowered economy while fostering sustainable growth through digital innovation. The master plan addresses Penang's unique challenges and opportunities while aligning with national strategies.

Serving as a guiding framework for the next phase of Penang's digital transformation from 2025 to 2030, DEMP will support the state's digitalisation ambitions, creating a connected, creative and competitive society and ensuring Penang's continued progress in the digital era.

EXECUTIVE SUMMARY

The digital landscape is driving innovation, connectivity and sustainable growth at global, national and state levels, including in Penang.

Global Digital Landscape

The global digital landscape is undergoing a profound transformation, driven by advancements in the Fourth Industrial Revolution (4IR). This era is defined by the convergence of digital, physical and biological domains, where rapid technological advancements are reshaping industries and unlocking new opportunities for growth. The 4IR is catalysing innovation across various sectors, with digital technologies playing a pivotal role in transforming business models, enhancing productivity and driving sustainable solutions.

As economies shift towards a digital-first approach, the global landscape is witnessing a rise in the adoption of digital, green and circular economies. These movements are fueled by a commitment to sustainability, resource efficiency and resilience, paving the way for a forward-thinking global economy. The continued evolution of deep technologies and Artificial Intelligence (AI) will be key to unlocking further growth, driving advancements and fostering a future where industries and societies are more interconnected, dynamic and innovative.

Malaysia's Digital Landscape

Malaysia's digital landscape is rapidly evolving, with the government prioritising digital transformation as a key pillar of economic growth. The Malaysian government has put in place numerous policies and strategies to foster technological and digital transformation nationwide.

In 2022, Malaysia’s digital economy contributed 23.0% (RM412.3 billion) to the national Gross Domestic Product (GDP), with projections to reach 25.5% by 2025. Through these policies, the government aims to capitalise on opportunities within the digital economy and foster long-term economic development.

Penang’s Digital Landscape

Penang's digital landscape is rapidly evolving, supported by the state's strong industrial base and strategic focus on digital transformation. The Penang state government is prioritising digitalisation through various initiatives aimed at improving connectivity, fostering innovation and boosting the local economy. The island state’s 2030 initiative, for instance, outlines its goal of becoming a leading smart and sustainable city.

As of April 2020, Digital Penang is committed to accelerating the state’s digital transformation, driving the growth of the digital economy and fostering greater engagement across sectors. It also serves as a platform to support startups and businesses in Penang.

As Penang continues to embrace digital transformation, it is positioning itself as a vibrant, connected economy, offering abundant opportunities for innovation, sustainable growth and global partnerships.

EXECUTIVE SUMMARY

DTMP 1.0 laid a strong foundation for Penang's digital transformation, with most initiatives showing significant progress, alignment and relevance to the state's strategic goals.

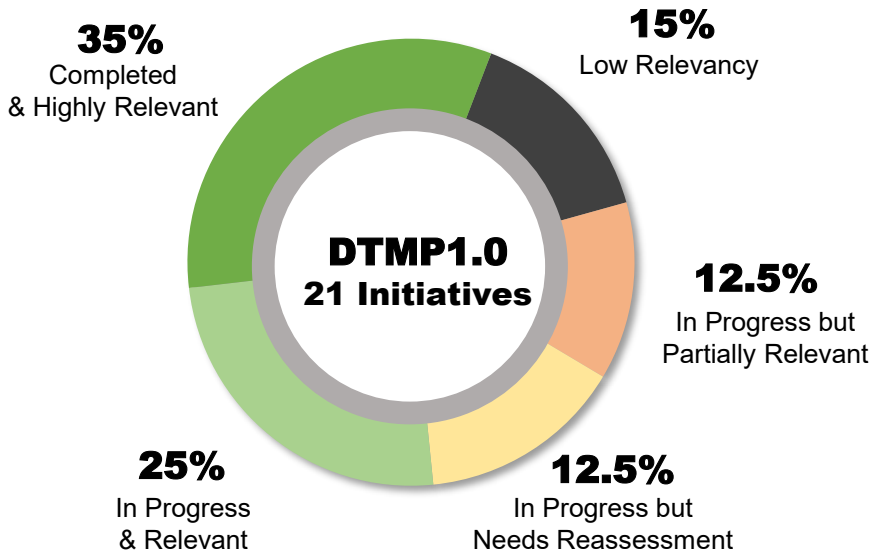
Digital Transformation Masterplan 1.0

The DTMP 1.0 outlined a vision and a set of strategic initiatives aimed at enhancing digital infrastructure and services in Penang from 2021 to 2023. This master plan established the foundation for a vibrant digital future, driving innovation and growth in the region through four strategic pillars: **Digital Governance, Digital Economy, Digital Community and Digital Infrastructure**.

DTMP 1.0 includes 21 initiatives that have played a crucial role in advancing Penang's digital transformation efforts. A study was conducted to assess the progress made and evaluate the strategic alignment of these initiatives within Penang's broader transformation framework, based on five key levels of relevance and progress.

The analysis revealed positive outcomes, with the majority of the initiatives showing significant progress and alignment with Penang's digital transformation goals. These achievements reflect a strong foundation laid by DTMP 1.0, showcasing effective implementation and alignment with Penang's broader transformation framework. This progress underscores the commitment to fostering a connected, innovative and sustainable digital ecosystem, paving the way for continued advancements in the next phase of Penang's digital journey.

The achievements under DTMP 1.0



EXECUTIVE SUMMARY

DEMP envisions empowering Penang's Digital Economy for all as a top tier digital hub in Southeast Asia that fosters innovation-driven enterprises, a connected society and a digital government.

Digital Economy Master Plan (DEMP)

DEMP represents the next phase of Penang's digital transformation, designed to guide the state's digital development from 2025 to 2030. It aims to create new opportunities for government, businesses and communities, ensuring Penang continues to progress in the digital era.

With emerging technologies like AI, 5G and IoT, along with challenges in cybersecurity and data privacy, DEMP ensures Penang remains competitive. DEMP aligns with national strategies and leverages on Penang's strengths to create a digitally empowered economy and society.

Penang is poised to become a leading digital economy hub, offering new opportunities for businesses and communities while enhancing its global competitiveness. In line with this, DEMP's strategic objectives focus on driving economic growth by harnessing the power of digital innovation to create new opportunities for government, businesses and communities. DEMP is anchored on the four strategic pillars supported by 16 initiatives to ensure that Penang can achieve its vision, mission and strategic goals.

Vision

- Empower Penang's Digital Economy for All as a top tier digital hub in Southeast Asia that fosters innovation-driven enterprises, a connected society and a digital government.

Mission

- Position Penang as a leader in innovation by cultivating a thriving startup ecosystem specialising in hard tech, deep tech and creative tech, supported by robust digital infrastructure and a culture of innovation;
- Empower all communities in Penang by ensuring equitable access to digital technologies and resources, fostering a digitally inclusive society where every citizen can thrive;
- Create an environment that encourages businesses in Penang to innovate and grow, enabling them to thrive in the digital economy and achieve long-term success in a competitive global market.

Strategic Pillars

I. Digital Government: Enhance public services to be more efficient, transparent and citizen-centric.

II. Digital Economy: Drive economic growth by fostering innovation and digital business opportunities.

III. Digital Society: Promote inclusivity and ensures equitable access to digital opportunities for all citizens.

IV. Digital Foundation: Act as the backbone to support and sustain long-term digital growth and innovation.

EXECUTIVE SUMMARY

Measure of Success

Within the framework of DEMP, clear and measurable Key Performance Indexes (KPIs) are essential for tracking progress, evaluating outcomes and aligning initiatives with long-term goals. These KPIs serve as benchmarks to ensure the DEMP's objectives are effectively achieved:

- Uplift GDP
- Increase Digital Contribution to GDP
- Attract High-Value Investments
- Increase Income Generation
- Support Job Preservation and Talent Development
- Enhance Sustainability

These KPIs provide a robust framework for monitoring and evaluating the success of DEMP, ensuring that strategic initiatives contribute to sustainable economic growth, digital advancement and societal well-being.

The Governance Structure

The governance structure for implementing DEMP ensures effective coordination, transparency and accountability across stakeholders. Through public, private and community partnerships and clear timelines for measurable outcomes, it empowers the state to drive initiatives that are tailored to Penang's specific economic landscape and digital ambitions.

The governance structure comprises the following:

- The Federal Government, providing support through advisory guidance and financial resources;
- The Penang State Government, serving as the primary driver of DEMP by allocating resources and coordinating with stakeholders;
- Digital Penang Implementation Task Force, responsible for managing the daily activities and monitoring execution of initiatives under DEMP;
- The Advisory Board, offering strategic insights, industry expertise and guidance on emerging trends; and
- The Multiple Working Groups, tasked with translating strategic initiatives into actionable projects, monitoring progress, addressing operational challenges and reporting to the task force.

EXECUTIVE SUMMARY

Strategic Recommendations

At its core, DEMP focuses on four key strategic pillars: Digital Government, Digital Economy, Digital Society and Digital Foundation. These pillars are designed to address the unique challenges and opportunities within Penang's digital ecosystem, fostering innovation, efficiency and inclusivity across all sectors. The plan integrates a series of strategic initiatives that span short-, medium- and long-term horizons, ensuring a structured and phased approach to digital growth, namely:

- Enhance Citizen Services and Experience
- Optimise Government Operations
- Leverage Technology for Economic Growth
- Position Penang as a Regional Tech Startup Hub
- Foster Development of Advanced Manufacturing and Related Sectors
- Develop a Fund of Funds (FoF) to Attract and Pool Investments
- Develop Creative and Creator Economy with Exportable Services
- Promote and Support the Adoption of Digital Solutions by Existing Key Industry Sectors
- Empower Business MSMEs
- Implement a Business Continuity Programme for Supply Chain Based on ESG Practices
- Enhance Digital Literacy and Access
- Community Digital Empowerment
- Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues
- Advance Digital Infrastructure and Readiness Enhancement
- Foster Digital Talent and Innovation
- Strengthen Cybersecurity and Data Privacy

Digital Penang

DIGITAL ECONOMY MASTER PLAN

DEMP
2025-2030

01

Digital Economy Master Plan 1.0 (DTMP 1.0)

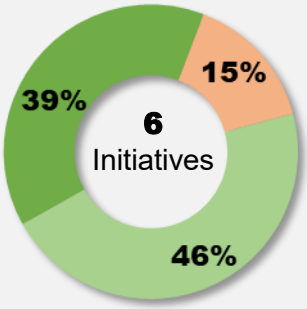
Digital Transformation Masterplan (DTMP 1.0)

Digital Governance and Digital Community show strong performance with 10 initiatives across 30 projects while Digital Economy and Digital Infrastructure require further refinement.

The charts below illustrate the relevance of each strategic pillar within DTMP 1.0. This analysis aims to provide valuable insights for the development of DEMP. It focuses on assessing the strategic initiatives based on their alignment with the goals using a five-level scale of relevancy: 'highly relevant,' 'relevant,' 'needs reassessment,' 'partially relevant,' and 'low relevancy'. The analysis helps identify areas that require improvement or realignment, thereby guiding the development of a more effective framework for DEMP.

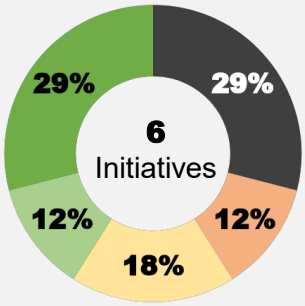
Strategic Pillar I
Digital Governance

Showed positive outcomes, with the majority of its strategic initiatives either completed or ongoing and only 15% considered partially relevant.



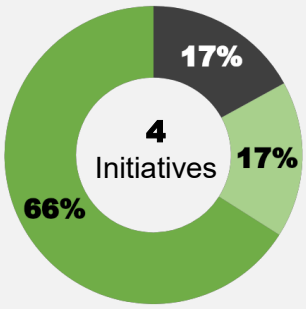
Strategic Pillar II
Digital Economy

Achieved an equal distribution between successful initiatives and those requiring adjustments for improved relevance.



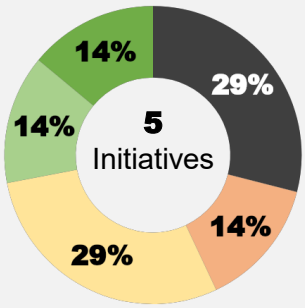
Strategic Pillar III
Digital Community

Demonstrated the most positive outcomes among all pillars, with the highest percentage of initiatives completed at 66%.



Strategic Pillar IV
Digital Infrastructure

The majority of initiatives showed either no alignment or required reassessment, with both categories accounting for 29% each.



- Low Relevancy
- In Progress but Partially Relevant
- In Progress but Needs Reassessment
- In Progress & Relevant
- Completed & Highly Relevant

DTMP 1.0 Overview

DTMP 1.0 laid a strong foundation for Penang's digital transformation, with most initiatives showing significant progress, alignment and relevance to the state's strategic goals.

Digital Transformation Masterplan 1.0

DTMP 1.0 outlined a vision and a set of strategic initiatives aimed at enhancing digital infrastructure and services in Penang from 2021 to 2023. Serving as Digital Penang's implementation document, DTMP 1.0 provided a comprehensive roadmap for fostering a vibrant digital future, driving innovation and enabling sustainable growth in the region.

Aligned with the overarching vision of Penang2030 and Digital Penang, DTMP 1.0 played a pivotal role in supporting Penang's long-term development goals.

Alignment with Penang2030 Vision

PENANG 2030

"A Family-Focused Green and Smart State that Inspires the Nation"

Launched in 2018, Penang2030 is an action plan that maps out the state's development in the next 12 years to increase livability by enhancing quality of life, upgrading the economy, empowering the people to strengthen civic participation and investing in the built environment.

Alignment with Digital Penang Vision

Digital Penang

"To leverage technology to extend comparative advantages in a digital economy and deliver agile solutions and infrastructure for pervasive adoption to promote an engaged community and data-driven governance"

Digital Penang is a government-linked company owned by the State of Penang, which began operations in April 2020 to accelerate efforts to capture opportunities in the digital economy and promote a digitally engaged society across the state.

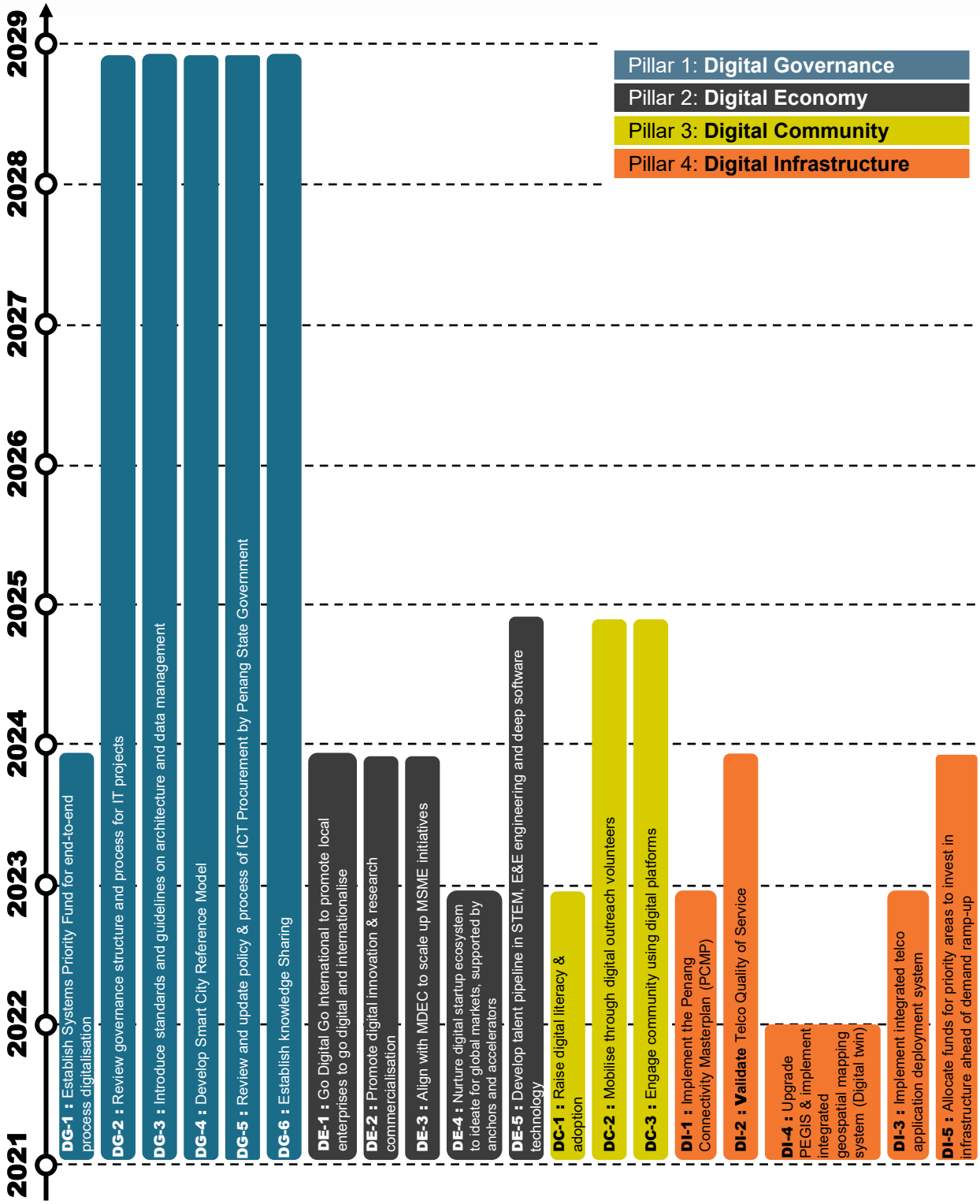
DTMP 1.0 Strategic Pillars & Initiatives

DTMP 1.0 includes four strategic pillars and 21 strategic initiatives that have played a crucial role in advancing Penang's digital transformation efforts.

DIGITAL TRANSFORMATION MASTER PLAN 1.0

STRATEGIC PILLARS		STRATEGIC INITIATIVES	
STRATEGIC PILLAR I Digital Governance	**DG-1**	Establish Systems Priority Fund (SPF) for end-to-end process digitalisation
	DG-2	Review governance structure and process for Information Technology (IT) projects
	DG-3	Introduce standards and guidelines on architecture and data management
	DG-4	Develop Smart City Reference Model
	DG-5	Review and update policy & process of ICT procurement by Penang State Government
	DG-6	Establish Knowledge Sharing
STRATEGIC PILLAR II Digital Economy	**DE-1**	Go Digital Go International to promote local enterprises to go digital and internationalise
	DE-2	Promote digital innovation & research commercialisation
	DE-3	Align with the Malaysia Digital Economy Corporation (MDEC) to scale up Micro, Small and Medium Enterprises (MSME) initiatives
	DE-4	Nurture digital startup ecosystem to ideate for global markets, supported by anchors and accelerators
	DE-5	Develop talent pipeline in Science, Technology, Engineering and Mathematics (STEM), Electrical and Electronics (E&E) engineering and deep software technology
	DE-6	Accelerate digitalisation of tourism sector according to Penang Tourism Masterplan
STRATEGIC PILLAR III Digital Community	**DC-1**	Raise digital literacy and adoption
	DC-2	Mobilise through digital outreach volunteers
	DC-3	Engage community using digital platforms
	DC-4	Foster early-stage STEM education and training
STRATEGIC PILLAR IV Digital Infrastructure	**DI-1**	Implement the Penang Connectivity Masterplan (PCMP)
	DI-2	Validate the Telco Quality of Service
	DI-3	Implement integrated telco application deployment system
	DI-4	Upgrade the Penang Geographic Information System Centre (PeGIS) and implement an integrated geospatial mapping system (Digital twins)
	DI-5	Allocate funds for priority areas to invest in infrastructure ahead of demand growth

DTMP 1.0 Implementation Timelines



Achievements under DTMP 1.0

Penang's digital transformation initiatives have made commendable progress, with most initiatives aligning effectively with strategic objectives.

A study was carried out to assess the progress achieved and evaluate the strategic alignment of these initiatives within Penang's broader transformation framework, using five key levels of relevance and progress:

i.	Low Relevancy	Initiatives with little to no alignment with current goals or lacking available data
ii.	In Progress but Partially Relevant	Initiatives that are not relevant to the development of Penang; however, other ministries/agencies are progressing with them
iii.	In Progress but Needs Reassessment	Initiatives that are in progress but requiring reassessment of their relevance in the current landscape
iv.	In Progress and Relevant	Initiatives that are currently ongoing and align well with the current goals
v.	Completed and Highly Relevant	Initiatives that have been completed and have shown substantial alignment with strategic goals

The analysis revealed positive outcomes, with the majority of initiatives demonstrating significant progress and alignment with Penang's digital transformation goals. These achievements reflect a strong foundation laid by DTMP 1.0, showcasing effective implementation and alignment with Penang's broader transformation objectives.

The progress underscores Penang's commitment to fostering a connected, innovative and sustainable digital ecosystem. The results highlight not only the successes achieved but also the pathways for continued advancements in the next phase of Penang's digital journey.

Key Findings:

- Strong alignment with strategic goals across most initiatives
- Evidence of effective inter-agency collaboration
- Opportunities for reassessment in selected initiatives to enhance relevance
- Recommendations for improving monitoring and evaluation mechanisms

DTMP1.0 Strategic Pillar I

Digital Governance's Strategic Initiatives & the Projects

DG-1 Establish Systems Priority Fund for end-to-end process digitalisation

DG 1-1 Systems Priority Fund — 2021-2024

A dedicated fund to prioritise the development, upgrading and digitisation of systems with strategic cross-agency value under a centralised governance structure. A list of such systems were defined annually, following a needs assessment with various departments.

RACI	Cost / Source	KPI
DP, JKN, Project Owner, Pg2030- C4, JKPeGG	Fund Size: RM 3 mil/year Management cost: RM 25,000/year TOTAL: RM9.75 mil	Development and updating of systems that have been identified in the SPF.

Progress & Outcome Summary	Scoring
• Systems Priority Funds (SPF) was replaced by MMK Digital Fund, which funded the Digital Integrated Service Centre (MyKADUN) development. • MyKADUN has enhanced service delivery by streamlining operations, boosting productivity and efficiency, minimising fraud, improving public satisfaction and facilitating informed policymaking.	

DG-2 Review governance structure and process for IT projects

DG 2-1 User Effectiveness Assessments — 2021-2025

A periodic user effectiveness assessment of current systems and applications to determine retirement and technology updates. Systems that qualify for updates can also be included in the SPF list.

RACI	Cost / Source	KPI
JKPeGG, BTMKN, DP, Project Owner	RM50,000	Annual assessment schedule that is derived from IT systems pipeline

Progress & Outcome Summary	Scoring
• This initiative was conducted in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* whereby 27 G2E system applications were studied and a report created in *Laporan Kajian Perekayasaan Sistem Aplikasi Berorientasi Teknologi Terkini.*	

DG 2-2 Governance structure review — 2021

Review and rationalise roles and regulatory levers of various agencies with authority over IT systems across the Penang State Government.

RACI	Cost / Source	KPI
DP, BTMKN, JKPeGG, Pg2030-C4	Not Applicable	Approval and implementation of new structure

Progress & Outcome Summary	Scoring
• This initiative was achieved with the creation of MMK Digital and its committee, chaired by the Digital Exco.	

DTMP1.0 Strategic Pillar I

Digital Governance's Strategic Initiatives & the Projects

DG-3 Introduce standards and guidelines on architecture and data management

DG 3-1 Data and Architecture Practitioner's Network 2021-2029

A network consisting of service teams who co-develop and publish standards and guidelines

The network also serves as a platform for knowledge transfer among agencies and across domain expertise.

RACI	Cost / Source	KPI
DP, Network, BTMKN, Pg2030-C4	Not applicable	Establishment of network

Progress & Outcome Summary	Scoring
• This initiative was carried out in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* by: o Rationalising state-level digital governance o Conducting a comprehensive review of existing ICT policies, guidelines and procedures o Developing new policies and procedures o Implementing an Information Security Management System (ISMS) to enhance overall effectiveness	

DG 3-2 Enforcement of Standards and Guidelines 2021-2029

An enforcement mechanism whereby the standards and guidelines published by the network ensure that IT systems are developed with consistent architecture

The mechanism is aligned with the governance structure outlined in DG-2-2.

RACI	Cost / Source	KPI
Pg2030-C4, DP, JKPeGG, BTMKN, CMI	Not applicable	Enforcement of published standards

Progress & Outcome Summary	Scoring
• This initiative was carried out in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* through: o A comprehensive review of existing ICT policies, guidelines and procedures o Development of new policies and procedures o Implementation of an Information Security Management System (ISMS) to enhance overall effectiveness.	

DTMP1.0 Strategic Pillar I

Digital Governance's Strategic Initiatives & the Projects

DG 3-3 Reusable service libraries — 2021-2029

Development and maintenance of reusable service libraries and deployment mechanism for common service modules to enable systems across the state to be developed in an agile and service-oriented manner

RACI	Cost / Source	KPI
DP, BTMKN (pending type), PBT	Not Applicable	Number of deployment of modules from service library

Progress & Outcome Summary	Scoring
• This initiative was conducted in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* through: ○ The creation of an online payment portal (eBayar) & the Penang Information & Complaints System (ePINTAS). • This was followed by the integration of MyKADUN with ePINTAS.	

DG-4 Develop Smart City Reference Model

DG 4-1 Smart City Reference Model — 2021

A reference model that can function as an implementable template for IT systems when new cities are established

RACI	Cost / Source	KPI
Pg2030-D3, DP, PBT	RM50,000	Publication of reference model

Progress & Outcome Summary	Scoring
• The reference model was established through the creation of the Penang Smart State Agenda 2021-2023.	

DG 4-2 Partnerships with thought leaders — 2021-2029

Strategic partnerships with thought leaders and Smart City related-organisations for funding, expertise and access to international networks

RACI	Cost / Source	KPI
BKT	Not applicable	Number of partnerships established and programmes organised

Progress & Outcome Summary	Scoring
• Partnership and collaborative efforts with the Kuching North City Hall (DBKU), Sarawak and private enterprises, such as TM One, on smart city initiatives.	

DTMP1.0 Strategic Pillar I

Digital Governance's Strategic Initiatives & the Projects

DG-5	Review and update policy & process of ICT procurement by the Penang State Government

DG 5-1 Local content policy in procurement — 2021

A form of local content policy which catalyses the development of Penang's ICT industry through increased spending and demand in the local ecosystem

RACI	Cost / Source	KPI
Pg2030-B4, JKN, DP, BTMKN, CMI	Not applicable	Approval and implementation of local content policy

Progress & Outcome Summary	Scoring
• This was conducted in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* through the development of a guideline that outlines: o The distribution of laptops, personal computers and printers for the State of Penang o The procedures for applying for technical approvals and monitoring of state agency ICT projects, o The application process for ICT software and equipment.	

DG 5-2 Review of procurement process for ICT — 2021-2029

A review of the current IT procurement process that favours the development of Penang's ICT industry by enabling procurement officers to share information seamlessly and further facilitate ease of doing business with the state for local vendors

RACI	Cost / Source	KPI
Pg2030-C4, JKN, DP, BTMKN	Not applicable	Increased participation of Penang-based companies in Penang State procurement

Progress & Outcome Summary	Scoring
• This initiative was achieved by adhering and following the procurement guidelines created by *MAMPU,* with support from the *Jawatankuasa Pemandu ICT (JPICT) and Jawatankuasa Teknikal ICT (JTICT).*	

DTMP1.0 Strategic Pillar I

Digital Governance's Strategic Initiatives & the Projects

DG-6 Establish Knowledge Sharing

DG 6-1 Training for specialised IT practitioners 2021-2029

Training programmes for specialised IT functions in the form of fellowship programmes, secondment, or knowledge partnerships with the private sector

RACI	Cost / Source	KPI
DP, BPSM, BTMKN, Pg2030-C4, Pg2030-D3	Not applicable	Number of IT staff who attend training

Progress & Outcome Summary	Scoring
• This was conducted in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* and the VISSIM Traffic Simulation through: o The use of the Immersion Technology Programme o Implementation of technical training of digital services o Provision of professional certificates	

DG 6-2 Training for Non-IT practitioners 2021-2029

Training programmes for functional service practitioners. These initiatives are intended to help general service staff become familiar with and willing to adopt technology in their everyday tasks

RACI	Cost / Source	KPI
DP, BPSM, BTMKN, Pg2030-C4, Pg2030-D3	Not applicable	Number of service practitioners who attend training

Progress & Outcome Summary	Scoring
• The training programmes were conducted in the *Pelan Strategik Pendigitalan PSUKPP (2021-2025)* by providing technical training on digital services.	

DG 6-3 Centre of Excellence 2021-2029

Digital Penang as a Centre of Excellence for IT expertise and data analytics, particularly in the field of government and public administration

RACI	Cost / Source	KPI
DP, Pg2030-C4, CMI	Not applicable	International recognition of Digital Penang's contribution

Progress & Outcome Summary	Scoring
• This was achieved when the Creative Digital District (CD2) was conceived in 2022.	

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE-1	Go Digital Go International to Promote Local Enterprises to go Digital and Internationalise	
DE 1-1	**Smart Factory Digitalisation**	**2021-2022**
Identification of eligible export-oriented manufacturing SMEs to begin their 4IR journey		
RACI	Cost / Source	KPI
DP	RM500,000	5 showcase pilots
Progress & Outcome Summary		Scoring
No data available		
DE 1-2	**Shared Platforms**	**2021-2024**
Shared resources leveraged to make essential software applications available to local enterprises to reduce costs and increase productivity		
RACI	Cost / Source	KPI
DP, Pg2030-B1	RM1 mil/year TOTAL: RM3 mil	Number of local enterprises which participate in shared platforms offered by Digital Penang
Progress & Outcome Summary		Scoring
No data available		
DE 1-3	**Founders@Penang Entrepreneur's Biography**	**2021-2024**
A book project to document, showcase and acknowledge the entrepreneurship journey of successful local enterprises in Penang that have leveraged technology for growth		
RACI	Cost / Source	KPI
DP, Pg2030-B1	RM50,000/year TOTAL: RM150,000	Number of entrepreneurs showcased
Progress & Outcome Summary		Scoring
• The book "Founders GRIT" was published in 2021, featuring 29 companies and copies of the book were distributed to promote entrepreneurship in Penang.		

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE-2 Promote Digital Innovation & Research Commercialisation

DE 2-1 Digital Open Innovation Platform (Rekanomi System) 2021-2024

A platform for problem owners to seek technology-based solutions to their business challenges, while also allowing individuals with solutions to secure their first customers

RACI	Cost / Source	KPI
DP, Pg2030-B4	Not applicable	Number of successful business transactions initiated through the platform

Progress & Outcome Summary	Scoring
This initiative was realised with the launch of the Automation Valley Malaysia Platform. It was an alliance between the Malaysian-German Chamber of Commerce and Industry (MGCC) and Digital Penang.	

DE 2-2 Digital Open Innovation Fund (Rekanomi Fund) 2021-2024

A fund by the private sector, matched by the Penang State Government to support entrepreneurs looking to provide technology solutions through the innovation platform while implicitly subsidising problem owners

RACI	Cost / Source	KPI
DP, Pg2030-B4	RM1.1 mil/year TOTAL: RM3.3 mil	Sustainability of fund

Progress & Outcome Summary	Scoring
The matching fund was not realised.	

DE 2-3 Commercialisation centre 2021-2024

A centre to support Research and Commercialisation (R&D) as an impetus for entrepreneurship and innovation

RACI	Cost / Source	KPI
Pg2030-B4, DP	TBD	Number of successful commercialisation

Progress & Outcome Summary	Scoring
No data available	

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE-3 Align with MDEC to Scale up MSME Initiatives

DE 3-1 MDEC Digital Accelerator Centre (DXC) 2021-2024

A one-stop centre for micro and small enterprises to access digitalisation initiatives and grants by MDEC, as well as other agencies and services by Digital Penang

RACI	Cost / Source	KPI
Pg2030-B4, DP, CMI	RM100,000/year TOTAL: 300,000	Number of SMEs served

Progress & Outcome Summary	Scoring
No data available	

DE 3-2 Kempen Penang Sales (B2B Marketplace) 2021-2024

Various programmes and initiatives championed by MMK Perdagangan, aimed at facilitating digitalisation of micro and small enterprises

RACI	Cost / Source	KPI
Pg2030-B4, DP, PDC, PHC	Not applicable	Number of participants in various programmes

Progress & Outcome Summary	Scoring
No data available	

DE-4 Nurture Digital Startup Ecosystem to Ideate for Global Markets, Supported by Anchors and Accelerators

DE 4-1 Pitch or Ditch 2021-2023

A monthly event for individuals to showcase their ideas and get valuable feedback from experts in the startup ecosystem

RACI	Cost / Source	KPI
DP, Pg2030-B4	RM 500,000/year TOTAL: RM1.5 mil	Number of individuals who participate in project

Progress & Outcome Summary	Scoring
Several programmes of a similar nature (Penang Hackathon, Pitch@USM, IdeaPesta, FundRace and Pitch Island) were conducted between 2021 and 2023.	

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE 4-2	**Startup Weekend**	**2021-2023**
A monthly weekend activity to educate interested entrepreneurs on the fundamentals of setting up a business		
RACI	Cost / Source	KPI
DP, Pg2030-B4	RM500,000/year TOTAL: RM1.5 mil	Number of startups who attend event
Progress & Outcome Summary		Scoring
There was no outcome from the original programme and it was subsequently replaced with "Techstars Startup Weekend Penang". This event was conducted between 2023 and 2024, yielding positive results, with new startups being developed as a pipeline for the ecosystem.		

DE 4-3	**Coffee & Currypuff**	**2021-2023**
Bi-weekly community events to kickstart various events of interest		
RACI	Cost / Source	KPI
DP, Pg2030-B4	Not applicable	Number of participation
Progress & Outcome Summary		Scoring
This initiative was conducted annually with great success, garnering over 500 participants from 2022, with various other programmes being created to strengthen the startup community and promote collaborations.		

DE 4-4	**Webinars**	**2021-2023**
Programmes with industry leaders and discussion on latest trends and happenings in the startup scene to address problems a startup may face		
RACI	Cost / Source	KPI
DP, Pg2030-B4	Not applicable	Number of participation
Progress & Outcome Summary		Scoring
This initiative was conducted as part of the supporting initiative for the Coffee & Currypuff initiative, garnering 5,135 participations.		

DE 4-5	**Startup Accelerator**	**2021-2024**
A programme for entrepreneurs who have a minimum viable product (MVP) to build their business		
RACI	Cost / Source	KPI
DP, Pg2030-B4	RM1.5 mil/year TOTAL: RM4.5 mil	Number of startups who complete the accelerator programme
Progress & Outcome Summary		Scoring
This initiative was successfully conducted with the One Founders GRIT Accelerator, supported by the Founders GRIT Seed Grant and Founders Grit Seed Programme in 2022, with successor programmes, such as the IHL Incubator Incentive Programme, Penang Startup Mentors; Startup Penang 500 and Hardtech Accelerator, launched in 2023–2024.		

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE 4-6 Go-to-Market Facilitation — 2021-2024

Collaboration with MATRADE to support access to local, regional and global markets

RACI	Cost / Source	KPI
DP, Pg2030-B4	RM0.5 mil/year TOTAL: RM1.5 mil	2 marketing trips per year

Progress & Outcome Summary	Scoring
This initiative was not conducted and was replaced with a structured programme in 2023 and 2024 called Market Access Program.	

DE-5 Develop Talent Pipeline in STEM, E&E Engineering and Deep Software Technology

DE 5-1 Attraction of digital FDI anchor — 2021-2024

A software incubation service and incentive to attract the setup of offshore centres

RACI	Cost / Source	KPI
Pg2030-B1, IP, DP	RM1 mil/year TOTAL:RM 3 mil	1 per year

Progress & Outcome Summary	Scoring
Not relevant and is under the jurisdiction of Invest Penang. However, engagements were conducted with the Malaysia Digital District.	

DE 5-2 Development of ICT ecosystem — 2021-2025

A network of Penang-based IT companies as a platform for knowledge sharing and synergising resources to develop a robust IT industry in Penang

RACI	Cost / Source	KPI
DP, BTMKN, Pg2030-C4	RM 50,000	Number of companies that participate in the network

Progress & Outcome Summary	Scoring
This initiative was replaced by the creation of a database of startups in Penang. Currently, the database contains 170 registered startups across 28 technology verticals, comprising primarily of software developers and system integrators.	

DTMP1.0 Strategic Pillar II

Digital Economy's Strategic Initiatives & the Projects

DE-6	Accelerate Digitalisation of Tourism Sector according to Penang Tourism Masterplan		
N/A	**N/A**		**N/A**
N/A			
RACI	Cost / Source	KPI	
N/A	N/A	N/A	
Progress & Outcome Summary			Scoring
No data available			

DTMP1.0 Strategic Pillar III

Digital Community's Strategic Initiatives & the Projects

DC-1 Raise Digital Literacy and Adoption

DC 1-1 #DahDigital **2021-2022**

Digital literacy classes targeted at daily technology applications

RACI	Cost / Source	KPI
DP, Pg2030-C1,C2	RM1.2 mil (inclusive of DC-1-2)	Number of classes organised and students' syllabus administered

Progress & Outcome Summary	Scoring
Digital clinics were created in various locations to improve access for participants. Furthermore, 64 classes were organised, with1,546 participations recorded.	

DC 1-2 #DahDigital **2021-2022**

Digital literacy classes targeted at micro-businesses and the self-employed

RACI	Cost / Source	KPI
DP, Pg2030-B4	RM1.2 mil (inclusive of DC-1-2)	Number of classes organised and students' syllabus administered

Progress & Outcome Summary	Scoring
This initiative was successfully conducted under the MicroSME LevelUP Programme, with three cohorts and 72 participants completing the advanced class.	

DC-2 Mobilise Digital Outreach Volunteers

DC 2-1 Digital Outreach Network (DON) **2021-2025**

An official network of volunteers comprising Penangites with various expertise who can be called upon for crisis management, co-creation of policies or state related programmes

RACI	Cost / Source	KPI
DP, Pg2030-C2	Platform: RM100,000 Programmes: RM200,000/year TOTAL: RM 1.1 mil	Number of volunteers who participate in various programmes

Progress & Outcome Summary	Scoring
A total of 325 volunteers successfully registered via DahDerma Portal and Teh Tarik Sessions in Digital Penang. However, further enhancements are being conducted through training to foster a positive mindset and develop tools to support volunteering efforts.	

DTMP1.0 Strategic Pillar III

Digital Community's Strategic Initiatives & the Projects

DC 2-2	**Interest-specific communities**	**2021-2025**
Interest-specific communities organised as various streams under DON and funneled into various other programmes		
RACI	Cost / Source	KPI
DP, Pg2030-C2	Platform: RM 100,000 Programmes: RM 200,000/year TOTAL: RM 1.1mil	Number of volunteers who participate in various programmes
Progress & Outcome Summary		Scoring
• A total of 325 volunteers successfully registered via DahDerma Portal and Teh Tarik Sessions in Digital Penang.		

DC-3 Engage Community using Digital Platforms

DC 3-1	**Online community engagement platforms**	**2021-2025**
A moderated digital platform where communities can deliberate and vote on various policy matters and where the government can conduct sense checks on policy ideas		
RACI	Cost / Source	KPI
DP, PI, Pg2030-C3	Platform: RM100,000 Programmes: RM200,000/year TOTAL: RM1.1 mil	Participation of communities in discourse on the platform
Progress & Outcome Summary		Scoring
The DahDerma Portal was revamped to enhance its reach and ensure greater public participation, providing a platform where communities can deliberate and vote on various policy matters and where the government can conduct sense checks on policy ideas.		

DC-4 Foster Early-stage STEM Education and Training

N/A	**N/A**	**N/A**
N/A		
RACI	Cost / Source	KPI
N/A	N/A	N/A
Progress & Outcome Summary		Scoring
No data available		

DTMP1.0 Strategic Pillar IV

Digital Infrastructure's Strategic Initiatives & the Projects

DI-1 Implement the Penang Connectivity Masterplan (PCMP)

DI 1-1 Implementation of PCMP **2021-2023**

Implement PCMP according to defined targets and timeline

RACI	Cost / Source	KPI
BKT, PDCTelco, Digital Penang	As in PCMP	As in PCMP

Progress & Outcome Summary	Scoring
The initiative was successfully conducted via the Penang Internet Exchange (PIX), resulting in improved internet connectivity, increased economic value creation, enhanced digital services and increased government efficiency.	

DI-2 Physical Validation of the Telco Quality of Service

DI 2-1 QoS validation **2021-2024**

A bi-annual or, at a minimum, an annual random exercise must be carried out to dispatch mobile units to verify and validate claims on network performance by the commercial Telcos. Any discrepancy between the reported claims versus the actual surveyed results will result in a penalty. Incentives may be provided for underserved areas deemed important by the State.

RACI	Cost / Source	KPI
PDCTS, DP	Borne by MCMC	QoS report

Progress & Outcome Summary	Scoring
No data available	

DI-3 Implement an Integrated Telco Application Deployment System

DI 3-1 Digitalisation of telco infrastructure process **2021-2023**

A system that integrates with the workflows of various departments and agencies to track application submissions, from approval to implementation to provide visibility on the process

RACI	Cost / Source	KPI
Pg2030-D2, DP, BKT, PDCTS	RM500,000	Real-time visibility of process

Progress & Outcome Summary	Scoring
This initiative was achieved through the PDC Telco Network Management System, resulting in the following outcomes: • Enhanced transparency and accountability, with clear tracking and visibility into the application process. • Improved efficiency, through streamlined processes and automation that reduced manual tasks and delays. • Better communication and collaboration, enabling real-time updates and cross-departmental problem-solving.	

DTMP1.0 Strategic Pillar IV

Digital Infrastructure's Strategic Initiatives & the Projects

DI-4 Upgrade the Penang Geographic Information System Centre (PEGIS) and implement an integrated geospatial mapping system (Digital twin)

DI 4-1 Utility Mapping-Digital Twin — **2021**

- Conduct business process analysis to understand data ownership and usage.
- Conduct gap analysis between new and old systems.
- Select and recommend solution, pilot and deploy.

RACI	Cost / Source	KPI
CMI, DP, Depts	Vendor supported	Time to deploy

Progress & Outcome Summary	Scoring
This initiative was achieved through the Penang Corridor Utility and PeGIS system, resulting in: • Improved decision-making and planning through better resource management, land use planning and enhanced emergency response capabilities using real-time data. • Economic development by attracting businesses and investments and by promoting tourism through detailed geographical data and mapping of tourist destinations.	

DI-5 Allocate Funds for Priority Areas to Invest in Infrastructure Ahead of Demand Growth

DI 5-1 Needs assessment — **2021**

An online survey to determine user demand zones and analyse data against other factors to determine priority zones

RACI	Cost / Source	KPI
PDCTS, Pg2030-D2, DP, BKT	Vendor cost	Report on priority zones

Progress & Outcome Summary	Scoring
The survey was not conducted. Nevertheless, a short online questionnaire could be carried out to gather general feedback from users on their preferred areas. The collected insights may be used to identify potential demand zones and compare them for further analysis.	

DI 5-2 Priority Funds — **2021-2024**

Funds set aside for zones where demand growth is low but high in economic value and the processing of applications to invest in advance

RACI	Cost / Source	KPI
Pg2030-D2, PDCTS, DP, BKT	RM5 mil/year TOTAL: RM15 mil	Establishment of funds

Progress & Outcome Summary	Scoring
No data available	

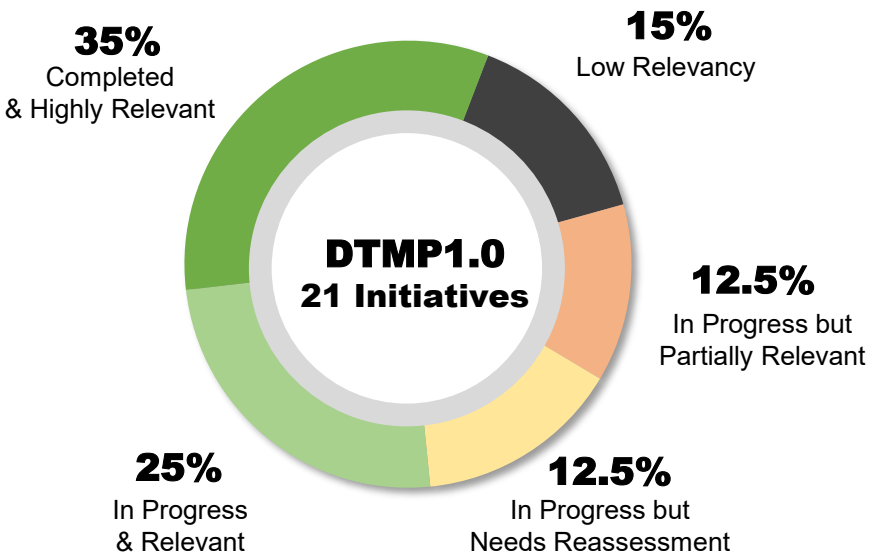
DTMP1.0 Strategic Pillar IV

Digital Infrastructure's Strategic Initiatives & the Projects

DI 5-2	**Financial Analysis**	**2021**
A financial and ROI analysis to quantify the external investment required		
RACI	Cost / Source	KPI
DP, PDCTS, BKT	Not applicable	Report on financial analysis
Progress & Outcome Summary		Scoring
No data available		

Achievements under DTMP 1.0

The summary consolidates the progress and strategic alignment of key initiatives for Penang's transformation framework.



The chart above highlights several positive outcomes demonstrating that the majority of initiatives under DTMP 1.0 have made substantial progress and are well-aligned with Penang's digital transformation objectives. These achievements underscore the solid foundation established by DTMP 1.0 reflecting effective implementation and alignment with Penang's broader vision for a connected, innovative and sustainable digital ecosystem.

The data presented in the chart further illustrate these outcomes. Specifically, 35% of the initiatives have been successfully completed and are highly relevant to strategic goals, with the digital community pillar dominating them. Additionally, 25% are in progress but show strong alignment with the intended objectives. Meanwhile, 25% of the initiatives are still in progress but require reassessment or are only partially relevant. In addition, 15% of the initiatives have been identified as having low relevance to the current strategic priorities, with the digital economy and digital infrastructure pillars comprising the highest percentages in these categories.

Achievements under DTMP 1.0

The level of relevance is presented through a list of key initiatives, highlighting their alignment with strategic objectives and priorities.

Level of Relevance	List of Projects	
Completed and Highly Relevant	**14 Projects (35%)**	**DG 2-1** User effectiveness assessments **DG 2-2** Governance structure review **DG 3-3** Reusable service libraries **DG 6-1** Training for specialised IT practitioners **DG 6-3** Centre of Excellence **DE 1-3** Founders@Penang entrepreneur's biography **DE 2-1** Digital Open Innovation Platform (Rekanomi System) **DE 4-2** Startup Weekend **DE 4-3** Coffee & Currypuff **DE 4-4** Webinars **DC 1-1, 1-2** #DahDigital **DC 2-1** Digital Outreach Network (DON) **DC 3-1** Online community engagement platforms **DI 1-1** Implementation of PCMP according to defined targets and timeline
In Progress and Relevant	**10 Projects (25%)**	**DG 1-1** Systems Priority Fund (SPF) **DG 3-1** Data and Architecture Practitioner's Network **DG 3-2** Enforcement of Standards and Guidelines **DG 4-1** Smart City Reference Model **DG 4-2** Partnerships with thought leaders **DG 6-2** Training for non-IT practitioners **DE 4-1** Pitch or Ditch **DE 4-5** Startup Accelerator **DC 2-2** Interest-specific communities **DI 4-1** Utility Mapping-Digital Twin
In Progress but Needs Reassessment	**5 Projects (12.5%)**	**DE 2-2** Digital Open Innovation Fund (Rekanomi Fund) **DE 4-6** Go-to-Market facilitation **DE 5-2** Development of ICT ecosystem **DI 5-1** Needs assessment **DI 5-3** Financial analysis
In Progress but Partially Relevant	**5 Projects (12.5%)**	**DG 5-1** Local content policy in procurement **DG 5-2** Review of procurement process for ICT **DE 3-1** MDEC Digital Accelerator Centre (DXC) **DE 5-1** Attraction of digital FDI anchor **DI 3-1** Digitalisation of telco infrastructure process
Low Relevancy	**6 Projects (15%)**	**DE 1-1** Smart Factory digitalisation **DE 1-2** Shared platforms **DE 2-3** Commercialisation Centre **DE 3-2** *Kempen Penang Sales* (B2B Marketplace) **DI 2-1** QoS validation **DI 5-2** Priority funds

Gaps Identified and Lessons Learned

Crucial analysis for identifying areas of improvement in DTMP 1.0 and ensuring effective implementation in DEMP

Gaps Identified	**Gap 1:** Slower Progress despite Positive Outcomes	• While DTMP 1.0 has produced significant positive outcomes, the pace of progress has been slower than expected, highlighting the need for stronger focus and coordination among agencies.
	Gap 2: Inconsistent and Unsustainable Funding	• The lack of consistent and sustainable budget throughout to fund the projects and initiatives in DTMP 1.0 needs to be corrected in the next DEMP where budget for the entire three years need to be committed.
	Gap 3: Need for Federal Strategy Alignment	• There is a growing need to update the plan to better align with the evolving direction of the federal government's strategies.
	Gap 4: Lack of Strategies and Stakeholder Engagement	• The current Penang DTMP lacks robust strategies and inclusive stakeholder engagement, limiting sustained progress and innovation.
	Gap 5: Weak Monitoring and Evaluation Mechanisms	• There are limitations in the existing monitoring and evaluation mechanisms, making it challenging to ensure consistent accountability and effective measurement of the initiatives' impact.
Lesson Learned	**Lesson 1:** Importance of Regular Monitoring and Evaluation	• Regular monitoring of initiatives by relevant agencies and project owners is crucial for timely implementation and effective outcome evaluation.
	Lesson 2: Leveraging Public-Private Partnerships	• Increased involvement of the private sector through PPPs should be explored, moving beyond a reliance on government funding.
	Lesson 3: Enhancing Stakeholder Collaboration	• Strengthening collaboration among stakeholders—government, private sector and community members—is essential for creating a cohesive strategy that aligns resources and efforts towards shared goals.
	Lesson 4: Need for a Long-Term Strategic Framework	• Establishing a long-term strategic framework will help maintain momentum and adaptability in the evolving digital landscape, ensuring alignment with federal and regional strategies.

02

DIGITAL ECONOMY

Digital Economy

State-level efforts are essential to effectively enhance Malaysia's economy, with a focus on addressing local needs and priorities to drive sustainable growth.

Performance of Malaysia's Digital Economy

Malaysia's GDP in 2022

13.6% Gross Value-Added ICT

9.4% E-commerce of other industries

23.0%
(RM 412.3 Bil) Contribution of Digital Economy to National GDP in 2022
2021: 23.2% (RM359.3 Bil)
+14.8% from 2021-2022

Malaysia's digital economy is projected to reach 25.5% by 2025.

What is Digital Economy?

Digital economy is defined as economic and social activities that involve the production and use of digital technology by individuals, businesses and governments.~ *Malaysia Digital Economy Blueprint*

The digital economy is a rapidly growing sector with significant opportunities both in Malaysia and globally, encompassing a wide range of diverse sectors and operational areas. According to Malaysia MyDIGITAL Blueprint, digital economy refers to economic and social activities that involve the production and use of digital technology by individuals, businesses and governments.

Similarly, the Trade Union Advisory Committee of the Organization for Economic Cooperation and Development (OECD) describes the digital economy as a networked ecosystem that spans multiple sectors using ICT, broadband and the IoT to enable global business and social interactions. For the US Bureau of Economic Analysis (BEA) of the United Nations (UN), digital economy is an economy supported by necessary digital infrastructure, which is essential for the functioning of digital networks. This infrastructure facilitates digital transactions (e-commerce) and user-generated content (digital media).

The OECD further notes that digital economy encompasses all economic activities that are either heavily dependent on or enhanced by digital inputs like technology, infrastructure and data. Finally, the World Economic Forum (WEF) highlights the importance of broadening the scope of tech diplomacy to involve a diverse range of stakeholders. This inclusive approach to tech diplomacy is essential for ensuring equitable and sustainable growth of the digital economy and fostering effective collaboration.

Digital economy is a networked ecosystem that spans sectors using ICT, broadband and the IoT to enable global business and social interactions.

OECD's Trade Union Advisory Committee

Digital economy is an economy that is supported by necessary digital infrastructure, which is essential for the functioning of digital networks. This infrastructure supports digital transactions (e-commerce) and user-generated content (digital media).

United States Bureau of Economic Analysis & Social Council of the United Nations

Digital economy encompasses all economic activities that are either heavily dependent on or enhanced by digital inputs like technology, infrastructure and data.

Organization for Economic Cooperation and Development

Widening the scope of tech diplomacy to include diverse stakeholders is key to the equitable and sustainable growth of the digital economy. Collaboration is crucial for ensuring an inclusive approach to tech diplomacy.

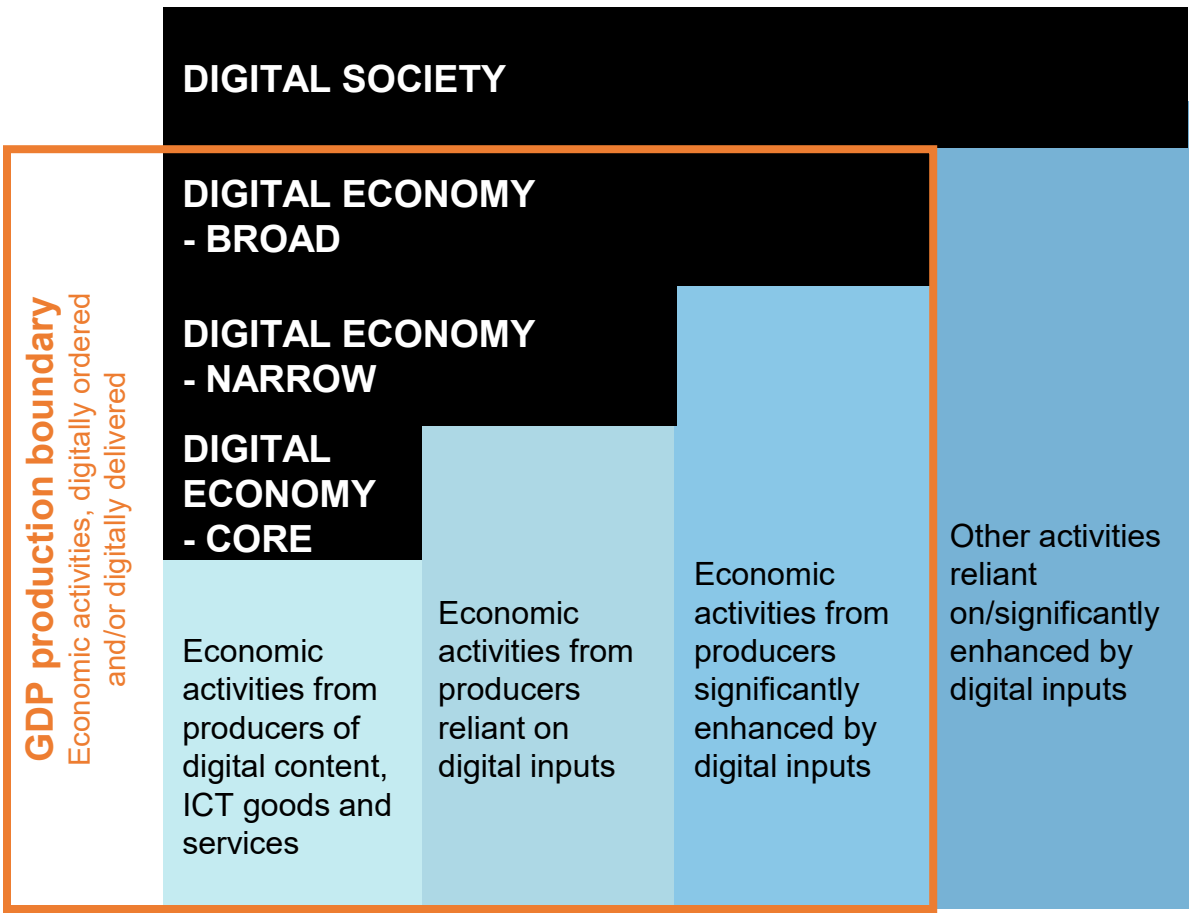
World Economic Forum

Tiered Definition of the Digital Economy

Understanding the tiers of the digital economy is key to strategy, resource allocation, innovation and equitable digital transformation.

The digital economy is a multi-tiered ecosystem encompassing the production, use and impact of digital technologies across society. It represents a transformative shift in how economies function, driven by advancements in digital infrastructure, innovative technologies and widespread connectivity. At its core, the digital economy leverages digital tools and platforms to optimise processes, enhance productivity and enable seamless communication and collaboration.

This ecosystem spans multiple layers, including:



Tiered Definition of the Digital Economy

LAYER I
DIGITAL ECONOMY- CORE

The core of the digital economy consists of industries that produce and manage digital technologies and infrastructure, including ICT, software and data services. These sectors form the foundation of the digital economy, enabling connectivity and fostering innovation across various industries.

LAYER II
DIGITAL ECONOMY- NARROW

The narrow definition of the digital economy emphasises economic activities generated by industries and businesses that primarily rely on digital inputs, including technologies, platforms and data. The scope includes sectors inherently digital, such as e-commerce, digital advertising, software development and online content services that operate on digital platforms, leveraging cloud computing and data-driven processes.

LAYER III
DIGITAL ECONOMY- BROAD

The broad definition of the digital economy extends beyond core and narrow components to include economic activities in industries and firms significantly enhanced by the use of ICT inputs. This perspective captures how traditional sectors, such as agriculture, manufacturing, healthcare and logistics, integrate digital technologies such as cloud computing, AI and IoT to innovate, optimise operations and engage with customers more effectively.

LAYER IV
DIGITAL SOCIETY

The concept of a digital society encompasses the broader social impacts of digital transformation, reflecting how technology influences various aspects of daily life, work and community well-being. It highlights the creation of new jobs driven by advancements in digital industries, emphasising the need for digital literacy to equip individuals with the skills necessary to thrive in an increasingly tech-driven world. A digital society also prioritises digital equity, ensuring that access to technology and its benefits are available to all, regardless of socioeconomic status or geographic location. Ultimately, a digital society enhances the overall quality of life while addressing critical challenges, such as the digital divide and economic inequality.

The Foundation of a Digital City

The digital economy provides the technological and economic foundation for a city's digital transformation.

Layer 4
ENVIRONMENT

Layer 3
SERVICES & APPLICATIONS

Layer 2
CORE PLATFORMS & FRAMEWORKS

Layer 1
PHYSICAL INFRASTRUCTURE

Digital cities involve adopting a strategic approach to optimise urban operations, ultimately making them safer, more efficient and capable of offering services that enhance the quality of life.

In a digital city, a wide range of elements—such as hospitals, schools, energy systems, transportation and public infrastructure, including streetlights, traffic signals, sensors and emergency equipment—are interconnected. This interconnectedness facilitates the seamless integration of services.

By leveraging shared data storage and analysis, intelligent connections can be established, leading to improvements in traffic flow and the creation of energy-efficient buildings. In addition, this system allows for the exchange of information between municipalities and the business sector, which helps reduce waste and enhances services at local, regional and national levels.

The Foundation of a Digital City

A digital city relies on the seamless interaction of all layers to create an innovative, inclusive and resilient urban space, improving the overall quality of life for its citizens.

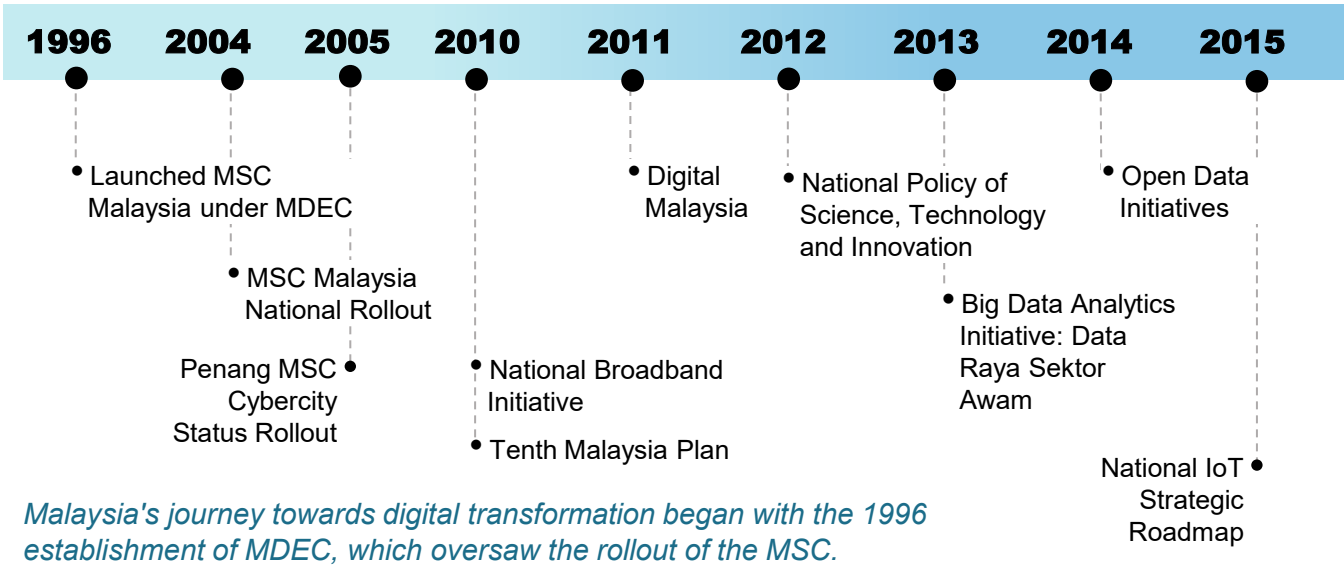
The Layers of a Digital City

Layer	Components	Explanation
Layer 1: PHYSICAL INFRASTRUCTURE	• Telecommunications Networks (fiber optics, 5G) • Broadband Infrastructure • Data Centres • IoT Devices & Sensors • Etc.	• This layer includes the physical assets required for connectivity and data transmission. • It supports communication and data collection, enabling real-time information flow and responsive systems.
Layer 2: CORE PLATFORMS & FRAMEWORKS	• Operating Systems • Development Frameworks • Data Storage and Middleware • User Interfaces • Etc.	• This layer provides the technical infrastructure for creating, managing and processing data. • It enables the development of digital services, ensuring smooth operations, data management and user interaction across various platforms.
Layer 3: SERVICES & APPLICATIONS	• Smart Traffic Management • E-Government Services • Smart Buildings • Smart Waste Management • Etc.	• This layer includes the digital solutions and applications that improve urban life. • It delivers services like efficient transportation, healthcare, waste management and citizen services.
Layer 4: ENVIRONMENT	• Eco-Friendly Urban Design • Environmental Monitoring • Renewable Energy • Community Engagement • Etc.	• This layer reflects the overall environment where digital solutions interact with urban systems and the natural world. • It promotes sustainability, using technology to monitor environmental conditions and engage communities in green practices.

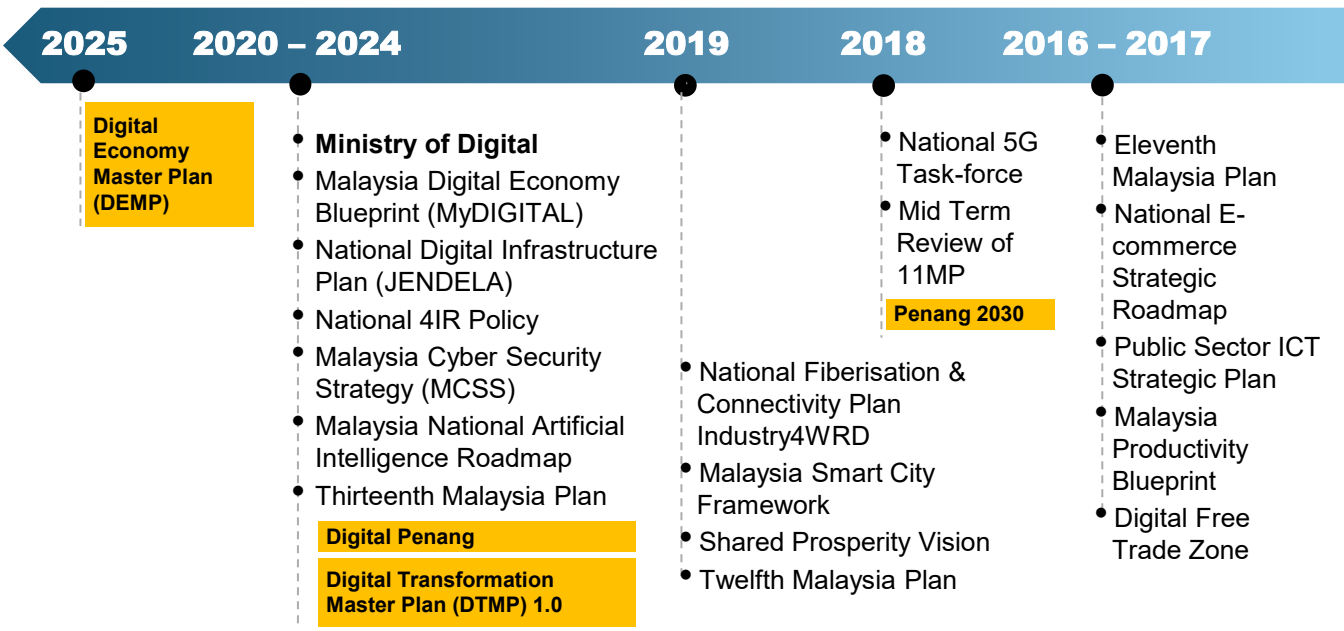
Malaysia's Digital Economy Journey

The Malaysian government has put in place numerous policies and strategies to foster technological and digital transformation nationwide.

Malaysia's ICT Policy Evolution



Malaysia's journey towards digital transformation began with the 1996 establishment of MDEC, which oversaw the rollout of the MSC.



Legend:

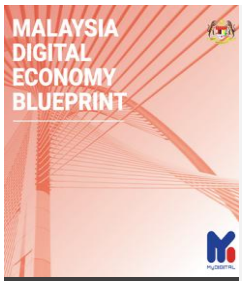
The launch of the Penang ICT Agenda

Supports Malaysia's Digital Roadmap

DEMP is strategically aligned with the vision of both national and state objectives, ensuring a unified approach towards sustainable development and digital transformation.

Ekonomi Madani

The "MADANI Economy: Empowering the People" aims to strengthen Malaysia's economy and enhance the quality of life for its citizens. It focuses on "Raising the Ceiling and Floor" by positioning Malaysia as a leading economy in Asia, among other key objectives.



Malaysia Digital Economy Blueprint

The Malaysia Digital Economy Blueprint focuses on driving digital transformation across public services, enhancing economic competitiveness and building robust digital infrastructure. Its vision is to change Malaysia into a digitally-driven, high-income nation by 2030.

12th Malaysia Plan

The plan aims to make Malaysia a high-income nation while tackling socio-economic challenges. It focuses on smart technologies, better connectivity and green infrastructure. For Penang, it includes the LRT, BRT, highway upgrades and etc.

New Industrial Master Plan 2030

The New Industrial Master Plan 2030 is designed to modernise Malaysia's manufacturing sector and enhance its global competitiveness. It includes increasing economic complexity, creating high-value jobs, strengthening domestic linkages and improving inclusivity, among other key objectives.

13th Malaysia Plan

The plan focuses on green, blue and silver economies, along with reforms in labour, education, health and housing. Its priorities include high-value industries, better public transport and environmental health.

Penang2030

Penang2030 aims to make Penang a "Family-Focused, Green and Smart State that Inspires the Nation." It focuses on improving liveability, upgrading the economy reducing inequalities and fostering a smart technology environment.

Global Digital Economy Landscape

Industrial revolutions have long played a pivotal role in transforming economies and the 4IR continues this trend, fostering a more interconnected world.

The Fourth Industrial Revolution or 4IR is reshaping industries, particularly manufacturing, through disruptive technologies like data connectivity, advanced analytics, human-machine interaction and robotics. Unlike previous revolutions, 4IR blends digital, physical and biological systems, transforming how products are designed, produced and distributed.

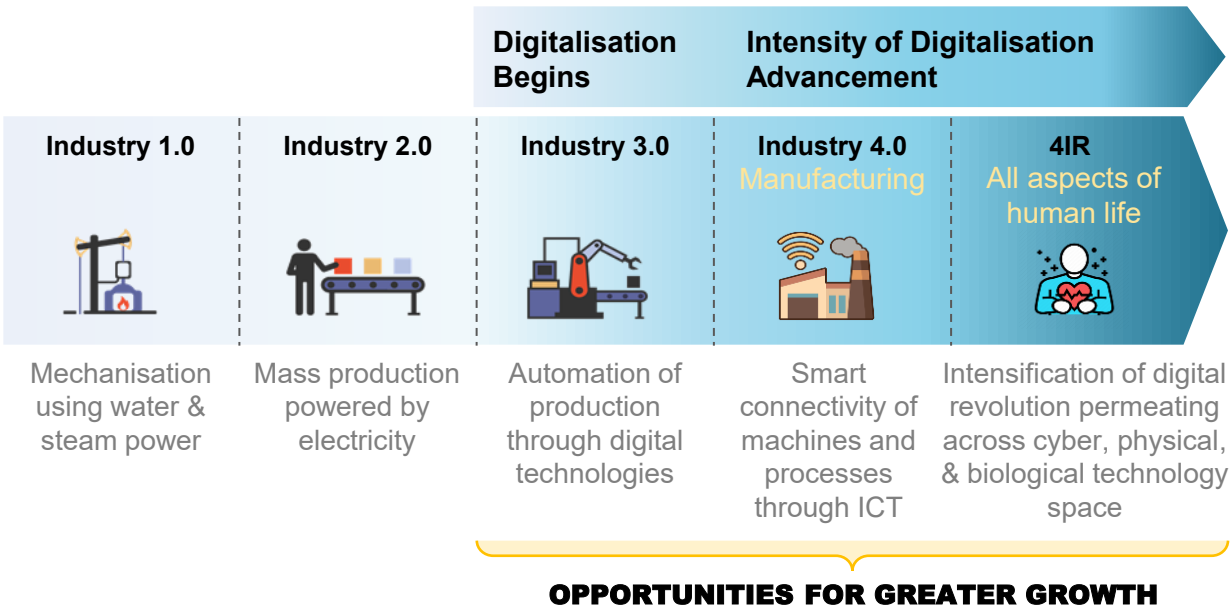
4IR builds on the Third Industrial Revolution, or the digital revolution, which began in the 1950s with computers, electronics and the Internet. This era enabled automation and global connectivity, changing industries and everyday life.

Looking back, the First Industrial Revolution started in 1760, driven by water and steam power for mechanised production. By the 1830s, the Second Industrial Revolution introduced electric power, leading to assembly lines and mass production, which changed industries like automotive manufacturing.

Today, the 4IR is defined by AI, IoT, blockchain and 5G, transforming manufacturing through smart factories and real-time data analysis. It is creating new business models and enhancing efficiency, sustainability and customer experiences, while also presenting challenges, such as job displacement and ethical issues.

As industries embrace these changes, the 4IR offers immense opportunities for innovation and growth, but it will require careful navigation to ensure inclusivity and sustainability in the digital age.

Evolution of Industries

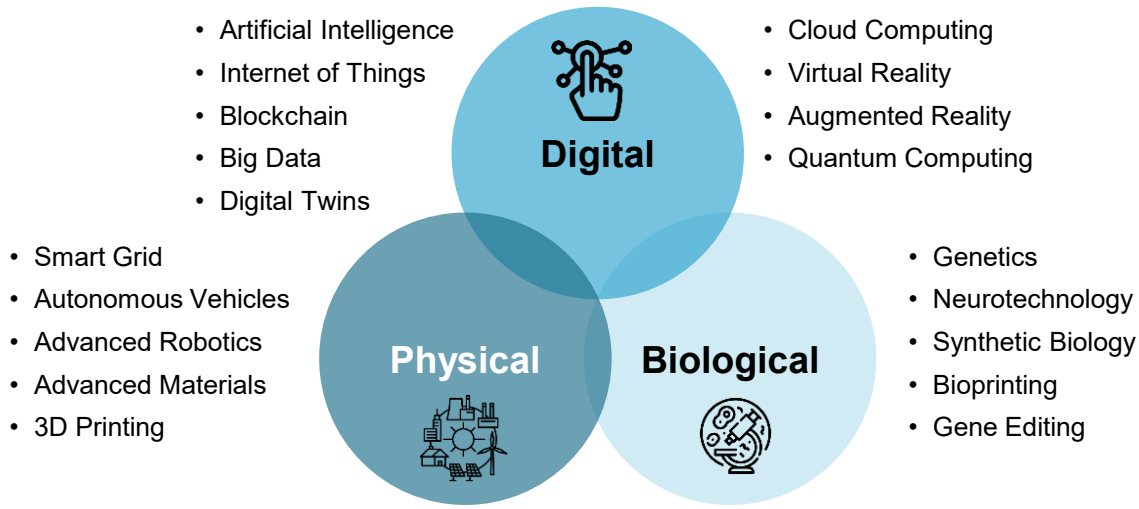


Global Digital Economy Landscape

The 4IR is characterised by the convergence of digital, physical and biological systems.

The 4IR refers to the ongoing transformation of industries and societies brought about by the fusion of the digital, physical and biological domains. This revolution builds on the advances of the Third Industrial Revolution but introduces a deeper integration of technologies that blurs the boundaries between these three areas.

Domains of 4IR Technologies



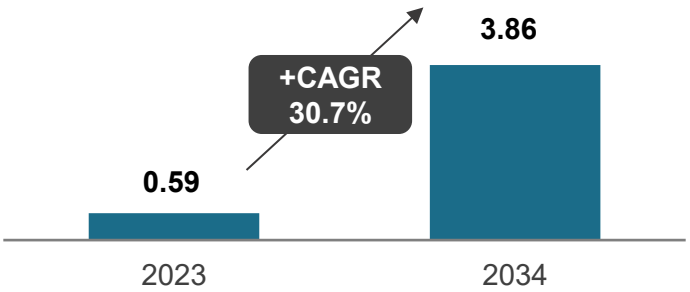
Opportunities For Greater Growth

- **Digital Economy**: Encompasses economic and social activities that depend on the creation, distribution and use of technology. It includes digital platforms, e-commerce and data-driven services, driving innovation and connectivity across various sectors.
- **Green Economy**: Focuses on creating a low-carbon, resource-efficient and socially inclusive system. It emphasises sustainability and resilience, ensuring that growth supports environmental protection and the responsible use of resources.
- **Circular Economy**: Aims to preserve the value of products, materials and resources for as long as possible, minimising waste and reducing the need for new resources. This model promotes recycling, reuse and sustainable design to enhance efficiency and reduce environmental impact.
- **Advanced Technologies**: Nurturing hard tech, deep tech, semiconductors and robotics is essential to reduce dependency on traditional manufacturing. These technologies foster high-value jobs, drive IP commercialisation and help develop local high-tech enterprises and industries. Embracing advanced technologies can lead to innovation, competitiveness and economic diversification.

Global Digital Economy Landscape

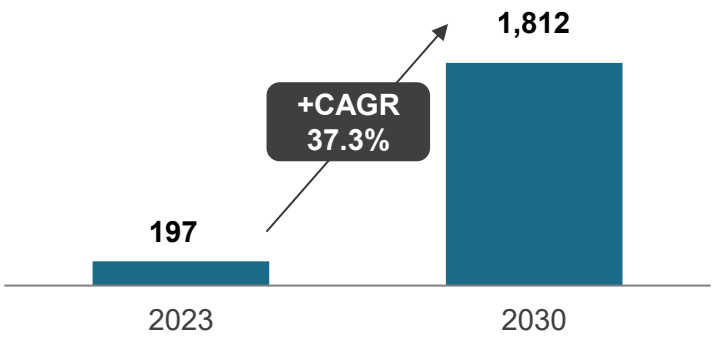
The integration of deep tech and artificial intelligence (AI) is rapidly reshaping the global digital ecosystem, accelerating technological progress and fostering new opportunities for growth and collaboration worldwide.

Global Deep Tech Market Size
(US $Billion, 2023 vs 2024)



The global deep tech market size is expected to grow at a compound annual growth rate (CAGR) of 30.7% from 2023, with a total of US $0.59 billion to US $3.86 billion in 2034. The rise of autonomous vehicles and smart transportation networks present opportunities for deep tech companies to revolutionise logistics, mobility and urban planning by improving efficiency, safety and sustainability through advanced technologies.

Global AI Market Size
(US $Billion, 2023 vs 2030)



The global AI market size is expected to grow at a CAGR of 37.3% from 2023, with a total of US $196.63 billion to US $1,811.75 billion in 2030. This rapid growth is primarily driven by the increasing demand for AI-powered solutions in various sectors, particularly for applications such as image processing and identification.

Source: 27 Advisory Analysis

Malaysia's Digital Economy Landscape

Overview of Malaysia's Digital Landscape in Connectivity, Activities and E-commerce

Connectivity

- **Ranked 14th** in Speedtest Global Index with 105.75 Mbps mobile broadband speed (09/2024)
- **96.4%** of households had internet connections (2023).
- **94.4%** of population used smartphone to access the internet. (2022).
- **146.9%** mobile cellular penetration (Q4 2024)
- **32.8% of** mobile subscription were 5G (2Q 2024).

Activities

- **81%** of Malaysians were active on social media (2020).
- **66%** of internet users used mobile banking (2019).
- **RM900 million** estimated data centre market (2018)
- **Top 5** social media penetration in SEA (2019)
- **343** e-payment transactions per-capita (2023)
- **57th Malaysia's** Ranking in UN-EGDI (2024)
- **3rd in SEA** in ride-hailing utilisation (2019)
- **90%** of government services were online.
- **41st Rank** in Digital Adoption Index (2016)

eCommerce

- **~RM16 billion** e-commerce market value in Malaysia by 2025
- **3rd in SEA** for e-commerce penetration amongst individuals. 4 out of 10 involved cross-border spending.
- **50%** of MSMEs used data analytics; however, 70% of them referred to spreadsheets.
- Food, travel, clothing, cosmetics, perfumes, & sports were the most popular categories in e-commerce.
- **44%** of MSMEs used cloud computing; however, more than **80%** used it mainly for storing documents, photos and videos.
- **35%** of MSMEs utilised IoTs solutions; however, there were used for building surveillance and fleet tracking.

Malaysia's Digital Economy Landscape

Malaysia is working to bridge the digital divide, creating new opportunities for access to technology, upskilling and digital employment.

Household Access to Mobile/Fixed Broadband (2019)	Urban	Rural
Mobile Broadband	88.8%	80.4%
Fixed Broadband	35.3%	11.7%

The digital divide in Malaysia remains a pressing issue particularly between urban and rural households. A striking 23.6% gap exists in fixed broadband access, underscoring the disparity in connectivity across different regions. This divide has widened considerably in recent years, as many rural areas and low-income families face significant barriers to accessing affordable internet services.

The challenges extend beyond internet access. In rural areas and among economically disadvantaged households, owning a computer is often a luxury rather than a norm. Without access to basic devices, these families are excluded from opportunities that require even minimal digital engagement, further amplifying the inequity.

Furthermore, the growing reliance on digital infrastructure is reshaping job markets and driving the evolution of employment opportunities across various sectors. As digital technologies become increasingly embedded in daily life, industries are adapting to new ways of working, leading to both opportunities and challenges for the workforce.

One of the most significant impacts of this transformation is the displacement of traditional jobs due to shifting skill requirements in the current digital age. Many roles that were once essential are being automated or replaced by technology necessitating upskilling and reskilling among workers to remain employable.

Simultaneously, the rise of the gig economy has introduced flexible and innovative opportunities, particularly in digital-centric industries, such as e-commerce, ride-hailing and online freelancing. Recent data revealed that four out of 10 workers in Malaysia who left traditional full-time jobs have transitioned into the gig economy, highlighting its growing significance. While this trend underscores the adaptability of the workforce, it also draws attention to the increasing reliance on digital platforms–a realm inaccessible to those without the necessary infrastructure.

Source: Malaysia Digital Economy Blueprint, Economic Planning Unit, Prime Minister's Dept. (2021); Internet Users Survey, 2022, MCMC (2022);Speedtest Global Index, Speedtest (2024); ICT use and access by individuals and household survey report 2023, DOSM (2024); Communication and Multimedia Facts & Figures 2Q 2024, MCMC (2024); BNM Annual Report 2023, BNM (2024), UN E-Government Knowledge Base, United Nations (2024)

Malaysia's Digital Economy Landscape

Malaysia's digital economy is rapidly expanding, with the goal of positioning the country as a regional leader in the digital sector.

Performance of Digital Economy

13.6% Gross Value-Added ICT

9.4% E-commerce of other industries

23.0%
(RM412.3 Bil) Contribution of digital economy to national GDP in 2022
2021: 23.2% (RM359.3 Bil)
+14.8% from 2021-2022

Malaysia's digital economy is projected to reach 25.5% by 2025.

1.22 Mil Employment in ICT Industry (2022)
7.9% of total employment market
2021: 1.21 Mil People

RM85 Bil Compensation of Employees (2022)
34.9% of total ICT income
2021: RM78.2 Bil

13.3% Contribution of E-commerce to GDP (2022)
3.9% - ICT Industry
9.4% - E-commerce of others
2021: 13.0%

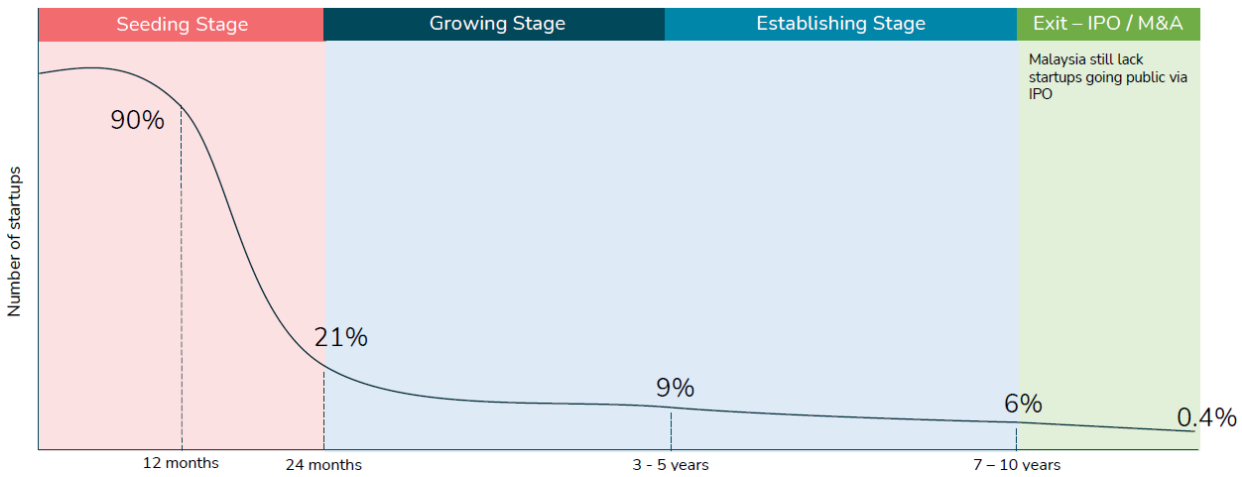
The projected growth in Malaysia's digital economy can be attributed to several factors. Increased digital adoption driven by the COVID-19 pandemic has led to significant shifts in consumer behaviour, particularly towards digital payments, online services and e-commerce. The significant contributions from key sectors such as the ICT industry and e-commerce have been instrumental in driving gross domestic product (GDP) growth. The rapid development of ICT services–including cloud computing, cybersecurity and other digital solutions–continue to support this trajectory by enhancing both economic efficiency and innovation.

Government initiatives and strategic investments in digital infrastructure have fostered a favourable environment, paving the way for sustainable growth in the digital economy. Increased internet access and connectivity have enabled businesses across various sectors to engage more effectively in digital space, fueling broader digital transformation efforts. For instance, the uptake of mobile broadband in 2020 demonstrated notable growth across major sectors: the service sectors reached 75.7% (up from 71.1% in 2019), the manufacturing sector climbed to 74.9% (up from 66.3% in 2019) and the construction sector recorded 73.8% (slightly up from 73.3% in 2019).

Source: Malaysia Digital Economy 2023, Department of Statistics (2023)

Malaysia's Digital Economy Landscape

The low survival and exit rates of startups in Malaysia highlight the need for strategic support.



In Malaysia, the long-term survival of startups presents a significant challenge, as only 6% of them sustained operations beyond 10 years. Even more concerning is the fact that merely 0.4% managed to reach the exit stage through initial public offerings (IPOs) or mergers and acquisitions (M&A).

These figures underline the urgent need for targeted support from government agencies such as Digital Penang to bolster the startup ecosystem. Such efforts are vital to unlocking the vast potential of Malaysia's digital economy, which is projected to reach a remarkable RM275 billion by 2025.

Startups play a critical role in driving economic activities at both the national and state levels. Notably, they contribute approximately 50% of Malaysia's GDP, further emphasising their importance as engines of growth, innovation and employment. However, many of these enterprises face structural challenges that hinder their ability to thrive in an increasingly competitive market.

Source: 27 Advisory Analysis

Malaysia's Digital Economy Landscape

Malaysia's e-commerce sector is poised for significant growth by 2025, driven by a strong B2C market and an emerging B2B sector.

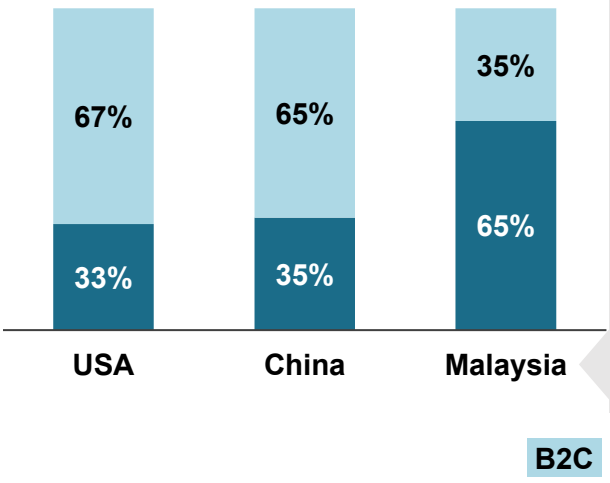
The Future of E-Commerce in Malaysia

Malaysian startups, particularly in the e-commerce sector, are projected to see stable growth by 2025. Forecasts indicate a 30% increase in the B2C market, reaching RM89 billion, while the B2B market is expected to grow by 40%, reaching RM52 billion. This amounts to RM 141 billion in the e-commerce segment by 2025.

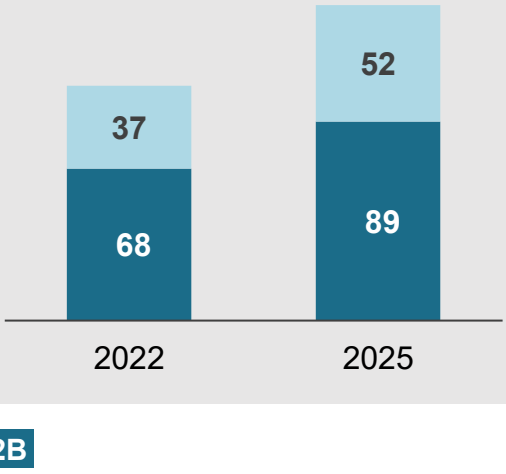
In mature markets like the US and China, the B2B e-commerce market is typically at least twice the size of the B2C market. However, in Malaysia, the opposite trend is observed, with the B2C market dominating at 65%, as B2B trading continues to operate largely through traditional methods. This disparity is largely attributed to the low rate of digital adoption among Malaysian businesses to manage back-end operations like supply chain or inventory management.

However, B2B growth is expected to accelerate in the coming years, driven by the increasing adoption of B2C e-commerce practices and the reduced barrier to entry for MSMEs, enabling greater economic opportunities for platform operators and sellers. Such developments are set to unlock greater economic opportunities for both platform operators and sellers, further bolstering the e-commerce landscape in Malaysia.

E-commerce Business Share in Selected Countries
(%, 2022)



E-commerce Market Size in Malaysia
(RM Billion, 2022 – 2025)



B2C B2B

Source: 27 Advisory Analysis

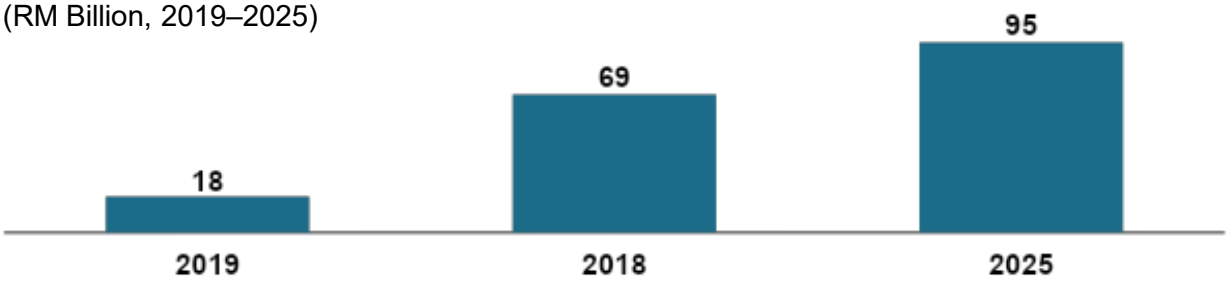
Malaysia's Digital Economy Landscape

E-Wallet and Microcredit Platforms are expected to continue growth in Malaysia.

E-Wallet Platforms continue growth in Malaysia

The digital finance service sector stands as the second-largest contributor to Malaysia's digital economy with its growth largely fueled by the widespread adoption of e-wallet transactions. From a consumer market perspective, e-wallet platforms gained significant traction during the COVID-19 pandemic and are projected to experience exponential growth beyond 2025.

E-Wallet Transaction Value in Malaysia
(RM Billion, 2019–2025)



Potential Growth in Alternative Financing for Malaysian Market

Based on forecasts, digital lending transaction values are expected to rise by 40%, reaching RM14 billion. With 70% of Malaysians lacking access to credit cards, this points to a significant untapped market for digital lending platforms, as well as other forms of alternative financing such as P2P lending, token-based financing and crowdfunding–all of which could further bridge the financial inclusion gap.

Digital Lending Transaction Value in Malaysia
(RM Billion, 2022–2025)

Source: 27 Advisory Analysis

Malaysia's Digital Economy Landscape

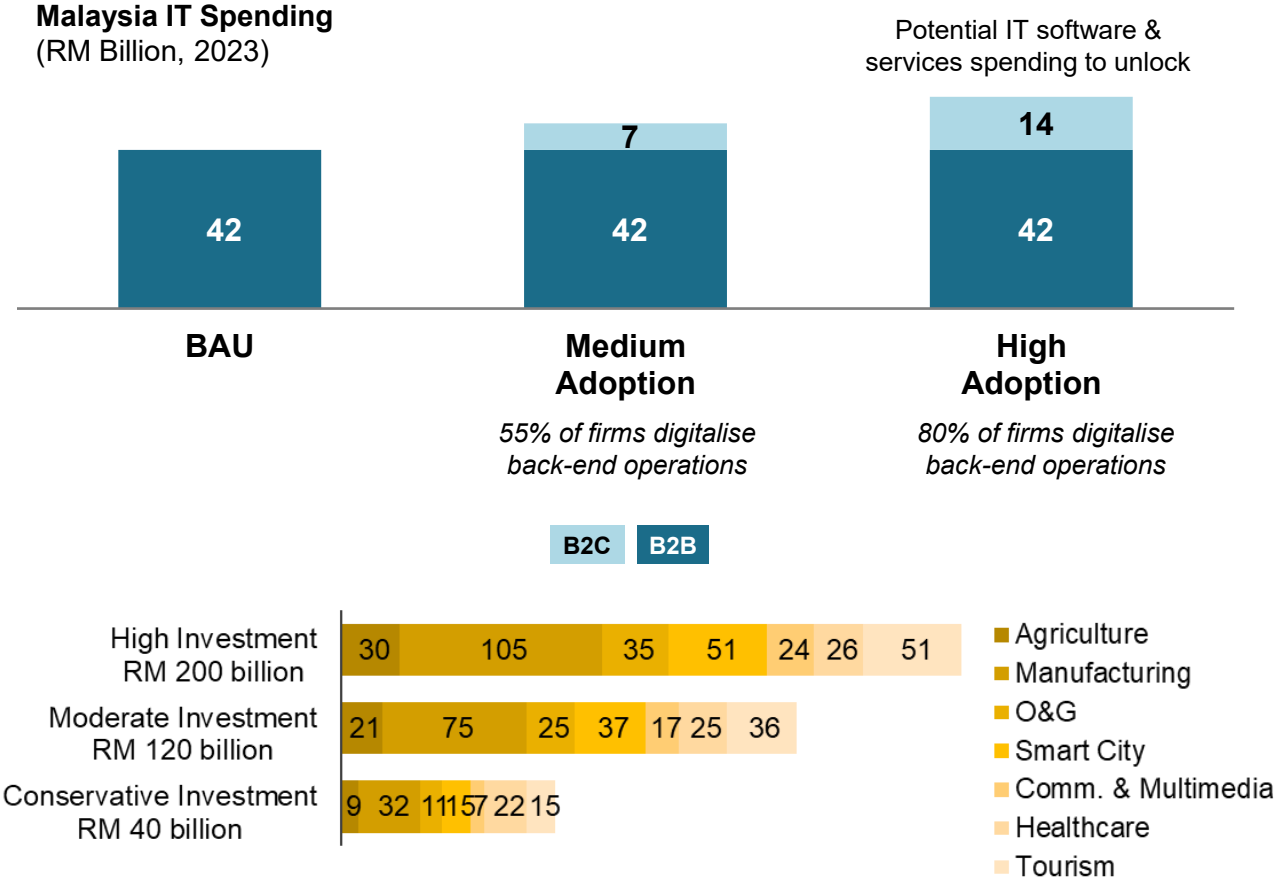
Lagging adoption of digital technology in back-end operations offers significant opportunities for B2B technology startups.

Accelerating Digitalisation in Malaysia

In Malaysia, digitalisation efforts are largely concentrated on front-end business processes, whereas the adoption of digital technologies for back-end operations among MSMEs has been slower, underscoring a gap in fully harnessing digital tools across the sector. This often results in front-end systems being supported by manual or fragmented back-end processes, which can limit efficiency and scalability.

Malaysia allocates approximately 3% of its GDP to IT spending, compared to Singapore's 7%. This highlights a potential RM714 billion opportunity for tech startups to drive digitalisation, particularly by optimising back-end operations for businesses.

Malaysia IT Spending
(RM Billion, 2023)



Source: 27 Advisory Analysis

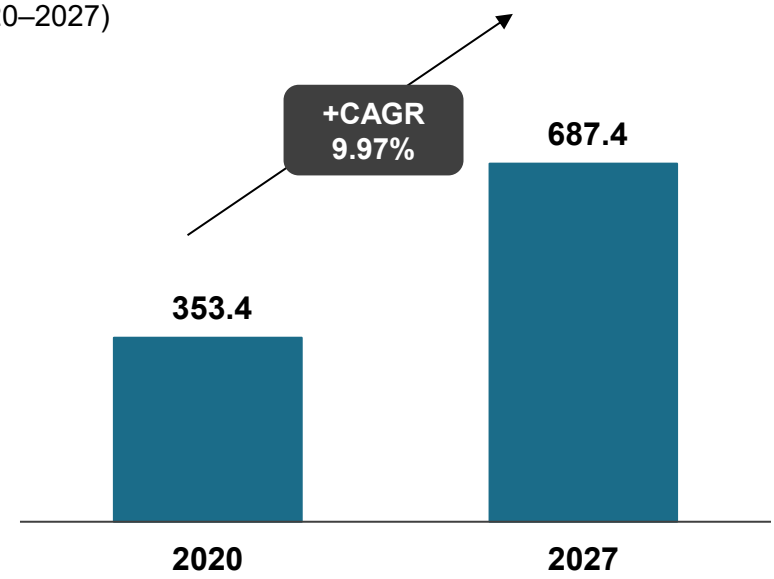
Malaysia’s Digital Economy Landscape

Malaysia advances its 5G infrastructure; the untapped potential in markets, such as the creative content sector, presents a valuable opportunity for innovation and economic growth.

Malaysia's Opportunity in the Creative Content Market

Untapped markets in Malaysia's 5G development go beyond the traditional industrial focus, offering significant potential for growth in sectors such as the creative content market, where advancements in connectivity could foster innovation, enhance digital media experiences and create new opportunities for content creators, distributors and consumers alike.

Global Creative Content Market
(US $ Bllion, 2020–2027)



The Malaysian government, through the Malaysian Communications and Multimedia Commission (MCMC), has proposed to deploy 5G technology to various areas and phases, including Smart City, agriculture and healthcare. Malaysia's GDP is projected to grow by RM110 billion, reaching RM321 billion over the next decade, depending on investment in 5G technology by the public and private sector.

The government aims to achieve 80% 5G coverage by the end of 2024, with 5G subscription penetration reaching 84% by 2030.

5G will also drive growth in Malaysia’s Creative and Creator Economy, including gaming, where Malaysia is set to generate approximately RM3 billion in revenue as part of the broader ASEAN creative content market.

Source: 27 Advisory Analysis

Malaysia's Digital Economy Landscape

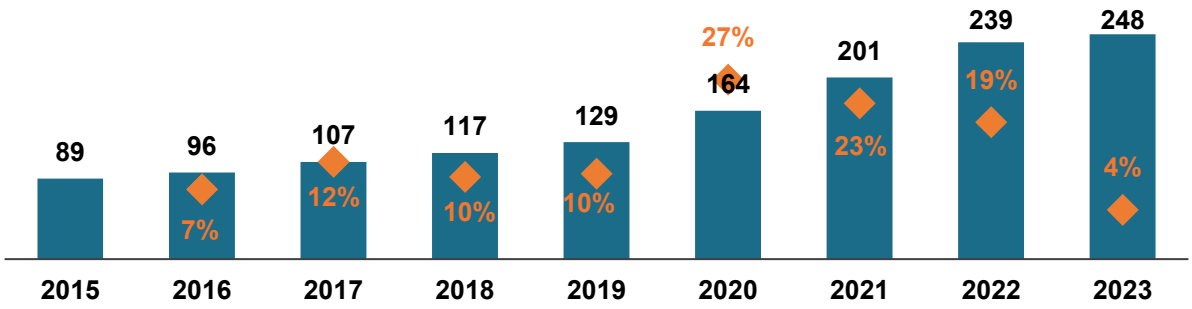
E-commerce serves as the engine for catalytic growth, driving businesses in Malaysia towards greater innovation and expansion.

Penang's Potential in Malaysia's E-Commerce Expansion

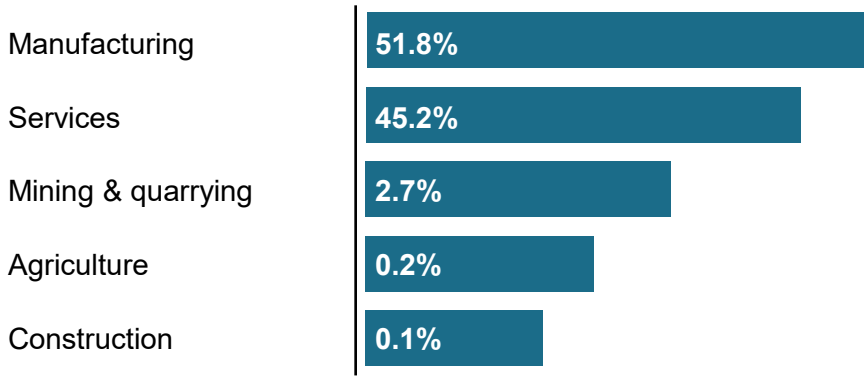
Malaysia's e-commerce market grew significantly between 2019 and 2021, reaching RM201 billion, driven by the COVID-19 pandemic. With projections of RM1.65 trillion by 2025, supported by the NESR, businesses in Penang have clear opportunities in this expanding digital marketplace.

Contribution of E-commerce to GDP
(RM Billion, 2015–2023)

Percentage Change
(%, 2015–2023)



Share of E-commerce by Main Sector
(%, 2023)



E-commerce contributed 13.6% to the Malaysian economy in 2023, with the manufacturing sector remaining in the lead at 51.8%, followed closely by the services sector, which accounted for 45.2% of e-commerce activity.

Source: Information & Communication technology Satellite Account 2023, Department of Statistic Malaysia (2024), Penang Socioeconomic Report 2023, DOSM (2023)

Malaysia's Digital Economy Landscape

The National E-Commerce Strategic Roadmap 2021-2025 (NESR 2.0) is a key initiative aimed at positioning e-commerce as a primary driver of business growth in Malaysia. Building on the foundation laid by the original National E-Commerce Strategic Roadmap (NESR 1.0) introduced in 2016, NESR 2.0 seeks to accelerate the nation's digital economy and strengthen its global competitiveness.

The first iteration of the roadmap, the NESR 1.0, set the stage for Malaysia's e-commerce expansion by targeting a doubling of the nation's e-commerce growth rate by 2020. It outlined six strategic thrusts that focused on enhancing infrastructure, fostering a supportive governance framework and implementing targeted government interventions. From 2017 to 2020, these efforts laid a robust groundwork for sustainable e-commerce development.

NESR 2.0 aims to build on the momentum established by its predecessor by driving significant growth in the e-commerce ecosystem from 2021 to 2025. Key objectives of NESR 2.0 include:

Through strategic collaboration between the government and industry stakeholders, NESR 2.0 is developed to implement targeted programmes under six key thrust areas, ensuring continued growth and innovation within Malaysia's digital economy,

Penang, the third largest e-commerce contributor in Malaysia, plays an instrumental role in realising the goals of NESR 2.0. The state has emerged as a key player in the national e-commerce landscape using its robust digital infrastructure and dynamic business ecosystem. Penang's impressive contributions underscore the importance of proactive measures to sustain its growth and strengthen its position as a leader in the digital economy.

The initiatives outlined in NESR 2.0 represent a critical forward in positioning Malaysia as a global e-commerce hub, fostering sustainable growth and innovation across all sectors.

Source: MDEC National E-Commerce Strategic Roadmap 2021-2025

Malaysia’s Digital Economy Landscape

Malaysian construction sector's adoption of IoT technologies underscores its leadership in innovation and digital transformation within the industry.

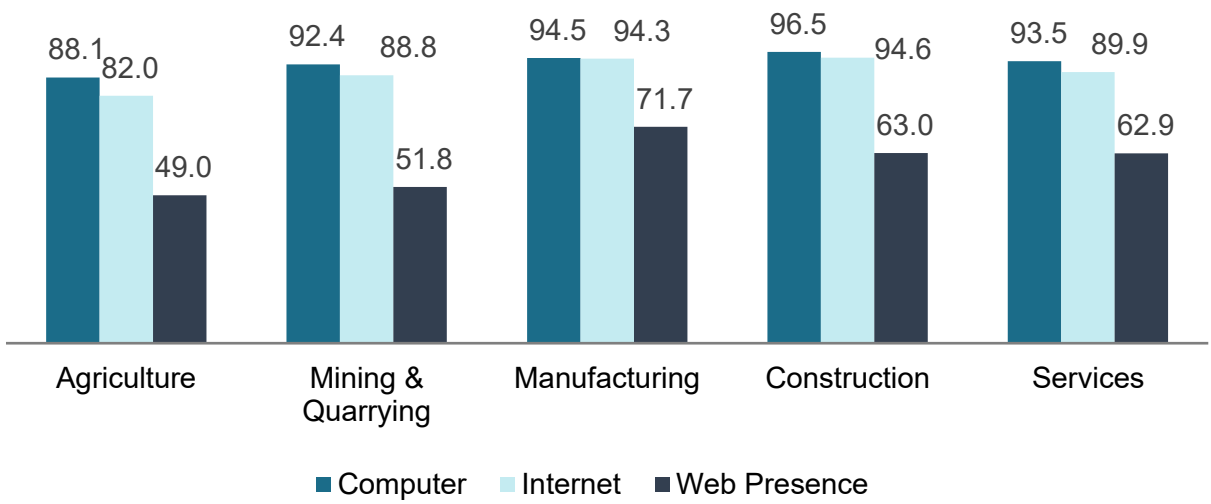
Malaysia's Usage of ICT Tools Led by the Construction Sector

The following provides an overview of how businesses across different sectors and states in Malaysia, including Penang, are adopting ICT tools. This comparison highlights Penang's progress in digital adoption relative to other states, offering insights into sectoral and regional variations in ICT usage.

In 2021, ICT adoption among businesses saw a significant rise, with 93.8% of companies using computers (up from 86.2% in 2019) and 90.6% utilising the internet (compared to 85.2% in 2019). However, web presence remained lower at 63.3%, despite the widespread use of ICT tools. This indicates that while businesses have integrated ICT tools into their operations, they have yet to fully embrace the broader opportunities offered by the digital platforms.

The construction sector leads in computer and internet usage. The sector has already implemented the IoT for site monitoring, machine controlling, construction safety, fleet management and project management. This demonstrates the sector’s forward-thinking approach.

Malaysia’s Usage of ICT Tools by Sector
(%, 2021)



Penang's Digital Economy Landscape

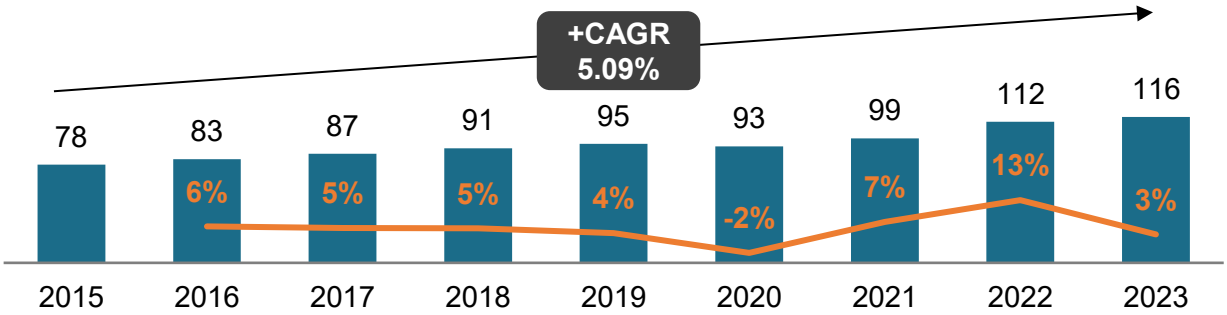
Penang is one of the key contributors to Malaysia's GDP, with its steady growth reflecting its vital role in the country's economic development.

Penang stands out as one of the key contributors to the national GDP.

Penang has experienced steady GDP growth since 2015, reaching RM116 billion in 2023, up from RM78 billion in 2015, with a CAGR of 5.09%. The lowest point was in 2020, during the Covid-19 pandemic, when the GDP contracted to negative 2.1%. However, the economy rebounded strongly in 2021 and 2022, recording growth rates of 6.9% and 13.3%, respectively. This post-pandemic recovery reflects increased confidence and rising economic activity in Penang.

Penang's GDP Contribution
(RM Billion, 2015–2023)

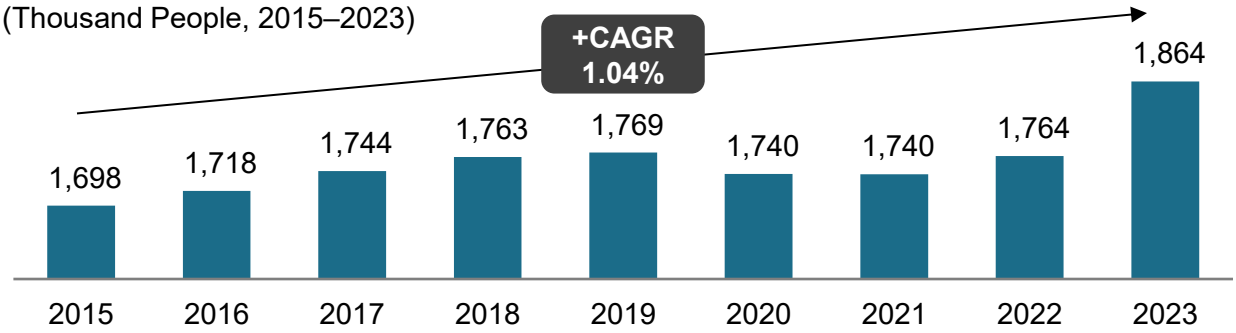
Percentage Change
(%, 2015–2023)



Penang's population is steadily increasing

Penang's population has grown steadily at a CAGR of 1.04% since 2015, reaching 1.86 million in 2023, driven possibly by urbanisation, industrialisation and migration. Based on a recent report on migration, in 2020, there was a negative 1,400 in net migration, the lowest for the past 10 years, with 2014 having the highest migration at 8,400.

Penang's Population
(Thousand People, 2015–2023)



Source: State Socioeconomic Report Pulau Pinang 2023, Department of Statistics Malaysia (DOSM) (2024); Current Population estimated by Administrative District – Pulau Pinang 2024, DOSM (2024); Migration Survey Report (2012-2020)

Penang’s Digital Economy Landscape

Penang's labour force has grown steadily reflecting a stable workforce and increasing job demand, which positions the state for continued economic development.

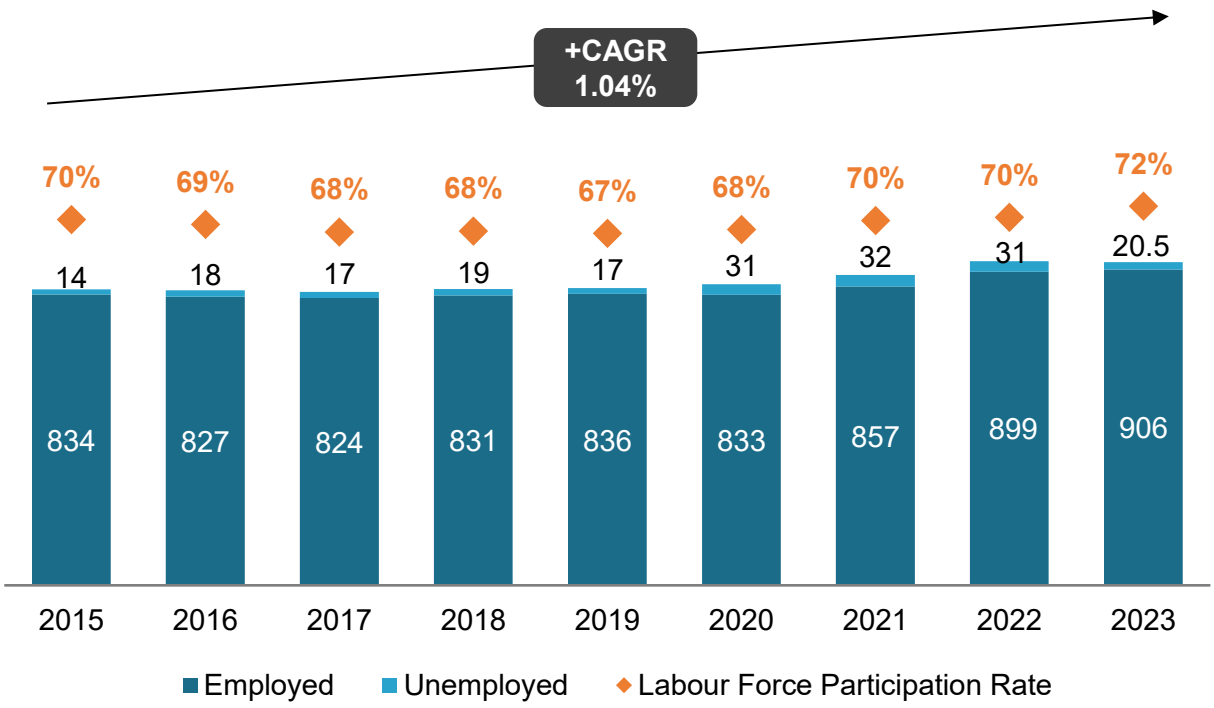
Steady increase of Penang’s labour force

Penang's labour force growth rate of 1.04% from 2015 to 2023, along with a corresponding employment growth rate of 1%, reflects a stable and gradual increase in the workforce. This growth trend indicates a steady demand for jobs and a growing pool of workers, which can be beneficial for sustaining economic development, especially in sectors like digital transformation and technology.

This growth in labour force participation presents a positive outlook for Penang’s economy highlighting the potential for further progress in emerging industries. The state government is dedicated to enhancing this momentum by creating additional employment opportunities, particularly for the younger demographic. By continuing to support a skilled workforce and fostering an environment conducive to innovation, Penang is set to remain a competitive player in the evolving global digital economy,

Penang’s Labour Force
(Thousand People, 2015–2023)

Penang’s Labour Force Participation Rate
(%, 2015–2023)



Source: State Socioeconomic Report Pulau Pinang 2023, Department of Statistics Malaysia (DOSM) (2024); Current Population estimated by Administrative District – Pulau Pinang 2024, DOSM (2024); Migration Survey Report (2012-2020)

Penang's Digital Economy Landscape

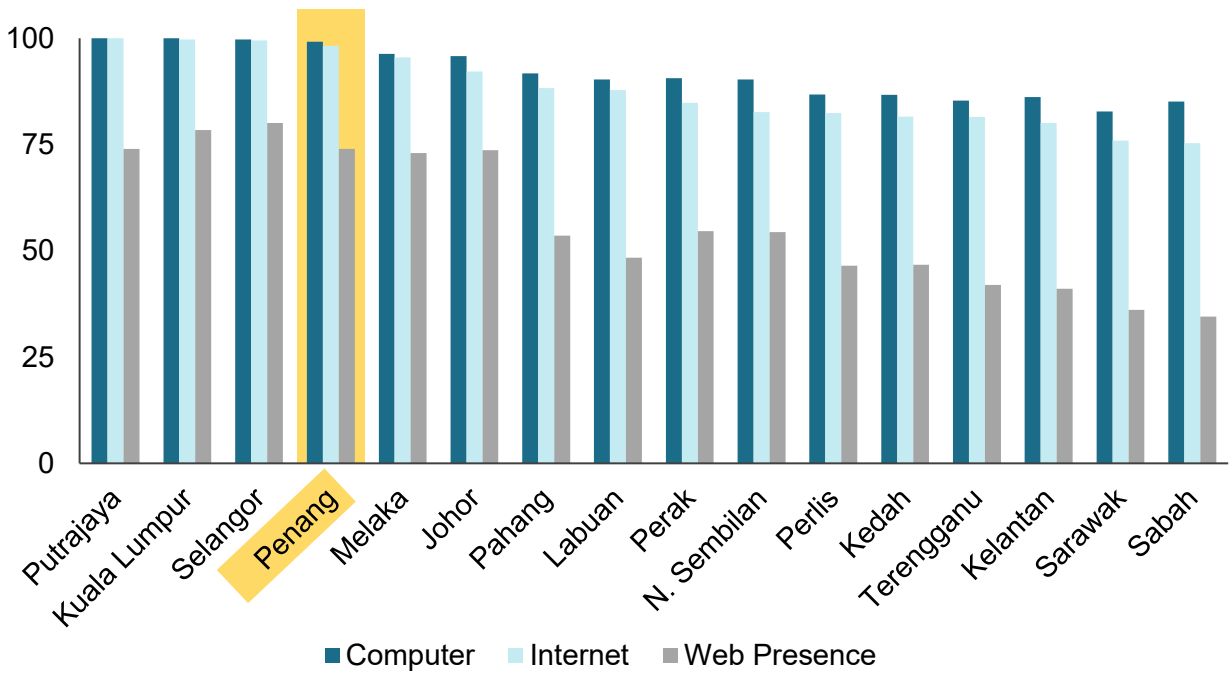
Penang's high ICT adoption rates highlight its strong position in digital transformation and provide opportunities to further boost its digital economy.

Penang ranks 3rd among Malaysian states in terms of ICT adoption.

In 2021, businesses in Penang demonstrated a 99.2% computer usage rate, exceeding the national average of 93.8%, though slightly behind Selangor (99.7%). Additionally, Penang's internet usage stood at 98.2% and web presence at 74%, both surpassing the national averages of 90.6% and 63.3%, respectively.

ICT usage significantly contributes to business sustainability for small and medium enterprises (SMEs), enhancing community participation in entrepreneurship. In Penang, the practice of using ICT in business, such as internet applications and information sources, serves as a predictor of the empowerment of rural entrepreneurs. This underscores Penang's strong positioning in digital adoption while also highlighting further opportunities to enhance its digital infrastructure and drive growth in its digital economy.

Usage of ICT Tools across States
(%, 2021)



Source: Usage of ICT and E-commerce by Establishment 2022, Department of Statistics Malaysia (2022)

Penang’s Digital Economy Landscape

Penang's high household ICT access establishes it as a leader in digital adoption, driving regional growth.

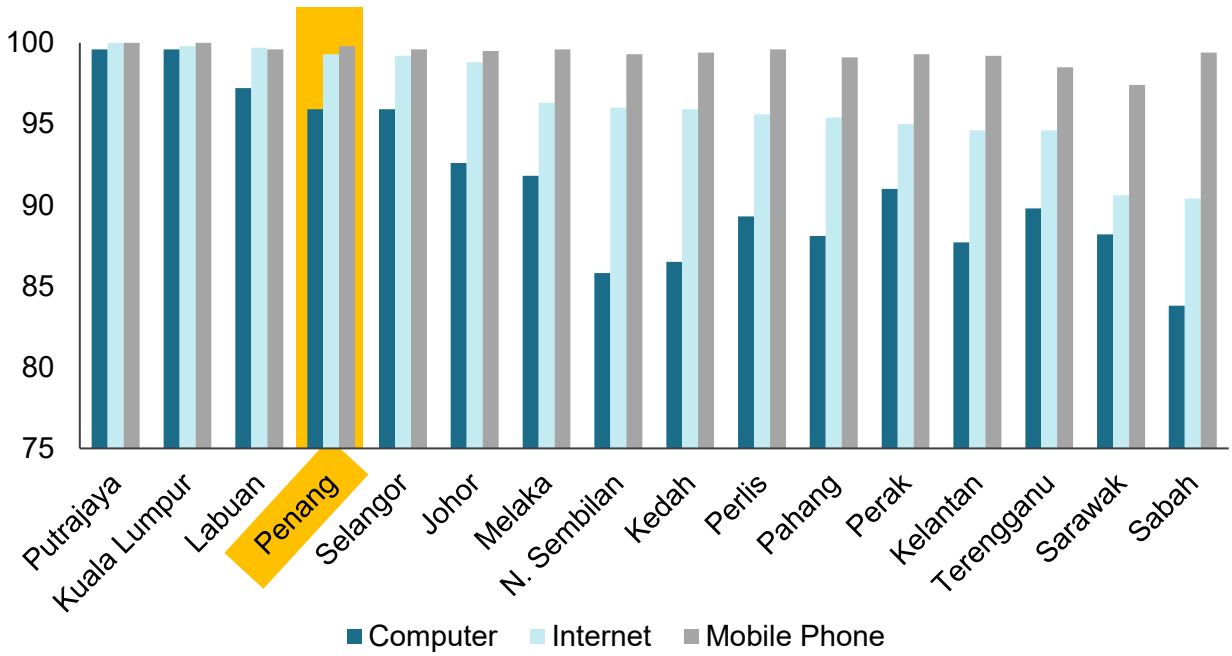
Penang’s stronghold in household ICT access

The following provides an overview of how households across different states in Malaysia, including Penang, are accessing ICT tools. This comparison highlights Penang’s position in digital access relative to other states, offering insights into regional variations in household ICT adoption.

In 2023, Penang ranked among the top states for household ICT access, slightly surpassing Selangor in both internet access (99.3% vs. 99.2%) and mobile phone access (99.8% vs. 99.6%). Both states demonstrated equal computer access at 95.9%, indicating high levels of technology adoption and connectivity. This data underscores that the vast majority of Penang households are equipped with ICT tools.

Penang can build on its current strengths and position itself as a regional leader in the digital economy, providing a model for other states in Malaysia and beyond.

Household Access to ICT Services & Tools by State
(%, 2023)



Source: ICT Use And Access By Individuals And Households 2023, Department of Statistics Malaysia (2024)

Penang's Digital Economy Landscape

Penang's strong ICT penetration across both regions signals significant progress in digital inclusivity, with slight regional variations in technology usage.

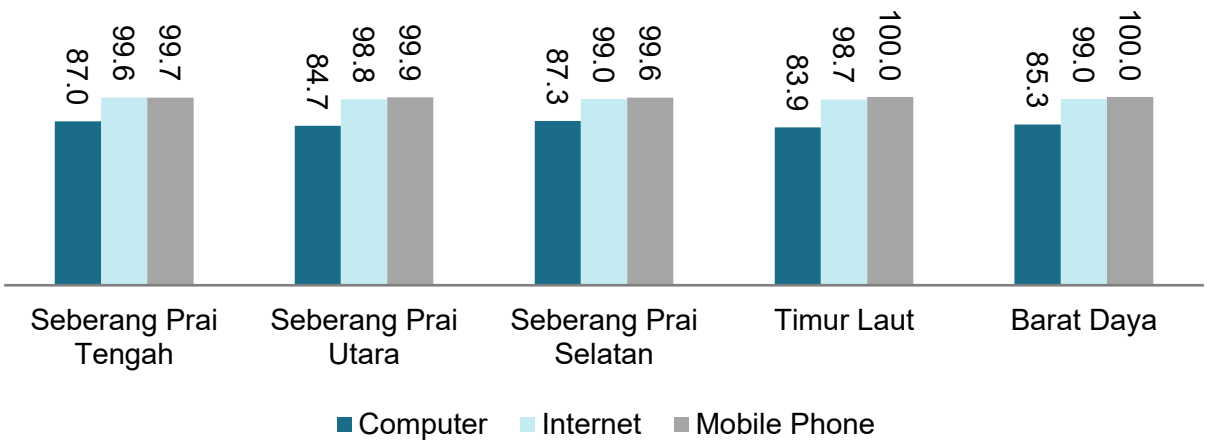
Digital trends in Penang

Based on the 2023 data, Timur Laut and Barat Daya (colloquially referred to as "island") had the highest mobile phone ownership, with 100% of individuals having access. Meanwhile, Seberang Prai (also known as "mainland") averaged 99.7% ownership. This indicates complete mobile phone ownership on the Island, while the mainland is slightly below full coverage, but still highly connected.

Interestingly, Seberang Prai Selatan led in computer ownership at 87.3%, followed closely by Seberang Prai Tengah at 87.0% and Seberang Prai Utara at 84.7%, placing last. In comparison, Barat Daya on the island recorded 85.3% and Timur Laut 83.9%. This suggests that Seberang Prai areas are more engaged in computer use than the island areas, perhaps due to differing needs or access to resources.

Lastly, internet access on the mainland averaged slightly higher at 99.1%, compared to the island's 98.9%. This could reflect the island's stronger cultural heritage, where conventional methods of communication or transactions may still hold some preference.

Penang's Individual Access to ICT Services & Tools by Administrative District
(%, 2023)



Source: Information & Communication Technology Satellite Account 2023, Department of Statistics Malaysia (2024)

Penang's Digital Economy Landscape

Penang's high mobile and internet access, along with declining use of traditional technologies, reflects the shift towards digital connectivity.

The growing influence of mobile devices and internet access among Penang households

Penang boasts an impressive mobile phone ownership rate, with 99.8% of households possessing mobile devices for two consecutive years (2022 and 2023). This high rate underscores the importance of mobile connectivity in the daily lives of its residents.

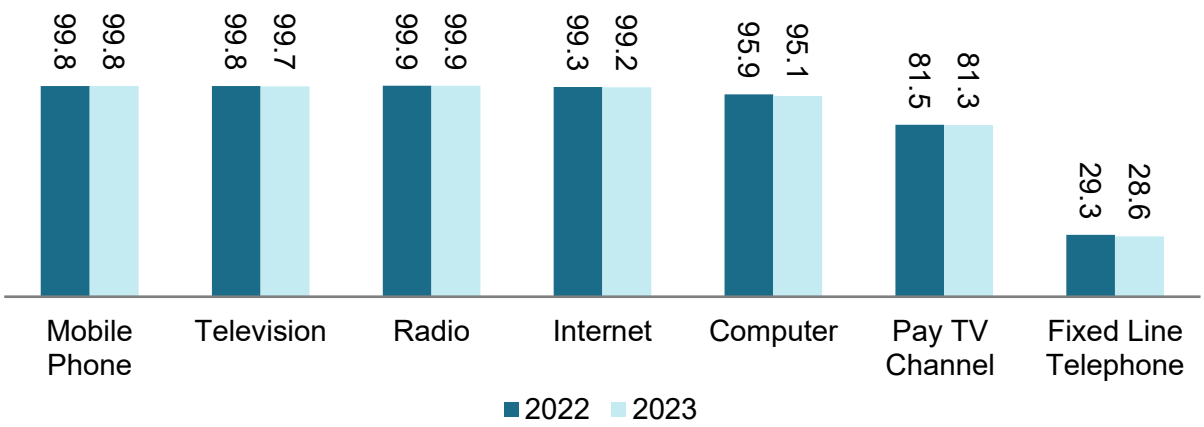
During the two years, internet access in Penang remained strong at 99.2%, although this reflects a slight decline of 0.1% from 2022 (99.3%). This minor decrease suggests that while the internet is widely available, there may be some fluctuations in usage patterns.

One notable trend is the decline in fixed-line telephone ownership, which decreased by 0.7%. This drop indicates a diminishing need for landlines, likely due to the widespread availability and advanced features of smartphones that cater to various communication needs.

Additionally, the reduction in computer ownership (95.6% to 95.1%) can be attributed to the growing capabilities of smartphones. Many people now perform tasks and work primarily through their mobile devices, further illustrating the shift in technology usage.

Overall, these trends highlight Penang's increasing reliance on mobile phones and internet connectivity. This signals positive progress towards the digital transformation of Penang, as residents adapt to the evolving technological landscape.

Penang Household Access to ICT Services & Tools
(%, 2022–2023)



Source: ICT Use And Access By Individuals And Households 2022, 2023, Department of Statistics Malaysia (2023 & 2024)

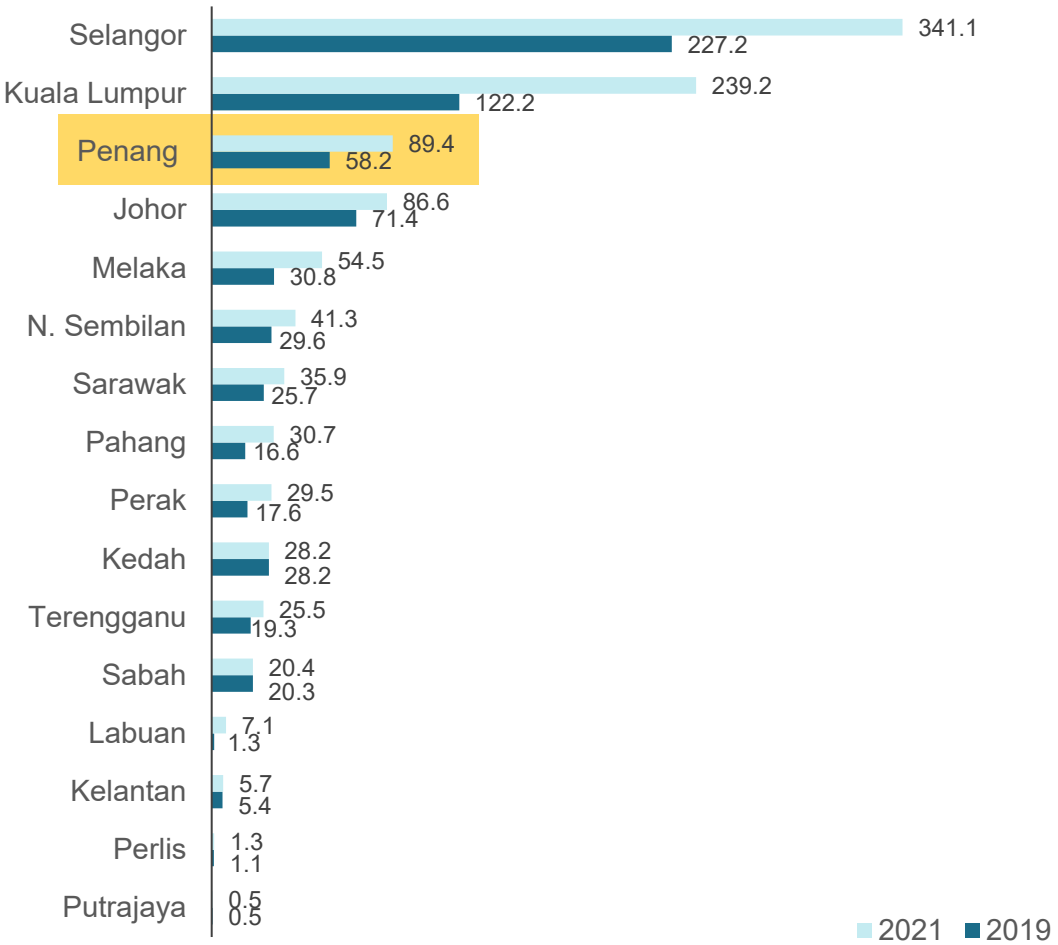
Penang's Digital Economy Landscape

Penang's strong growth in investment inflows highlights its resilience and solidifies its position as a key driver of Malaysia's economic development and a top investment destination.

Penang ranks 3rd in e-commerce income among states in Malaysia

Penang demonstrated strong investment performance, with total investment inflows rising significantly from RM58.2 billion in 2019 to RM89.4 billion in 2021, marking a notable increase of over 50%. This positions Penang as one of the leading states in Malaysia for investment, following Selangor and Kuala Lumpur. The state's consistent growth underscores its attractiveness as a hub for economic activity and its strategic importance in Malaysia's overall investment landscape.

E-Commerce Income by State
(RM Billion, 2019 & 2021)



Source: Usage of ICT and E-commerce by Establishment 2022, Department of Statistics Malaysia (2022)

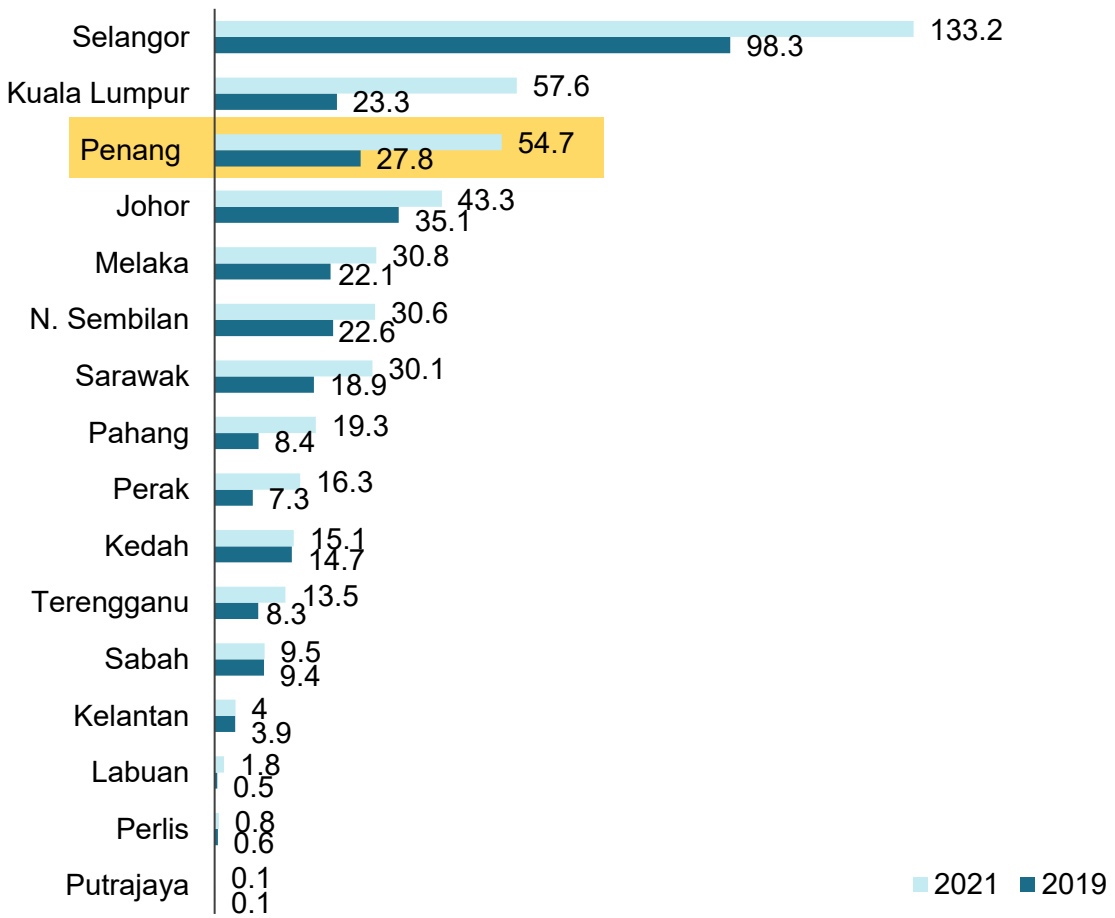
Penang's Digital Economy Landscape

Analysis of Penang's Digital Infrastructure, Adoption and Economic Potential

Penang ranks 3rd in e-commerce expenditure among states in Malaysia

Penang ranks third, with e-commerce expenditure totaling RM54.7 billion, marking a significant increase of 40.2%. This strong growth highlights Penang's pivotal role in Malaysia's e-commerce landscape, showcasing the state's expanding dependence on digital transactions and online shopping. The rising trend in e-commerce spending across these states highlights the increasing importance of digital platforms in driving consumer purchasing behavior.

E-Commerce Expenditure by State
(RM Billion, 2019 & 2021)



Source: Usage of ICT and E-commerce by Establishment 2022, Department of Statistics Malaysia (2022)

Empowering Penang's Digital Transformation

Penang is set to be transformed into a digitally engaged society and supporting the state's vision of becoming a family-focused, green and smart state by 2030.

Digital Penang Boosts Penang's Digitalisation

Digital Penang, a government-linked company owned by the State of Penang, was established in April 2020 to accelerate the capture of opportunities in the digital economy and foster a digitally engaged society.

As a key driver of Penang's digital transformation, Digital Penang promotes innovation, supports startups and strengthens the state's digital infrastructure.

Aligned with the Penang2030 vision of creating a family-focused, green and smart state, the transformation journey emphasises increasing digital adoption among the community, enabling data-driven governance, developing a diverse talent pool for entrepreneurship and investment and building resilient digital infrastructure to sustain a livable environment.

Digital Penang collaborates closely with key industry players to support MSMEs and conducts community engagement initiatives to drive widespread digital adoption.

VISION

Creating a connected, creative and competitive society that strengthens the pillars of Governance, Economy, Community and Infrastructure.

MISSION

To leverage technologies and extend comparative advantages in a digital economy

To deliver agile solutions and infrastructure for pervasive adoption to promote an engaged community and data-driven governance

KEY ROLES

in Accelerating Digital Economy

- Venture Development
- Community Engagement
- Capital Access Facilitation
- Talent Development Advocate
- Digital Project Facilitators
- Startups & Business Partnership Builders
- Market Development & Access Facilitation

Source: Digital Penang Executive Overview 2023, Digital Penang (2024)

Empowering Penang's Digital Transformation

Digital Penang has made tremendous milestones on improving Penang's digital ecosystem, focusing on its key pillars.

Snapshots of the achievements realised by the year 2023

DIGITAL TRANSFORMATION MASTER PLAN 1.0

STRATEGIC PILLAR I Digital Governance	1. **MyKADUN:** Streamlining operations of KADUN service centres in over 40 KADUNs
STRATEGIC PILLAR II Digital Economy	1. **Tech Startup Ecosystem Development:** Nurturing and supporing startups through every stage of their entrepreneurial journey • 200 tech startups joined, with 27 ecosystem activations • Facilitated 11 fundraising events and investor engagement and 10 venture development and market access 2. **Digitalisation of MSME** via strategic collaboration with key industrial players, resulting in 680 MSME participants that empowers their digitalisation journey 1. **CD2:** A tuition-free computer science school (42 Penang) to cultivate sustainable talent pipeline
STRATEGIC PILLAR III Digital Community	1. **DahDigital:** Advancing digital literacy & promoting widespread digital adoption • Conducted over 400 Digital Clinic classes with more than 8,000 participants • Comprises 23 registered NGOs on the **DahDerma Application** 2. **More than 50,000 public engagements in Penang,** promoting digital transformation via campaigns and events
STRATEGIC PILLAR IV Digital Infrastructure	1. **Penang Internet Exchange (PIX):** A localised network exchange that reduces internet latency and enables accelerated data transfer

Source: Digital Penang Executive Overview 2023, Digital Penang (2024)

Empowering Penang's Digital Transformation

Designing the funding mechanism that drives Penang's digital startups through the Valley of Death

Roles of Digital Penang in the Startup Financing Cycle

Digital Penang's core mandate revolves around advancing Penang's digital economy by fostering innovation, growing startups and ensuring the state stays competitive in the digital age.

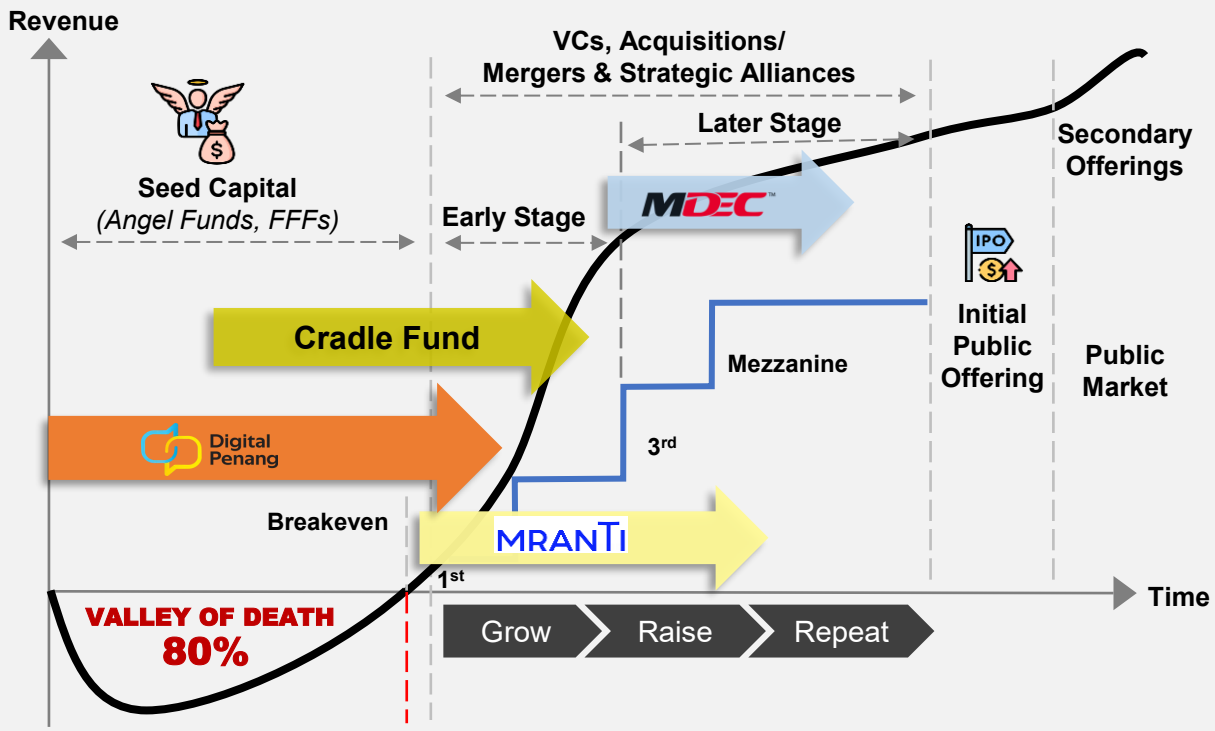
One of their primary roles is to assist digital startups in overcoming the "Valley of Death", a critical stage in the startup financing cycle where early-stage companies face cash flow shortages before they secure consistent revenue or additional funding.

Key Roles of Digital Penang in Supporting Startups

- Facilitating Access to Funding
- Capacity Building & Mentorship
- Creating a Collaborative Ecosystem
- Connecting Startups to Markets
- Providing Supportive Infrastructure

While agencies like MDEC focuses on national-level digital transformation, Digital Penang is uniquely positioned to serve the local startups. Its efforts concentrates on nurturing a digital ecosystem specifically tailored to Penang's needs, with a strong focus on leveraging local talent, resources and industries.

Startup Financing Cycle



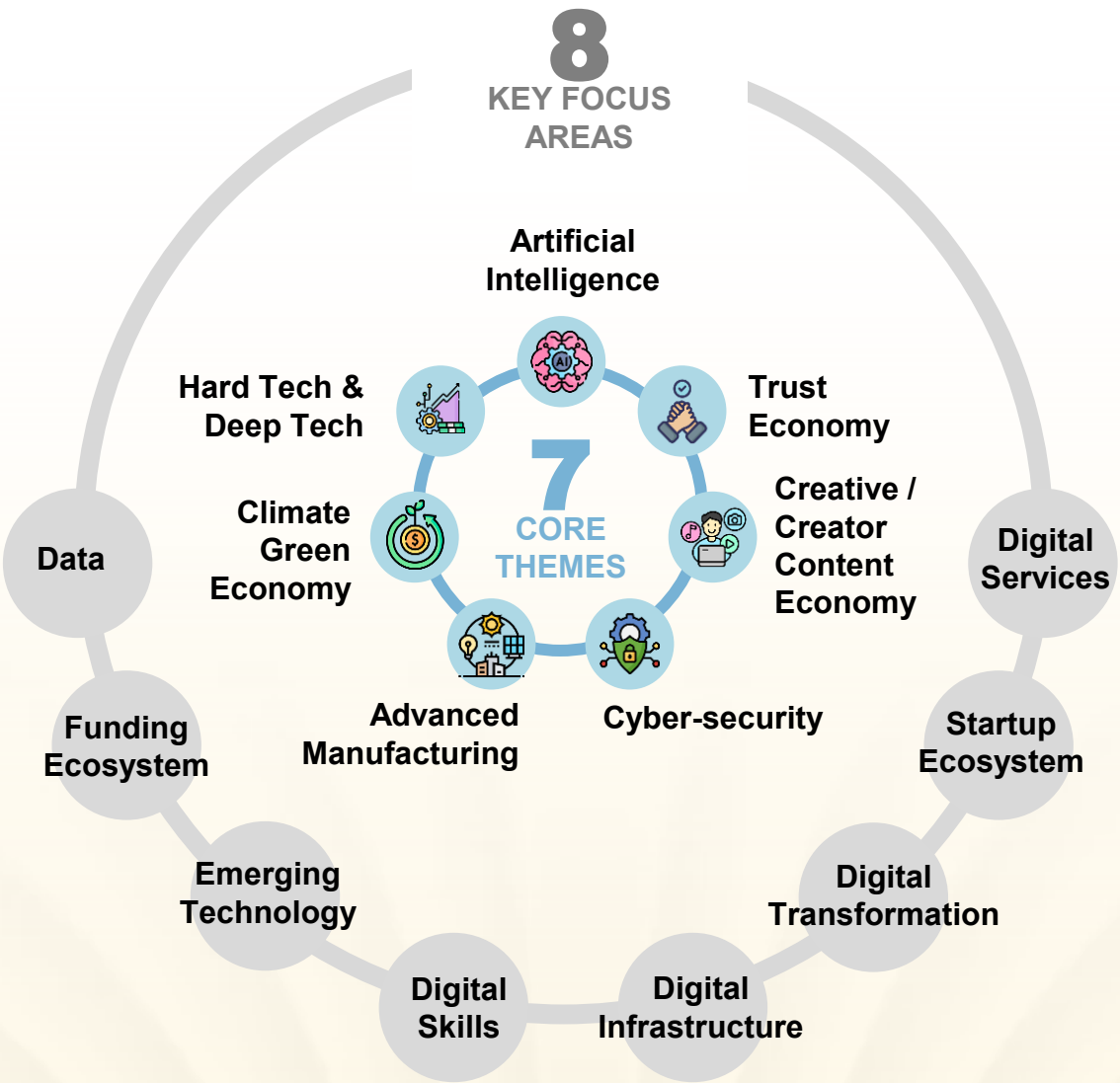
03

CASE FOR CHANGE

Key Trends for a Thriving Digital Economy

By harnessing current trends and focusing on the right areas, nations and businesses can build an inclusive, secure and future-ready digital economy, ensuring long-term success.

As the world accelerates towards a digital-first future, the key drivers of a thriving digital economy are shaped by dynamic and evolving trends. These trends are underpinned by **seven (7) core themes** and supported by **eight (8) key focus areas** that provide the foundation for sustainable growth and innovation.



Key Trends for a Thriving Digital Economy

Leveraging global digital trends through a strategic focus on key areas that will drive innovation, foster economic growth and enhance Penang's e-commerce ecosystem

As the third largest e-commerce contributor in Malaysia, Penang is well-positioned to capitalise on global digital trends, enhancing its e-commerce ecosystem. By strategically focusing on key areas, the state can continue to drive innovation and foster economic growth within the digital space.

The current global digital trends are categorised into seven (7) core themes and eight (8) key focus areas that significantly shape the evolving digital landscape. These themes and focus areas, as outlined below, offer a framework for understanding the key drivers of change in the global digital economy. By capitalising on these trends and enablers, Penang can continue to strengthen its digital economy and lead the charge in the evolving global digital landscape.

Core Theme	Key Focus Area		
 **Artificial Intelligence**	Data	Funding Ecosystem	Digital Infrastructure
 **Trust Economy**	Emerging Technology	Digital Skills	Digital Transformation
 **Creative/Creator Content Economy**	Digital Services	Digital Skills	Startup Ecosystem
 **Cybersecurity**	Digital Skill	Data	Digital Infrastructure
 **Advanced Manufacturing**	Data	Funding Ecosystem	Startup Ecosystem
 **Climate Green Economy**	Data	Funding Ecosystem	Startup Ecosystem
 **Hard Tech & Deep Tech**	Startup Ecosystem	Funding Ecosystem	Digital Infrastructure

Key Trends for a Thriving Digital Economy

Outlined below are the eight (8) key focus areas that underpin sustainable growth and innovation:

1. **Data**: Data are the lifeblood of the digital economy. Its collection, analysis and utilisation drive informed decision-making, innovation and personalised experiences. Data governance and privacy remain crucial as data become a strategic asset.
2. **Funding Ecosystem**: A strong funding ecosystem supports entrepreneurship by providing access to capital through VCs, grants and private investments. This enables startups to scale, innovate and drive economic growth.
3. **Emerging Technologies**: The rapid development and adoption of emerging technologies such as blockchain, AI, hard tech and deep tech are transforming industries. These technologies are paving the way for new solutions and business models that address evolving challenges.
4. **Digital Skills**: A digitally skilled workforce is essential for leveraging the full potential of a digital economy. Upskilling and reskilling initiatives are needed to equip individuals with the skills required to succeed in the digital age.
5. **Digital Infrastructure**: Digital infrastructure, including high-speed internet, data centres and 5G networks, supports business operations and enables digital transformation. Accessible and reliable infrastructure is vital for businesses to grow and compete.
6. **Digital Transformation**: Digital transformation integrates technologies across organisations, changing how businesses operate and deliver value. It enhances efficiency, decision-making and customer experiences, offering a competitive advantage in a rapidly evolving landscape.
7. **Startup Ecosystem**: A vibrant startup ecosystem fosters innovation and entrepreneurship by providing access to funding, mentorship and talent. This ecosystem supports the growth of new technologies and business models, driving economic resilience and growth.
8. **Digital Services:** Digital services enable the creation, distribution and monetisation of digital content through platforms, applications and cloud-based tools. This empower individuals and businesses to reach global audiences, unlock new revenue streams and transform how value is produced and consumed in the digital space.

Together, these trends and focus areas outline a vision for a prosperous and sustainable digital economy, powered by technology, innovation and collaboration across all sectors.

Theme 1

Artificial Intelligence

Overview

AI is recognised for its significant impact across various sectors, driving innovation and efficiency. It is highlighted for its capabilities in software development, digital government applications and environmental sustainability enhancement.

Key Focus Areas

- Data
- Funding Ecosystem
- Digital Infrastructure

Key Trends		Usage
i.	Industrial AI for Cutting-Edge Process Optimisation and Automation, leveraging AI-driven insights that revolutionise efficiency, automation and customisation in production, creating smarter, more resilient operations for the industrial sector	• **Efficiency in Operations:** Optimises production and maintenance processes, enabling reduced downtime and improvement in overall operational efficiency. • **Predictive Risk Management:** Uses data and analytics to proactively identify and mitigate risks, optimising efficiency and reducing costs. • **Predictive Innovation:** Enables industries to identify opportunities for innovation and development of new areas through development of advance AI LLM models.
ii.	AI-Powered Digital Government, assisting public sector to streamline their operations by automating repetitive and routine tasks	• **Improved Services:** Governments use AI to automate citizen services, streamline processes and provide personalised experiences. • **Data-Driven Policies:** AI analyses data to inform policy decisions and identify areas for intervention, enhancing governance effectiveness. • **Modernisation:** AI helps modernise digital infrastructures, making them more resilient and responsive to citizen needs.
iii.	GenAI accelerating environmental sustainability by providing potential environmental risk across concerning parameters	• **Sustainability Solutions:** GenAI optimises resource management, improving energy consumption and reducing waste. • **Predictive Analytics:** AI predicts environmental changes, allowing for proactive measures to mitigate negative impacts. • **Challenges:** The computational demands of GenAI raise concerns about energy use and electronic waste, necessitating sustainable practices.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 2

Trust Economy

Overview

The Trust Economy emphasises the importance of trust in digital interactions, particularly as technology evolves and becomes more integrated into daily life. It focuses on how trust can be built and maintained in various sectors, including finance, healthcare and governance.

Key Focus Areas

- Emerging Technology
- Digital Skills
- Digital Transformation

Key Trends	Usage
i. Token-Based Trust Systems in Business Transactions, providing an alternative trusted, secure systems for digital transactions and interactions	• **Enhanced Transparency:** Tokens provide traceable, immutable transaction records, building consumer trust by showing transparency at each step. • **Reduced Fraud:** Through tokenised asset verification, businesses can better verify transactions, making fraud detection more reliable and reducing the need for third-party oversight. • **Interoperability**: Token-based systems foster interoperability between digital platforms, enabling smoother transitions and exchanges between services and improving overall user experience.
ii. Blockchain's Green Revolution, giving birth to platforms such as the Voluntary Carbon Market to mitigate/eliminate the impact of climate change	• **Sustainability Focus**: Blockchain technology is increasingly recognised for its potential to support environmental sustainability initiatives. It can enhance transparency in supply chains, enabling organisations to track and verify sustainable practices. • **Decentralised Solutions:** By leveraging blockchain, organisations can create decentralised systems that promote accountability and trust in sustainability efforts. This trend aligns with global movements towards greener practices and regulatory compliance.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 3

Creative/Creator Content Economy

Overview

The creative/creator content economy thrives on the synergy between creators, digital platforms and audiences, enabling the production, sharing and monetisation of creative work. The growth of digital content is a driving force in the modern economy, empowering individuals and small businesses to generate income through content creation.

Key Focus Areas

- Digital Services
- Digital Skills
- Startup Ecosystem

Key Trends	Usage
i. Decentralised Content Ownership empowering creators	• **Empowering Control:** Allows creators to maintain direct ownership of their content, reducing reliance on traditional intermediaries and promoting fairer revenue distribution. • **Transparency and Rights Management:** Blockchain technology allows creators to authenticate their work, reducing piracy and ensuring they retain full rights and control over usage. • **Greater Monetisation Opportunities:** Enable creators to explore various monetisation models, **including microtransactions and nonfungible tokens (NFTs),** for a diversified income stream.
ii. Immersive Content Experiences that enhance user engagement	• **Enhanced Engagement through Augmented Reality (AR) and Virtual Reality (VR):** AR and VR are creating new dimensions in content, enabling creators to build interactive, experiences that deeply engage audiences. • **Cross-Platform Accessibility:** Immersive content can be experienced across multiple digital platforms, allowing creators to reach audiences and enhancing brand reach. • **Experiential Marketing:** Allows audiences interact directly with brands, which strengthens brand loyalty and drives higher engagement.
iii. Creator-Centric Monetisation Models	• **Direct-to-Consumer Models:** Platforms like Patreon and Ko-fi allow creators to earn directly from fans through subscriptions, donations, or pay-per-view content, fostering stronger creator-audience relationships. • **Revenue from Microtransactions:** Creators are capitalising on microtransactions through platforms like Twitch, TikTok and YouTube, where small contributions add up, creating sustainable income streams.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 4

Cybersecurity

Overview

As businesses and individuals rely more on digital tools, platforms and transactions, robust cybersecurity is essential for safeguarding sensitive data, maintaining trust, preventing financial losses and supporting the smooth functioning of the digital economy. Cybersecurity is unraveling the digital asset opportunity, verifying the green revolution and enabling the next generation of digital services.

Key Focus Areas

- Digital Skill
- Data
- Digital Infrastructure

Key Trends	Usage
i. Integration of Emerging Technologies, an imperative for the current rapidly advancing threats	• **Adaptive Defense Mechanisms:** As cyber threats become more sophisticated, integrating innovative technologies such as AI and ML into cybersecurity is essential. These technologies enhance threat detection and overall security measures. • **Proactive Threat Management:** The use of AI and machine learning (ML) allows for real-time analysis of vast amounts of data, enabling organisations to identify and mitigate threats before they escalate. It is crucial for maintaining the resilience of digital infrastructures.
ii. Growth of the Cybersecurity Market, as cyber threats rises on malicious events attacking private and public sector alike	• **Increased Investment**: The cybersecurity market is experiencing significant growth, driven by the rising number of cyber threats and the need for robust security solutions. Organisations are investing in advanced technologies to protect their digital assets and ensure compliance with regulations. • **Focus on Resilience:** The emphasis is shifting from merely preventing attacks to building resilient systems that can withstand and recover from cyber incidents. This trend highlights the importance of cybersecurity strategies that encompass prevention, detection and response.
iii. Cyber Insurance gaining prominence as cyberattacks and data breaches increase worldwide across enterprises of all sizes	• **Tailored Policies for Specific Risks:** As cyber threats become more complex, insurance providers are increasingly offering customised policies based on industry-specific vulnerabilities, covering risks such as ransomware attacks, data breaches and business interruption. • **Incentives for Strong Cyber Hygiene**: To encourage proactive cybersecurity practices, insurers are providing discounts or reduced premiums to companies that invest in advanced cybersecurity measures, such as multi-factor authentication, employee training and endpoint protection.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 5

Advanced Manufacturing

Overview	Key Focus Areas
An IoT-enabled, data-integrated ecosystem that enhances efficiency, quality and sustainability in manufacturing by linking technologies like robotics, AI and digital twins. This connected network enables smarter production, real-time decision-making and streamlined supply chains, adapting seamlessly to evolving industrial demands.	Data Funding Ecosystem Startup Ecosystem

Key Trends	Usage
i. Risk-Averse IoT devices for data privacy and security purposes	• **Focus on Security and Privacy:** As IoT devices proliferate, there is an increasing emphasis on ensuring the security and privacy of these systems. Organisations are adopting risk-averse strategies to mitigate potential vulnerabilities associated with interconnected devices. • **Regulatory Compliance:** The trend includes the establishment of regulations and standards to ensure that IoT devices meet security requirements, promoting a baseline level of protection against cyber threats and enhancing user trust in smart ecosystems.
ii. Automated Quality Control in Advanced Manufacturing	• **Focus on Precision and Consistency**: Automation in quality control is transforming manufacturing by enabling real-time monitoring and detection through AI-driven inspection systems and sensors. This shift reduces human error, enhances consistency and ensures higher product quality across production lines. • **Efficiency and Cost Reduction**: By utilising ML to analyse patterns and predict failures, automated quality control minimises waste and speeds up processes. This innovation helps manufacturers reduce costs while meeting stringent quality standards, making it integral to industries like automotive and electronics manufacturing.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 6

Climate Green Economy

Overview

An economic framework that prioritises environmental sustainability, social equity and economic growth. It emphasises the interconnection between economic development and ecological health, aiming to reduce environmental risks and ecological scarcities.

Key Focus Areas

- Data
- Funding Ecosystem
- Startup Ecosystem

Key Trends	Usage
i. Emerging Green Technologies & Smart Systems, particularly smart energy systems that are affordable, secure and sustainable	• **Innovative Solutions:** The development of emerging green technologies is crucial for addressing environmental challenges. These include advancements in renewable energy, energy-efficient systems and smart grids that optimise energy consumption and reduce waste. • **Integration of Smart Systems:** Powered by IoT and data analytics, they enhance the efficiency of resource management in various sectors. Enabling real-time monitoring and control of energy use, water management and waste reduction, contributing to a more sustainable economy.
ii. Industry 5.0 that supports the Circular Economy, utilising digital technology to optimise resource usage, achieving a true circular economy	• **Human-Centric Approach:** Industry 5.0 emphasises a shift towards a more sustainable and human-centric industrial landscape. It focuses on the well-being of workers while leveraging advanced technologies to enhance productivity and innovation. • **Circular Economy Principles:** This trend promotes the circular economy model, which contrasts with the traditional linear economy. It encourages practices such as sharing, reusing and recycling. IoT plays a crucial role by providing data that enhances visibility and control over manufacturing and distribution processes.
iii. Regulatory impetus for Green Transition to achieve the net-zero emission targets	• **Policy Frameworks:** Governments are establishing regulations and policies to facilitate the transition to a green economy. This includes setting emissions reduction targets, providing incentives for green investments and enforcing environmental standards across industries. • **Support for Innovation:** Regulatory frameworks are designed to encourage innovation in green technologies and practices, ensuring that businesses can adapt to changing environmental requirements while promoting sustainable growth.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Theme 7

Hard Tech and Deep Tech

Overview

Hard tech and deep tech innovations often require intensive research and development, creating transformative technologies with long-term impact and high entry barriers. These domains drive fundamental changes in sectors ranging from healthcare to manufacturing and energy.

Key Focus Areas

- Startup Ecosystem
- Funding Ecosystem
- Digital Infrastructure

Key Trends	Usage
i. Increasing demand for tangible, physical technologies and systems, often requiring heavy engineering and manufacturing expertise	• **Semiconductors & Advanced Manufacturing:** With the global chip shortage and increasing demand for advanced semiconductors, Asian countries are ramping up efforts to innovate and expand production capabilities. • **Robotics & Automation:** The development of robotics for manufacturing, logistics and healthcare, including industrial robots and collaborative robots (cobots) designed to assist workers in various tasks, is transforming industries in Japan, China and South Korea. • **Electrification & Green Energy**: The focus on renewable energy, EVs and energy storage technologies has gained momentum. The push for smart grids and energy-efficient infrastructure is another key hard tech trend.
ii. Emerging Deep Tech Innovation in Asia	• **AI & ML:** AI remains a dominant focus, particularly in China, Japan and India. AI is being integrated across industries such as healthcare, finance and transportation. • **Quantum Computing**: Countries like China and Japan are investing heavily in quantum computing, which has the potential to revolutionise industries such as cryptography, optimisation and material science. • **Blockchain & Decentralised Technologies:** Blockchain is seeing increasing adoption across Asia, with applications in finance (particularly in digital currencies and cross-border payments), supply chain management and digital identity verification. China, Japan and South Korea are key players in the blockchain space.

Source: Digital Economy Trends, 2024, Digital Cooperation Organisation (2024)

Penang’s Strengths and Opportunities

Leveraging Penang’s strategic location to drive a robust digital strategy for global competitiveness

Penang stands out as a prime example of how strategic geographical positioning, combined with strong infrastructure, skilled talent and an innovation-driven ecosystem, can drive a robust digital strategy. The state's unique advantages position it as a key player in the regional and global digital economy, fostering growth, sustainability and innovation.

Penang's strategic location can play a pivotal role in shaping a robust digital strategy, with key advantages:

- **Gateway to the Global Market**

  Situated at the heart of the Indonesia-Malaysia-Thailand Growth Triangle

  (IMTGT), Penang is well-positioned to strengthen digital trade and e-commerce. Its proximity to key regional markets enhances cross-border transactions, positioning the state as a crucial hub for digital trade within ASEAN and beyond.

- **Logistics and Smart City Integration**

  Penang’s strong infrastructure, including its ports and airports, offers the ideal environment for implementing smart city technologies. By integrating IoT and AI into logistics and supply chain management, Penang can optimise operations, reduce costs and enhance efficiency. This would solidify Penang’s reputation as a digital logistics hub and improve its competitiveness on the global stage.

- **Access to Talent and Partnerships**

  Penang’s educational institutions and growing tech ecosystem provide a steady pipeline of skilled talent in fields like AI, data science and digital marketing. Its strategic location also enables strong partnerships with multinational companies, further boosting Penang’s role as a centre of innovation and supporting the growth of its digital economy.

Penang's success as a digital hub is anchored by:

- **Strong Manufacturing Ecosystem**
  A well-established electrical and electronics (E&E) sector supports digital transformation and smart manufacturing practices.
- **Skilled Talent Pool**
  Continuous investments in STEM education and digital upskilling programmes ensure a workforce ready for 4IR.
- **Thriving Startup Ecosystem**

  Initiatives led by Digital Penang nurture startups in e-commerce, fintech and IoT sectors, fostering innovation and entrepreneurship.

Penang's Strengths and Opportunities

Leveraging Penang's strategic location to drive a robust digital strategy for global competitiveness

Penang is well-positioned to seize future opportunities:

- **Attracting Foreign Investment**
  Penang's strengths in manufacturing, digital innovation and sustainability position it a leading destination for global investments in AI, 4IR and green technology.
- **Upskilling and Talent Development**
  Expanding training programmes to build a future-ready workforce that aligns with the needs of the digital economy.
- **Green Digital Economy**

  By integrating digital technologies with sustainability goals, Penang can position itself as a leader in clean technology and smart environmental solutions.

Penang's strategic advantages in location, infrastructure, talent and innovation form the cornerstone of its robust digital strategy. With a strong emphasis on connectivity, sustainability and talent development, the state is well on its way to becoming a leading digital hub in Southeast Asia. By capitalising on these strengths and fostering collaboration across stakeholders, Penang is poised to drive sustainable growth, innovation and prosperity in the digital era.

Case For Change

As Penang's digital landscape evolves, the need for enhanced digital infrastructure and greater innovation is crucial to sustain growth and global competitiveness.

i.	**Promoting Inclusive Digital Literacy for All**	• Penang's digital growth faces challenges in digital literacy among groups like the elderly and heritage communities. • To bridge these gaps, inclusive initiatives, such as targeted training and awareness campaigns, are essential to foster broader digital engagement.
ii.	**Aligning with National Digital Transformation Goals**	• The Malaysian government aims to drive the country's digital transformation by fostering a robust digital economy, enhancing public sector efficiency, improving infrastructure and ensuring inclusive digital access for all citizens. • Penang can align with these efforts by fostering innovation and sustainable growth. Collaborating with national agencies and leveraging resources will improve digital infrastructure, support local businesses and bolster economic resilience.

Case For Change

iii.	**Expanding E-Commerce Opportunities for Local Businesses**	• Penang ranks third in Malaysia for e-commerce income and expenditure. However, to maximise this growth, local businesses, especially MSMEs, need support in their digital transformation. • By offering resources, training and access to digital platforms, Penang can help these enterprises thrive in the digital economy and enhance their competitiveness in local and global markets.
iv.	**Harnessing Penang's Manufacturing Strengths**	• Penang can harness its manufacturing strengths to promote hard tech and deep tech within its startup ecosystem. By fostering collaboration between universities and industries, the state can drive innovation in advanced technologies. • Creating incubators and providing funding will empower startups to develop scalable solutions, enhancing Penang's competitiveness in the global market.
v.	**Investment and Catalytic Fund to Drive Growth**	• Establishing an investment and catalytic fund will stimulate growth in key sectors such as technology and sustainability by attracting private investments and supporting local startups, addressing funding gaps and fostering innovation. Focusing on these strategic sectors will enhance Penang's economic resilience and drive job creation. • Additionally, participating in co-investment opportunities within the federal government's Jelawang Capital Fund of Funds will help attract further capital for critical investments in technology and sustainability, accelerating local innovation and economic development.

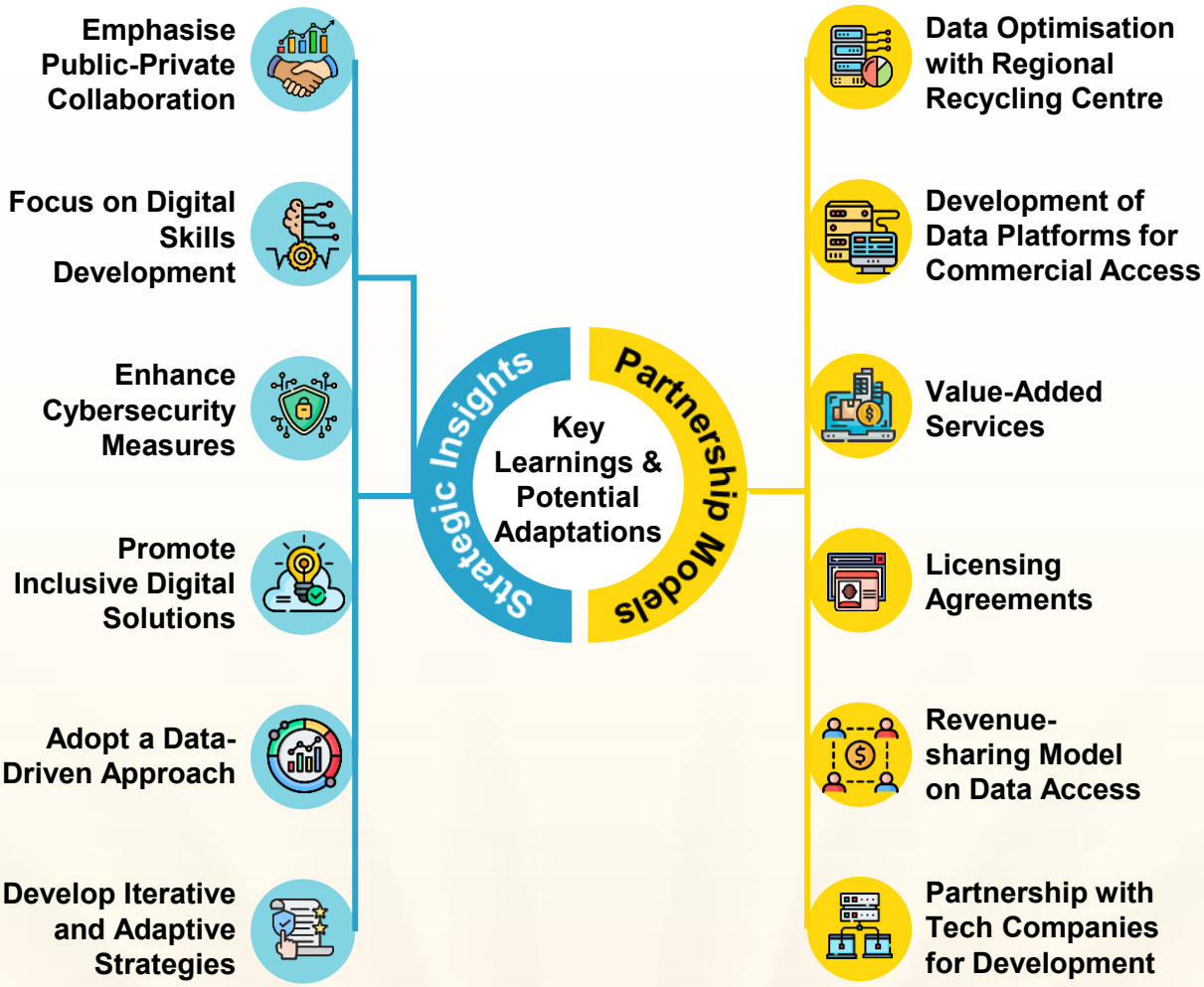
04

Strategic Alignments

Strategic Alignments

Ensuring alignment with strategies and identified partnerships through Strategic Insights and Partnership Models to drive Penang's digital transformation

The combination of these two exercises, the analysis of **Strategic Insights** and the design of effective **Partnership Models**, ensures that Penang's digital transformation efforts are comprehensive, well-supported and aligned with broader policy frameworks while also fostering collaborative partnerships to drive real change.



Strategic Insights and Partnership Models

This integrated approach ensures Penang is aligned with both local needs and global standards, positioning it as a leader in the digital economy.

In developing DEMP, two key exercises were conducted: Strategic Insights and Partnership Models. The Strategic Insights exercise involved analysing relevant federal, regional and state blueprints, policies and major plans to ensure alignment with national and regional strategic priorities while addressing Penang's unique socio-economic and digital landscape. Key reference documents included domestic policies and frameworks, such as MyDIGITAL, the New Industrial Master Plan 2030 and the National 4IR Policy, alongside international benchmarking that identify global trends and best practices in digital transformation.

This analysis provided valuable insights and key learnings that have directly shaped the development of DEMP. Among the key takeaways and possible adaptations are:

- **Emphasis on Public-Private Collaboration**: Strengthening partnerships to leverage the strengths of both sectors.
- **Focus on Digital Skills Development**: Ensuring the workforce is equipped with the skills needed for a digital economy.
- **Enhanced Cybersecurity Measures**: Building robust cybersecurity frameworks to protect digital infrastructure.
- **Promotion of Inclusive Digital Solutions**: Ensuring digital solutions are accessible to all segments of society.
- **Adoption of a Data-Driven Approach**: Using data to inform decisions, policies and services.
- **Iterative and Adaptive Strategies**: Adopting flexible, evolving strategies that can adapt to technological advancements and market shifts.

From these insights, potential adaptations for Penang include integrating advanced technologies, strengthening public-private partnerships (PPP) and implementing scalable, citizen-centric frameworks. These strategies aim to accelerate Penang's digital transformation, addressing local challenges while capitalising on new opportunities.

The **Partnership Models** exercise focused on exploring successful PPP frameworks to identify potential financing mechanisms for DEMP. The analysis highlighted how PPPs had been instrumental in supporting the development of critical digital infrastructure and innovation globally. Adapting these models for Penang can combine public sector goals with private sector expertise and investment, ensuring the sustainability and scalability of the digital transformation. Integrating PPPs will secure funding, drive innovation and build a resilient digital ecosystem, positioning Penang for long-term growth.

Strategic Insights and Partnership Models

The PPP model effectively leverages the strengths of both the public and private sectors, offering a range of key benefits. It enables resource optimisation by ensuring the efficient allocation of resources, leading to greater impact. The model also fosters innovation and expertise by harnessing private sector capabilities to drive forward-thinking solutions. Through accelerated implementation, projects can be developed and deployed more quickly, addressing urgent needs in the digital landscape.

Furthermore, PPPs stimulate economic growth by driving collaboration between the sectors, which in turn boosts economic activity. It also enhances service delivery, improving the quality and accessibility of public services to citizens, ensuring that the benefits of digital transformation are widely felt.

The analysis of PPP funding models also revealed opportunities for Penang, including:

- **Data Optimisation**: Using regional recycling centres to maximise data utility.
- **Commercial Data Platforms**: Enabling businesses to leverage data for growth.
- **Value-Added Services**: Creating new revenue streams.
- **Licensing Agreements:** Licensing specific datasets to private enterprises.
- **Revenue-Sharing Models on Data Access**: Monetising digital assets through strategic agreements.
- **Partnerships with Tech Companies**: Accelerating digital projects through collaboration.

These insights provide a clear path forward for Penang to strengthen its digital ecosystem, ensure sustainable growth and position itself as a leader in the digital economy.

Strategic Insights

By drawing from these proven models, Penang can tailor its approach to ensure the implementation of sustainable, innovative and effective digital solutions.

In this chapter, we present a comparison of best practices, strategic frameworks and innovative policies drawn from both Malaysian national policies and leading countries. The goal is to extract actionable insights and solutions that are relevant to Penang's ongoing digital transformation journey. The documents and frameworks highlighted below have been carefully selected for their relevance to Penang's digital ecosystem and their potential for adaptation to the local context. Each framework provides valuable guidance for implementing sustainable, digital and innovative solutions that align with Penang's objectives for long-term growth and development.

List of Domestic Case Studies

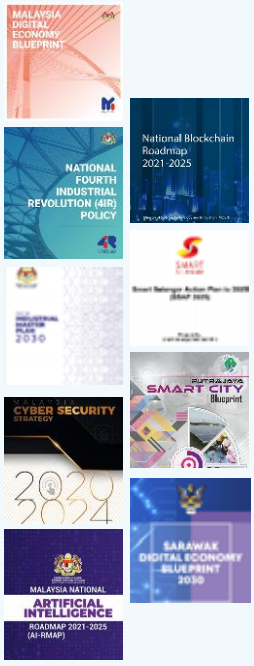
Policies	Goals
Malaysia Digital Economy Blueprint	To be a regional leader in the digital economy and achieve inclusive, responsible and sustainable socioeconomic development
National Fourth Industrial Revolution (4IR) Policy	To empower the nation to achieve a "balanced, responsible and sustainable growth" by leveraging technological adoption and innovation
New Industrial Master Plan 2030	To provide national strategic direction for industrial development, serve as a reference for investors and other economies on Malaysia's position and direction and highlight the role of the Malaysian government in shaping the economy
Malaysia Cyber Security Strategy	To enhance Malaysia's cybersecurity posture and defend against growing cyber threats
Malaysia National Artificial Intelligence Roadmap	To create a self-sustaining AI Innovation Ecosystem for AI development, leveraging quadruple helix collaboration guided by Responsible AI Principles
Malaysia National Blockchain Roadmap	To strengthen Malaysia's leadership position in blockchain for economic competitiveness and growth through cohesive strategic collaboration and synergy
Smart Selangor Action Plan to 2025	To pave the way for more productive, economically liveable and environmentally conscious Selangor communities
Putrajaya Smart City Blueprint	To offer a liveable and well-connected city for its people, provide better services and improve resource efficiency and create stronger, safer and more resilient communities
Sarawak Digital Economy Blueprint 2030	To be a leading Digital Economy and Society by 2030

Strategic Insights

To overcome the challenges of digital transformation, it is crucial for states to implement strategic actions that address local barriers and align with national goals.

Domestic Case Studies

Policies



Issues and challenges identified

Digital Transformation Barriers:

- Lack of a digital-first mindset
- Insufficient supportive ecosystem for local enterprises
- Limited internet infrastructure
- Shortage of future-ready workforce
- Digital divide among income and age groups
- Low trust and ethical concerns regarding data and technology usage
- Resistance to technology adoption
- Shortage of skilled talent and enabling infrastructure in certain regions
- Fragmented regulations and siloed governance

Economic and Productivity Challenges:

- Economic complexity and stagnated labour productivity
- Talent shortage and skills mismatch
- Increasing reliance on re-exports
- Underutilisation of Free Trade Agreements (FTAs) by local companies
- Slow improvement in product market diversification
- Rising non-tariff measures
- Declining Foreign Direct Investments (FDIs) and Domestic Direct Investments (DDIs)
- Growing disparities in manufacturing across states
- Limited participation of MSMEs in Global Value Chains (GVCs)
- Insufficient financing for new ventures
- Need for improvement in ease of doing business

Cybersecurity and Threats:

- Increasing cybercrimes (frauds) targeting Malaysian citizens
- Cyber threats against critical infrastructure, particularly healthcare services
- Shortage of cybersecurity talent
- Low public awareness and preparedness to respond to cyber threats

Urban and Environmental Challenges:

- Regional competition and disruptive technologies threatening growth
- High crime rates, pollution and traffic congestion affecting livability
- Inadequate road planning and poorly connected public transportation
- Rapid urbanisation leading to congestion, pollution and resource depletion
- Aging population increasing healthcare demands
- Climate change, extreme weather and rising sea levels contributing to environmental risks

Strategic Insights

The selected benchmark countries focus on advancing digital transformation through e-governance, cybersecurity and emerging technologies to strengthen their economies and public service.

International Case Study

Country	Key Digital Roadmap	Key Takeaways
Estonia	• Estonian Information Society Strategy (2007–2013) • Digital Agenda 2020 • Cyber Security Strategy (2014–2017) • Estonian Digital Agenda (EDA) 2030	• Estonia has been a pioneer in digital governance, focusing on creating a digital society with e-governance and cybersecurity as key pillars. • The country's digital roadmaps, such as the Estonian Information Society Strategy and Digital Agenda 2020, laid the foundation for widespread internet access, digital literacy and the introduction of secure digital services. • The Cyber Security Strategy and the Estonian Digital Agenda (EDA) 2030 focus on strengthening digital infrastructures, ensuring data protection and fostering innovation in public services and private sector engagement.
Singapore	• Smart Nation (SN) Initiative 1.0 • SN 2.0	• Singapore’s Smart Nation Initiative, spanning SN 1.0 and SN 2.0, aims to transform the country into a leader in digital innovation. • Through this roadmap, Singapore integrates advanced technologies like IoT, AI and data analytics to enhance urban living, government services and the economy. • The SN 2.0 continues this work with a stronger focus on digital entrepreneurship, AI and cybersecurity, fostering collaboration between the public and private sectors to create a robust digital ecosystem.

Strategic Insights

International Case Study

Country	Key Digital Roadmap	Key Takeaways
Denmark	• Digital Strategy 2022–2025	• Denmark's **Digital Strategy 2022–2025** focuses on strengthening the country's digital economy by advancing digital public services, secure infrastructure and smart city initiatives. • Denmark emphasises integrating emerging technologies like AI and blockchain into both government services and industrial sectors. • The strategy aims to develop digital skills across the population and establish Denmark as a leader in the global digital economy.
South Korea	• The Digital Strategy of Korea • Korea Digital Development Program (KoDi)	• South Korea's digital roadmaps, **The Digital Strategy of Korea** and the **Korea Digital Development Program (KoDi)**, focus on driving the digital transformation of industries, public administration and the economy. • South Korea promotes the integration of AI, IoT and 5G technologies in various sectors, including healthcare, education and manufacturing. • The government aims to build a robust digital ecosystem that fosters innovation, increases productivity and supports smart cities and green technologies.

Strategic Insights

Key learnings and potential adaptations for gaining strategic insights to drive future growth and enhance decision-making processes

This analysis offers valuable insights and key learnings that have significantly shaped DEMP. Possible adaptations from the analysis are highlighted below:

 **Emphasise Public-Private Collaboration**	Foster partnerships between government and private sectors to drive innovation and develop inclusive digital solutions. This collaboration can enhance resource sharing and expertise, ensuring that digital initiatives meet the needs of all citizens.
 **Focus on Digital Skills Development**	Invest in training programmes to equip the workforce with essential digital skills. This will not only prepare the current workforce for technological advancements but also cultivate future-ready talent through integrated digital literacy and STEM education.
 **Enhance Cybersecurity Measures**	Prioritise the security and resilience of digital infrastructure. Implement robust regulations and public awareness campaigns to combat cyber threats and misinformation, ensuring a safe online environment for all users.
 **Promote Inclusive Digital Solutions**	Ensure equitable access to digital opportunities, particularly for marginalised groups and tailor initiatives to address specific societal challenges, making sure that no one is left behind in the digital transformation journey.
 **Adopt a Data-Driven Approach**	Leverage data to inform decision-making and improve citizen-centric services and establish frameworks for data sharing that respect privacy while driving innovation and enhancing public services.
 **Develop Iterative and Adaptive Strategies**	Develop policies that are flexible and can evolve with technological advancements and emerging challenges and engage continuously with citizens and businesses to co-create solutions that address community needs.

Partnership Models

Implementing a PPP model for Digital Penang's DEMP initiatives presents a compelling strategy to accelerate digital transformation effectively.

The Partnership Models exercise focused on exploring PPP options to identify effective approaches for financing and delivering digital transformation initiatives. By studying successful global PPP frameworks, valuable insights were gained into optimising resource allocation, accelerating project implementation and fostering seamless collaboration between the public and private sectors.

Comparison of Different Funding Models
Conventional PPP, Private Finance Initiative (PFI) and Privatisation

Conventional PPP	Private Finance Initiative	Privitisation
Procurement funded directly through government budget	Funding through private financial resources without government guarantee	Funding through private financial resources without government guarantee
Immediate impact on government budget	Impact on government budget spreads over the duration of concession period	No financial implication to the government for use-pay model
Risks are entirely borne by government.	Risks are allocated to parties which can manage them most efficiently.	Risks are entirely borne by the private sector.
Extensive public sector involvement in each stage of project implementation and maintenance throughout life of project	Public sector involvement is through enforcement of pre-agreed KPIs.	Government acts as regulator.
Relationship with private contractor is short term.	Relationship with private contractor is long term and spans the entire project lifecycle.	Relationship with private contractor is long term and spans the entire project lifecycle.
Suitable for projects with high socio-economic returns and projects justified on strategic considerations	Suitable for projects with commercial viability	Suitable for projects with commercial viability

Partnership Models

Potential flagship project: City data monetisation to drive innovation and foster economic growth

Case Study

Below is a project on monetising data in the Kuala Lumpur Competitive City Master Plan with a PPP model that DEMP can explore.

Utilising and Monetising Information for City Planning

Collaborating with private businesses to incorporate digital information related to city planning to enhance benefits for citizens while also creating a sustainable revenue stream for the government

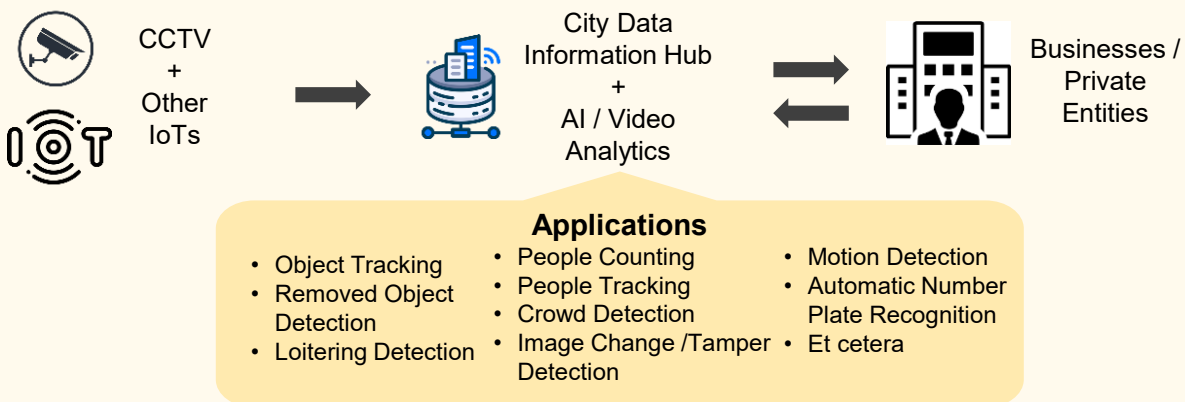
Example Application:

- Developing an online platform that gathers and digitises national and local policies into a single accessible location, available for a monthly subscription fee.
- Creating a 3D model that combines zoning data with financial viability algorithms to forecast the potential profitability of a project under various scenarios.
- Partnering with navigation companies like Google and Waze to facilitate the collection of traffic data to monitor vehicle and pedestrian activity.

Potential Benefits:

- Integrating all city planning information, including policies and future developments, that supports developers, investors and the public.
- Property developers and town planners can be targeted customers for city planning information like GIS data, enabling them to make more informed decisions.

Potential Flagship Project: City Data Monetisation



Partnership Models

Monetising city data to unlock new opportunities for entrepreneurial innovation, empowering startups and businesses to create cutting-edge solutions and drive economic growth

Potential data sets that a city could capture and monetise, enabling entrepreneurs to build innovative business models

Transportation & Mobility

- Real-time Traffic Data
- Public Transport Usage
- Parking Availability
- Bike and Scooter Sharing Data
- Pedestrian Traffic
- EV Charging Stations

Environment & Sustainability

- Air Quality
- Water Quality
- Energy Consumption
- Waste Management
- Renewable Energy Production
- Urban Green Spaces

Infrastructure & Utilities

- Smart Grid Data
- Water Usage
- Telecom Infrastructure
- Street Lighting
- Building Energy Efficiency
- Sewage System

Public Safety

- Crime Data
- Emergency Services Response
- Surveillance Camera Footage in Fire Hazard Zones
- Disaster Preparedness

Economy & Commerce

- Real-time Traffic Data
- Retail Sales Data
- Tourist Data
- Real Estate Prices
- Workforce Employment Data
- Business Registrations
- Local Economic Activities

Health & Social Services

- Hospital Capacity
- Health Service Usage
- Disease Outbreak Data
- Public Health Metrics
- Social Welfare Statistics

Education & Learning

- School Enrollment Data
- Learning Outcomes
- Public Library Usage

Housing & Urban Development

- Affordable Housing Data
- Land Use and Zoning Data
- Population Growth & Demographics

Partnership Models

Potential partners and vendors play a crucial role in driving the successful implementation and long-term success of DEMP, contributing to the realisation of its strategic goals and vision.

Note: The list of potential partners and vendors provided above is non-exclusive. We reserve the right to engage with additional partners and vendors as deemed necessary for the successful execution of the project or initiative.

Partnership Models

Key learnings and potential adaptations for future development are essential for guiding progress and ensuring continuous improvement.

This analysis provided valuable insights and key learnings that have significantly shaped DEMP. Possible adaptations from the analysis are highlighted below:

 **Data Optimisation with Regional Recycling Centre**	Collaborate with the regional recycling centre and city authorities to understand recycling demand and market the data to recycling organisations.
 **Development of Data Platforms for Commercial Access**	Create a data marketplace where private companies, startups and research institutions can purchase or subscribe to various city datasets (e.g., traffic patterns, environmental data, public infrastructure). The platform can offer tiered access based on usage, type of data and commercial interest.
 **Offering Value-Added Services**	Develop analytics and insights services that go beyond raw data. Digital Penang or other entities can charge for value-added services, such as predictive analytics or decision-making tools, using city data for businesses in sectors like retail, transport and real estate.
 **Establishing Licensing Agreements**	License specific datasets to private enterprises (e.g., transportation companies, urban planners) under non-exclusive agreements. This ensures recurring revenue without giving up exclusive control of valuable data.
 **Implementing Revenue-sharing Model on Data Access**	Engage in partnerships with private companies (e.g., technology, telecoms, real estate) that require city data for their operations or innovations. State agencies can offer data access in exchange for a revenue-sharing model or equity stake in the innovations developed from the data.
 **Partnering with Tech Companies for Development**	Collaborate with private companies to build AI-driven applications or IoT devices that utilise city data. In return, the state agencies could gain royalties from the commercial use of these tools and technologies or secure long-term contracts for data sharing.

Digital Penang

DIGITAL ECONOMY MASTER PLAN

DEMP
2025-2030

05

Digital Economy Master Plan (DEMP)

Digital Economy Master Plan

Guided by 1 Vision, supported by 3 Missions, anchored on 4 Strategic Pillars and implemented through 16 Strategic Initiatives to drive sustainable growth across key focus areas

1 VISION

Empowering Penang's digital economy for all as a top tier digital hub in Southeast Asia that fosters innovation-driven enterprises, a connected society and a digital government

3 MISSIONS

- Position Penang as a leader in innovation by cultivating a thriving startup ecosystem specialising in hard tech, deep tech and creative tech, supported by robust digital infrastructure and a culture of innovation.
- Empower all communities in Penang by ensuring equitable access to digital technologies and resources, fostering a digitally inclusive society where every citizen can thrive.
- Create an environment that encourages businesses in Penang to innovate and grow, enabling them to thrive in the digital economy and achieve long-term success in a competitive global market.

4 STRATEGIC PILLARS

- Digital Government
- Digital Economy
- Digital Society
- Digital Foundation

16 STRATEGIC INITIATIVES

DG-1	Enhance Citizen Services and Experience	**DG-2**	Optimise Government Operations	**DG-3**	LeverageTechnology for Economic Growth	**DE-1**	Position Penang as a Regional Tech Startup Hub
DE-2	Foster Development of Advanced Manufacturing and Related Sectors	**DE-3**	Develop a Fund of Funds to attract and pool investments	**DE-4**	Develop Creative and Creator Economy with Exportable Services	**DE-5**	Promote and Support the Adopation of Digital Solutions by Existing Key Industry Sectors
DE-6	Empower Business MSMEs	**DE-7**	Establish a Business Continuity Programme for Supply Chain Based on ESG Practices	**DS-1**	Enhance Digital Literacy and Access	**DS-2**	Community Digital Empowerment
DS-3	Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues	**DF-1**	Digital Infrastructure and Readiness Enhancement	**DF-2**	Foster Digital Talent and Innovation	**DF-3**	Strengthen Cybersecurity and Data Privacy

Digital Economy Master Plan Overview

DEMP envisions empowering Penang's digital economy for all as a top tier digital hub in Southeast Asia that fosters innovation-driven enterprises, a connected society and a digital government.

The Digital Economy Master Plan (DEMP) is Penang's strategic blueprint for advancing its digital transformation from 2025 to 2030. Building on the successes of DTMP 1.0 (2021–2023), this next phase aims to position Penang as a global leader in the digital economy. By creating new opportunities for the government, businesses and communities, DEMP ensures that Penang continues to thrive in the evolving digital landscape.

As emerging technologies such as AI, 5G and IoT reshape industries, DEMP addresses key challenges in cybersecurity and data privacy to maintain Penang's competitiveness. Aligned with national strategies, the plan also leverages Penang's unique strengths, fostering a digitally empowered economy and society.

Penang is uniquely positioned to lead in the digital economy. Its strategic location, skilled workforce and robust tech ecosystem, particularly in electronics, biotechnology and manufacturing, provide a solid foundation for digital transformation. Building on these strengths, DEMP aims to establish Penang as a top-tier digital hub in Southeast Asia.

DEMP is structured around four strategic pillars, underpinned by 16 initiatives, to ensure the achievement of its vision, mission and goals.

Through this comprehensive digital transformation, Penang will remain at the forefront of the digital age, fostering sustainable economic growth and improving the quality of life for its citizens.

Vision

- Empowering Penang's digital economy for all as a top tier digital hub in Southeast Asia that fosters innovation-driven enterprises, a connected society and a digital government.

Mission

- Position Penang as a leader in innovation by cultivating a thriving startup ecosystem specialising in hard tech, deep tech and creative tech, supported by robust digital infrastructure and a culture of innovation;
- Empower all communities in Penang by ensuring equitable access to digital technologies and resources, fostering a digitally inclusive society where every citizen can thrive;
- Create an environment that encourages businesses in Penang to innovate and grow, enabling them to thrive in the digital economy and achieve long-term success in a competitive global market.

Strategic Objectives

- DEMP focuses on driving economic growth through digital innovation, creating new opportunities for the government, businesses and communities. Penang is set to become a global leader in the digital economy, offering businesses and communities the tools to succeed in a competitive international market.

Digital Economy Master Plan Overview

Measure of Success

In the context of DEMP, clear and measurable KPIs are essential for tracking progress, evaluating outcomes and aligning initiatives with long-term goals. These KPIs serve as benchmarks to ensure DEMP's objectives are effectively achieved:

- Uplift GDP: Increase Penang's GDP contribution from RM116 billion (2023)[1] to RM156 billion by 2030[2].
- Increase Digital Contribution to GDP (%): Increase the digital economy's contribution to 35% of Penang's GDP by 2030.
- Attract High-Value Investment: Attract up to RM20 billion in digital investment (including IC Design) and RM130 billion in advance semiconductor manufacturing investment by 2030.
- Increase Income Generation: Penang's household median income is expected to rise by approximately 17% to RM7,700 by 2030.
- Job Preservation and Talent Development: Create 50,000 new digital jobs and upskill 30% of the workforce.
- Enhance Sustainability: Reduce energy intensity by 25% and increase renewable energy usage to 10%[3].

These KPIs provide a robust framework for monitoring and evaluating the success of DEMP, ensuring that the strategic initiatives contribute to sustainable economic growth, digital advancement and societal well-being.

Uplift
Gross Domestic Product (GDP)

Increase
Digital Contribution to GDP (%)

Attract
High-Value Investment

Increase
Income Generation

Job Preservation & Talent Development

Enhance
Sustainability

Note: 1) Source: Invest Penang; Source: Penang SEED; 3) Source: Malaysia Renewable Energy Roadmap

Digital Economy Master Plan Overview

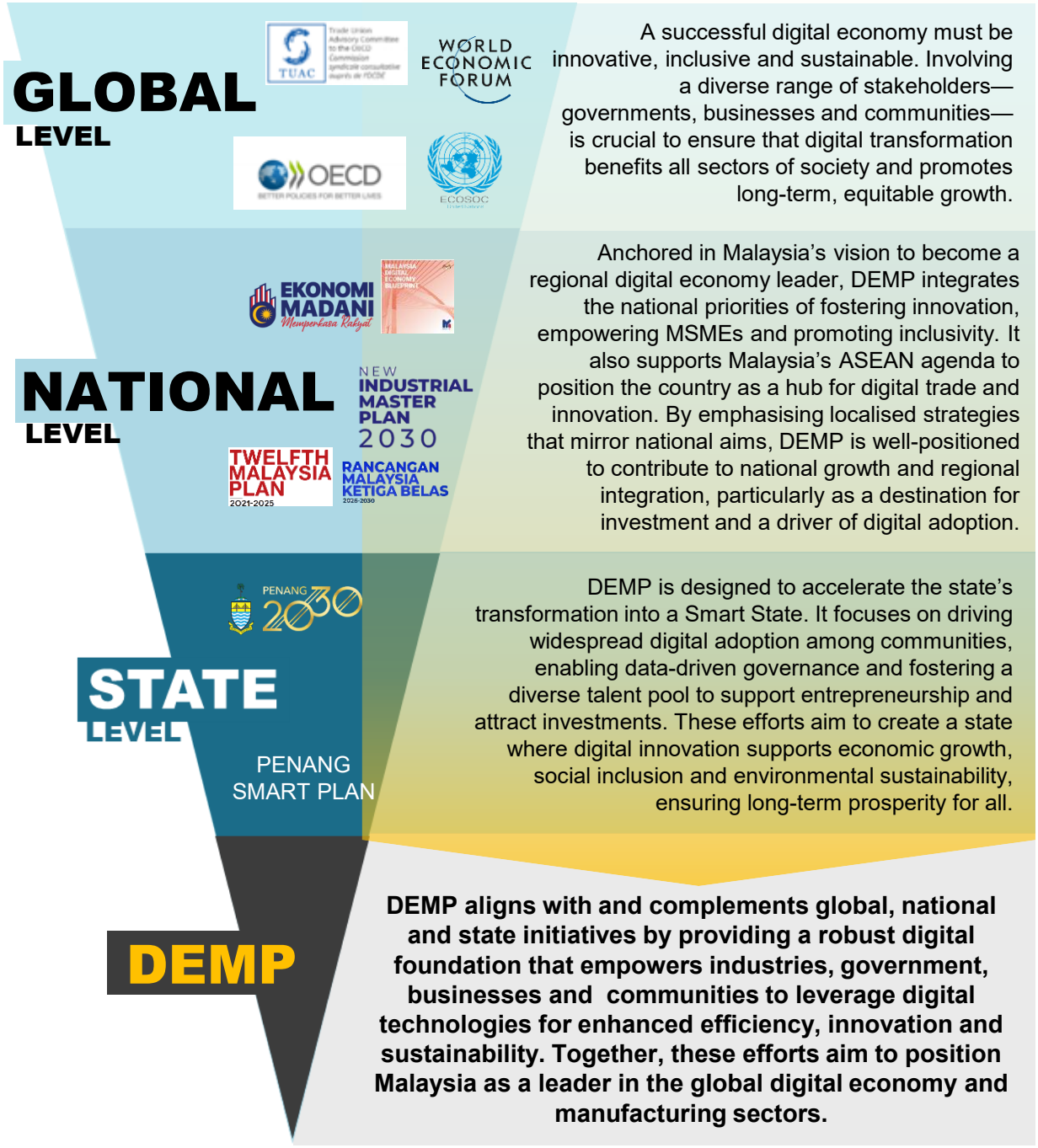
Measure of Success	Target by 2030	Rationale
 **Uplift Gross Domestic Product (GDP)**	**RM156 billion**	This represents a 35% growth over seven years based on normal circumstances annual rate of 4.4% reported in Penang SEED.
 **Increase Digital Contribution to GDP (%)**	**35% of Penang's GDP**	The projected accumulative growth of GDP for Penang in 2030 represents a 35% increase from 2023, assuming the annual rate of 4.4% continues[1)].
 **Attract High-Value Investment**	**RM150 billion**	The National Semiconductor Strategy document targets RM500 billion of investment for the next 15 years[2)]. In 2023, Penang secured 39% of manufacturing investment[3)] where the bulk was in semiconductor, assuming an attrition rate of 12% (derived from 1998 financial crisis) as well as other factors, such as intra-state and regional competition, to secure semiconductor investments and positive contribution from development of tech startup and other digital ecosystems over this period.
 **Increase Income Generation**	**Min target: RM7,600**	According to DOSM data, Malaysia's mean household income is growing at an annual rate of 2%[4)]. Assuming all investments and programmes are implemented, Penang's growth rate is expected to increase to 4%, with the median household income projected to reach RM7,600 by 2030.
 **Job Preservation & Talent Development**	**50,000 Jobs, 30% Upskilled**	Penang's strong educational ecosystem and industrial base provide a solid foundation for talent development. This aligns with Malaysia's target of creating 500,000 digital jobs by 2030[5)].
 **Enhance Sustainability**	**25% reduction, 10% renewable energy**	Penang's focus on green technology and smart city initiatives should drive sustainability. Penang Energy Framework sets the target for 10% increase of renewable energy and 25% energy intensity reduction by 2030[6)]. This aligns with Malaysia's commitment to achieve energy savings of 21% by 2040[7)] and 40% of renewable energy installed by 2035[8)].

Note: 1) Source: Penang SEED; 2) Source: National Semiconductor Strategy; 3) Source: MIDA; 4) Source: DOSM; 5) Source: MyDIGITAL; 6) Penang Energy Framework; 7)National Energy Transition Roadmap; 8) Source: Malaysia Renewable Energy Roadmap

DEMP

Aligning Strategies to Shape a Sustainable Digital Future

Aligning and Complementing Global, National and State Strategies for Digital Economic Growth and Sustainability



DEMP Strategic Pillars

The four strategic pillars are supported by 16 strategic initiatives that spread across short-term, mid-term and long-term.

4 Strategic Pillars

Strategic Pillar I

DIGITAL GOVERNMENT

Enhance public services to be more efficient, transparent and citizen-centric.

By leveraging digital technologies, the government aims to streamline processes, reduce bureaucracy and make public services more accessible to all.

Strategic Pillar II

DIGITAL ECONOMY

Drive economic growth by fostering innovation and digital business opportunities.

Focuses on enhancing Penang's competitiveness by promoting digital entrepreneurship, enabling digital transformation in traditional sectors and expanding access to global markets.

Strategic Pillar III

DIGITAL SOCIETY

Promote inclusivity and ensure equitable access to digital opportunities for all citizens.

Focuses on bridging the digital divide by enhancing digital literacy, promoting affordable access to digital tools and ensuring that no one is left behind in the digital transformation.

Strategic Pillar IV

DIGITAL FOUNDATION

Act as the backbone to support and sustain long-term digital growth and innovation.

Focuses on building the essential infrastructure, policies and frameworks necessary for the continued success of Penang's digital transformation.

DEMP Key Action Plans

Guided by 16 strategic initiatives and executed through 92 key action plans, DEMP serves as a roadmap to position Penang as a top-tier digital hub in Southeast Asia.

- Strategic Pillars
- Strategic Initiatives
- Key Action Plans

I	DIGITAL GOVERNMENT
DG-1	**Enhance Citizen Services and Experience**
DG-1.1	Enhancement of Penang MyGov Portal
DG-1.2	Public Sector Digital Service Innovation
DG-1.3	Improvement of Housing Information System
DG-1.4	Enhancement of Online Appeal System
DG-1.5	Development of e-Tanah Solution (eTS)
DG-1.6	Strengthening of Cashless Community Initiatives
DG-1.7	Enhancement of eRIBI System
DG-1.8	Flood Information System
DG-1.9	PgLAND Portal
DG-1.10	Wood-Based Industry e-License System
DG-1.11	Enhancement of Digital Integrated Service Centre (MyKADUN)
DG-2	**Optimise Government Operations**
DG-2.1	Promote Data Sharing Policy Across All Agencies
DG-2.2	Promote Adoption of Technology by State GLCs
DG-2.3	Electronic Monitoring Structure Plan (eMosPlan)
DG-2.4	Digitalising Business Process for Efficiency and Productivity
DG-2.5	Penang GovTech Maturity Index (GTMI) Assessment
DG-3	**Leverage Technology for Economic Growth**
DG-3.1	Strengthening And Expanding National Digital Identity (MyDigital ID)
DG-3.2	Smart Farm and Fertigation System
DG-3.3	Smart City Reference Model

DEMP Key Action Plans

Strategic Pillars
Strategic Initiatives
Key Action Plans

II	DIGITAL ECONOMY
DE-1	**Position Penang as a Regional Tech Startup Hub**
DE-1.1	Hardtech and Deeptech Commercialisation Accelerator
DE-1.2	Penang Startup Growth Programme
DE-1.3	Penang Deeptech Regional Summit
DE-1.4	Penang Seed Accelerator for Tech Startups
DE-1.5	Research Labs and Makers Lab Access Programme
DE-1.6	Market Access and Development Programme for Tech Startups
DE-1.7	ASEAN Startups Soft Landing Programme
DE-1.8	Green and Climate Tech Sandbox @Penang
DE-1.9	Startup Venture Vibes Summit
DE-1.10	Startup Seminar(s)
DE-1.11	Nexea Entrepreneurs Program
DE-1.12	Nexea Entrepreneur Camp
DE-2	**Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI**
DE-2.1	GBS 2.5 Talk Series & Networking
DE-2.2	Penang Silicon Design @5km+
DE-2.3	Set up Global Business Services (GBS) Spaces in Penang
DE-2.4	POC Accelerator
DE-3	**Develop a Fund of Funds to Attract and Pool Investments into Key Digital Sectors and Startup Ecosystem**
DE-3.1	Hardtech and Deeptech Pre-Seed Fund
DE-3.2	Corporate Venture Development Programme
DE-3.3	Advance Technology Research Funding for High Impact Technologies
DE-3.4	Angels and Investment Certification Programme
DE-3.5	Development of Blended Financing Mechanism
DE-3.6	Pitch Tuesdays: Penang
DE-3.7	Penang Micro VC fund

DEMP Key Action Plans

Strategic Pillars
Strategic Initiatives
Key Action Plans

II	DIGITAL ECONOMY
DE-4	**Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services**
DE-4.1	Creative Startup and Creator Incubator Programme
DE-4.2	Annual Digital Creative Week
DE-4.3	Public-private Collaboration Programmes to Encourage Co-creation & Innovation
DE-5	**Promote and Support the Adoption of Digital Solutions in Key Sectors, such as Tourism & Hospitality, Food Security And Medical Care to Elevate These Industries Globally**
DE-5.1	Penang Agri Tech & Food Tech Industry Council
DE-5.2	Centralised Super Apps for Streamlined Services and Enhanced Government-Community Engagement
DE-5.3	Agri Tech Drone Pilot Development Programme
DE-5.4	Cultural Heritage Trail: Preserving our Past for the Future
DE-5.5	Archaeological Heritage Trail: Preserving our Archaeological Legacy for the Future
DE-5.6	Ecotourism Trail: Preserving our Natural Heritage for the Future
DE-5.7	Sedusun Technology Valley
DE-5.8	Nexea Accelerator Program
DE-6	**Empower Business MSMEs**
DE-6.1	MSME LevelUP Programme Seberang Perai / Pulau Pinang
DE-6.2	MSME LevelUP Market Access Programme Seberang Perai / Pulau Pinang
DE-6.3	MSME Exchange Programme to enhance the global competitiveness of MSMEs
DE-6.4	NCER Technology Innovation Centre (NTIC) Enhancement
DE-6.5	SMEs Seminar
DE-7	**Business Continuity Programme for Penang/Northern Region Supply Chain based on ESG Practices**
DE-7.1	Sustainable Accelerator Programme (SAP) - ESG Certification and Compliant Programme for SMEs in Penang and the Northern Region
DE-7.2	Bi-annual Seminars, Workshops & Award Night to Showcase and Collaborate among Alumni
DE-7.3	Development of Circular Economy Waste Management Ecosystem for Penang Island

DEMP Key Action Plans

Strategic Pillars
Strategic Initiatives
Key Action Plans

III	DIGITAL SOCIETY
DS-1	**Enhance Digital Literacy and Access**
DS-1.1	Eco-Entrepreneurship & Youth Entrepreneurship Workshop
DS-1.2	Digital Clinic Workshop (DahDigital)
DS-2	**Community Digital Empowerment**
DS-2.1	Adoption of digital technology by NGOs
DS-2.2	Industry-academia Collaboration for Future-ready Workforce Development
DS-2.3	Community Tech Centres to Drive Digital Empowerment and Innovation
DS-2.4	Community Advocacy and Public Awareness on Telecommunication Electric and Magnetic Fields (EMFs)
DS-3	**Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity**
DS-3.1	Series of Events, Conferences and Seminars on Green and Climate Related Initiatives to Promote Awareness on Challenges, Regulatory Requirements and Adoption of Technology
DS-3.2	Promote ESG Reporting to Enhance Transparency, Sustainability and Long-term Value Creation Across Sectors

DEMP Key Action Plans

Strategic Pillars
Strategic Initiatives
Key Action Plans

III	DIGITAL FOUNDATION
DF-1	**Enhance Digital Infrastructure and Readiness**
DF-1.1	Penang Utility Corridor to Coordinate and Organise The Underground Utility Mapping System
DF-1.2	SMARTPLAN Map Services to Improve Community Services in Penang
DF-1.3	Regular Penang Digital Readiness Assessment to Assess Penang's Digital Readiness
DF-1.4	Internet Exchange (IX) Hub
DF-1.5	Connectivity Infrastructure Quality Enhancement
DF-1.6	Strengthening Connectivity Governance and Regulatory
DF-2	**Foster Digital Talent and Innovation**
DF-2.1	Penang Chip Design Academy
DF-2.2	MakerLab and Advanced MakerLab Tracks
DF-2.3	Penang2030 Innovation Bootcamp
DF-2.4	Coding for All
DF-2.5	Computer Science Core Skills
DF-2.6	Girls in Engineering and Tech
DF-2.7	FIRST Tech Challenge
DF-2.8	AI Initiatives
DF-2.9	Careers Awareness Workshops/Program
DF-2.10	AI Education Consortium
DF-2.11	AI for Schools
DF-2.12	Digital Innovation Hub: Fostering Tech Ecosystem for Economic Growth
DF-2.13	How to start a startup - Alpha Startups Series
DF-2.14	Access to Leet Academy Online Accelerator
DF-3	**Strengthen Cybersecurity and Data Privacy**
DF-3.1	Penang Security Operations Centre (PSOC) to Provide Proactive Monitoring and Real-time Response to Cybersecurity Threats and Incidents
DF-3.2	Cybersecurity Awareness Programmes to Educate Community to Understand, Identify And Avoid Cyber Threats
DE-3.3	Strengthening the Network Infrastructure and Security for Enhanced Digital Resilience (SUK)

Digital Penang

DIGITAL ECONOMY MASTER PLAN

DEMP
2025-2030

06

Enhancing the Development of the Digital Economy

Digital Economy Master Plan (DEMP)

Overview of Strategic Pillars and Initiatives

4 Strategic Pillars

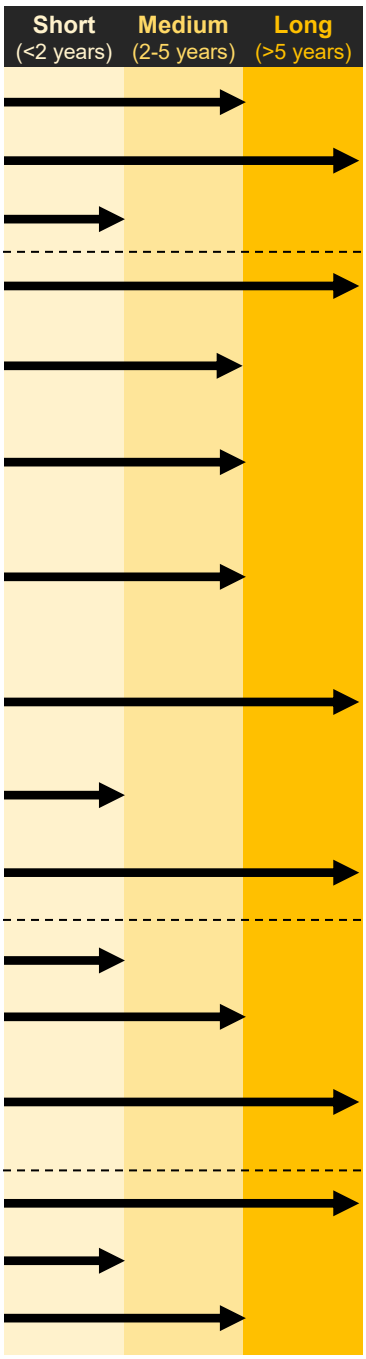
16 Strategic Initiatives

DG Digital Government	**DG-1**	Enhance Citizen Services and Experience
	DG-2	Optimise Government Operations
	DG-3	Leverage Technology for Economic Growth
DE Digital Economy	**DE-1**	Position Penang as a Regional Tech Startup Hub
	DE-2	Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI
	DE-3	Develop a Fund of Funds to Attract and Pool Investments into Key Digital Sectors and startup Ecosystem
	DE-4	Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services
	DE-5	Promote and Support the Adoption of Digital Solutions in Key Sectors such as Tourism & Hospitality, Food Security and Medical Care to Elevate these Industries Globally
	DE-6	Empower Business MSMEs
	DE-7	Business Continuity Programme for Penang/Northern Region Supply Chain Based on ESG Practices
DS Digital Society	**DS-1**	Enhance Digital Literacy and Access
	DS-2	Community Digital Empowerment
	DS-3	Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity
DF Digital Foundation	**DF-1**	Enhance Digital Infrastructure and Readiness
	DF-2	Foster Digital Talent and Innovation
	DF-3	Strengthen Cybersecurity and Data Privacy

DEMP Implementation Roadmap

List of initiatives for each strategic pillar spread across short, medium and long-term

Pillars	Code	Initiatives
Digital Government	DG-1	Enhance Citizen Services and Experience
	DG-2	Optimise Government Operations
	DG-3	Leverage Technology for Economic Growth
Digital Economy	DE-1	Position Penang as a Regional Tech Startup Hub
	DE-2	Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI
	DE-3	Develop a Fund of Funds to Attract and Pool Investments into Key Digital Sectors and Startup Ecosystem
	DE-4	Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services
	DE-5	Promote and Support the Adoption of Digital Solutions in Key Sectors such as Tourism & Hospitality, Food Security and Medical Care To Elevate these Industries Globally
	DE-6	Empower Business MSMEs
	DE-7	Business Continuity Programme for Penang/Northern Region Supply Chain Based on ESG Practices
Digital Society	DS-1	Enhance Digital Literacy and Access
	DS-2	Community Digital Empowerment
	DS-3	Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity
Digital Foundation	DF-1	Enhance Digital Infrastructure and Readiness
	DF-2	Foster Digital Talent and Innovation
	DF-3	Strengthen Cybersecurity and Data Privacy



Strategic Pillar I

Digital Government: Enhancing Public Services for Efficiency, Transparency and Citizen-Centricity

In the rapidly evolving digital age, governments are presented with the challenge and opportunity to transform how they engage with citizens, optimise internal operations and drive economic growth.

Strategic Pillar 1, the Digital Governance pillar, is a vital part of any comprehensive digital transformation agenda, focusing on making public services more efficient, transparent and responsive to the needs of the public. This pillar ensures that government operations are not only streamlined but also aligned with the expectations of a digitally savvy citizenry.

The Digital Governance pillar focuses on:

DG-1 Enhance Citizen Services and Experience

This initiative focuses on improving the quality, accessibility and efficiency of citizen services through digital transformation. It prioritises citizen-centric design, streamlining processes, providing clear information and leveraging technology to enhance service delivery.

DG-2 Optimise Government Operations

This initiative aims to optimise government operations by leveraging technology to streamline processes, reduce bureaucracy and improve efficiency. It focuses on implementing digital solutions such as e-government platforms, automated workflows and data analytics. By adopting this initiative, the government can enhance decision-making, lower operational costs and deliver better public services, ultimately creating a more effective and responsive public sector.

DG-3 Leverage Technology for Economic Growth

This initiative aims to harness the power of emerging technologies, such as AI, blockchain, deeptech, hardtech, green tech and bio tech, to drive economic growth within the state. By fostering innovation, enabling digital adoption across industries and creating a conducive ecosystem for startups and technology-driven businesses, the state seeks to strengthen its position as a competitive player in the global digital economy.

The three strategic initiatives, comprising one short-term, one medium-term and one long-term initiative, are designed to ensure a phased and sustainable approach to achieving the goals of Digital Governance.

The Digital Governance pillar is a crucial step towards building a government that is more responsive, transparent and efficient. By focusing on citizen services, government operations and leveraging technology for economic growth, governments can create systems that are more accessible, fair and innovative.

Strategic Pillar I

Digital Government

DG-1	Enhance Citizen Services and Experience	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	This initiative focuses on improving the quality, accessibility and efficiency of citizen services through digital transformation. It prioritises citizen-centric design, streamlining processes, providing clear information and leveraging technology to enhance service delivery.
Expected Outcomes	• Increased citizen satisfaction • Reduced bureaucracy • Enhancement of transparency and accountability • Improvement in service delivery • Cost reduction
Impact	• 24/7 Availability: Digital services ensure accessibility at anytime, minimising wait times and enhancing convenience. • Personalisation: Tailored services based on citizens' needs improve relevance and the effectiveness of government programmes • Centralised Digital Platform: A platform that integrates various government services and applications into one interface that provide citizens with a single access point for everything, reducing the complexity of navigating through multiple apps
Enabling Factors	• Availability of a robust digital infrastructure, along with citizen access to devices and internet connectivity • Strong government commitment to implementation, including adequate funding and policy support • Effective data security and privacy measures to foster trust

Strategic Pillar I

Digital Government

DG-1	Enhance Citizen Services and Experience		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DG-1.1**	Enhancement of Penang MyGov Portal Lead: BTMKN (SUK) Support: BTMKN (SUK)	• Number of applications integrated
	DG-1.2	Public Sector Digital Service Innovation Lead: BTMKN (SUK) Support: BTMKN (SUK)	• Number of applications developed
	DG-1.3	Improvement of Housing Information System Lead: LPNPP Support: State Government	• Service accessibility rate • System uptime and reliability
	DG-1.4	Enhancement of Online Appeal System Lead: PlanMalaysia Support: State Government	• Number of partnerships and collaborations
	DG-1.5	Development of e-Tanah Solution (eTS) Lead: PTG Support: State Government	• Number of registered users • Frequency of transactions • Transaction processing time
	DG-1.6	Strengthening of Cashless Community Initiatives Lead: BKT (SUK) Support: State Government	• Percentage of government services using online payment

Strategic Pillar I

Digital Government

DG-1	Enhance Citizen Services and Experience		Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DG-1.7**	Enhancement of eRIBI System Lead: Harmonico Support: State Government	• Number of additional functions upgraded
	DG-1.8	Flood Information System Lead: JPS Support: State Government	• Number of Siren Hotspot
	DG-1.9	PgLAND Portal Lead: PTG Support: State Government	• Number of online transactions • Total online revenue collection
	DG-1.10	Wood-Based Industry e-License System Lead: Jabatan Perhutanan Support: State Government	• Number of approved license
	DG-1.11	Enhancement of Digital Integrated Service Centre (MyKADUN) Lead: Digital Penang Support: State Government	• Number of KADUNs implemented

Strategic Pillar I

Digital Government

DG-2	Optimise Government Operations	Timeline
		Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative aims to optimise government operations by leveraging technology to streamline processes, reduce bureaucracy and improve efficiency. It focuses on implementing digital solutions such as e-government platforms, automated workflows and data analytics. By adopting these approaches, the government can enhance decision-making, lower operational costs and deliver better public services, ultimately creating a more effective and responsive public sector.
Expected Outcomes	• Increased efficiency • Improved decision-making • Enhanced transparency and accountability • Cost reduction • Strengthen governance
Impact	• Faster Decision-Making: Data-driven insights support timely, informed decisions, enhancing the government's responsiveness to emerging issues. • Cost Reduction: Automation minimises manual work and resource waste, significantly lowering operational expenses. • Transparency and Trust: Real-time tracking and streamlined workflows enhance transparency, building public trust in government operations.
Enabling Factors	• The government has the necessary digital infrastructure and secure platforms to support the initiative. • Agencies and stakeholders are willing to adopt and adapt to new technologies and processes. • Adequate funding and skilled personnel are available to implement and sustain the solutions.

Strategic Pillar I

Digital Government

DG-2	Optimise Government Operations		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DG-2.1**	Promote Data Sharing Policy Across All Agencies Lead: BTMKN SUK Support: State Agencies	• Number of data sets published • Number of applications developed
	DG-2.2	Promote Adoption of Technology by State GLCs Lead: Digital Penang Support: State GLCs	• Number of technology adopted
	DG-2.3	Electronic Monitoring Structure Plan (eMosPlan) Lead: PlanMalaysia Pulau Pinang Support: State Government	• Accurate rate of data collected • Project completion rate • Operational efficiency rate
	DG-2.4	Digitalising Business Process for Efficiency and Productivity Lead: State Agencies Support: State Government	• System adoption rate • Number of technology adopted
	DG-2.5	Penang GovTech Maturity Index (GTMI) Assessment Lead: Digital Penang Support: State Government	• Number of State Agencies assessed

Strategic Pillar I

Digital Government

DG-3	Leverage Technology for Economic Growth	Timeline: **Short** (<2 years) / **Medium** (2-5 years) / **Long** (>5 years)

Description	This initiative aims to harness the power of emerging technologies, such as AI, blockchain, deep tech, hard tech, green tech, bio tech, etc., to drive economic growth within the state. By fostering innovation, enabling digital adoption across industries and creating a conducive ecosystem for startups and technology-driven businesses, the state seeks to strengthen its position as a competitive player in the global digital economy.
Expected Outcomes	• Increased digital adoption • Job creation • Increased GDP contribution • Enhanced innovation ecosystem
Impact	• Economic Competitiveness: Enhanced global competitiveness through a diversified and tech-driven economy. • Sustainable Growth: Long-term sustainability with reduced reliance on traditional industries, fostering resilience against economic disruptions. • Social Inclusion: Broader participation in the digital economy, including rural areas and marginalised communities, enabled by accessible and inclusive technology initiatives.
Enabling Factors	• Active involvement of industry players and investors in driving technology adoption and innovation. • Sufficient digital infrastructure, including high-speed internet and cloud services, to support widespread adoption. • Availability of talent with relevant digital skills, supported by reskilling and upskilling initiatives.

Strategic Pillar I

Digital Government

DG-3	Leverage Technology for Economic Growth		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DG-3.1**	Strengthening and Expanding National Digital Identity (MyDigital ID) Lead: BTMKN SUK Support: Digital Penang	• Number of application integrated with MyDigital ID
	DG-3.2	Smart Farm and Fertigation System Lead: Jabatan Pertanian Support: Digital Penang	• Percentage of districts covered
	DG-3.3	Smart City Reference Model Lead: BTMKN SUK Support: Digital Penang	• Number of pilot projects conducted • System integration rate

Strategic Pillar II

Digital Economy: Drive economic growth by fostering innovation and digital business opportunities

In an era defined by rapid technological advancements and global connectivity, the digital economy serves as a cornerstone for sustainable economic growth and resilience. Penang, with its strategic geographical location, established industrial ecosystem and skilled workforce, is well-positioned to leverage digital technologies as a catalyst for economic transformation.

This pillar focuses on fostering a dynamic digital ecosystem that drives innovation, attracts investments and empowers businesses of all sizes to thrive in the global digital landscape.

Strategic Pillar II focuses on:

DE-1 Position Penang as a Regional Tech Startup Hub

This initiative focuses on establishing Penang as a premier destination for tech startups, with a strategic emphasis on hard tech and deep tech verticals, such as robotics, semiconductors, advanced manufacturing, AI and clean technology. By leveraging Penang's strategic location, industrial ecosystem and talent pool, the state aims to attract high-potential startups, foster innovation and strengthen its position as a key player in the regional technology landscape.

DE-2 Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI

This initiative focuses on upscaling the value chain of high-tech manufacturing into advanced manufacturing by encouraging the production of advanced components and materials. It aims to enhance productivity, innovation and sustainability within the manufacturing ecosystem while fostering growth in complementary sectors.

DE-3 Develop a Fund of Funds to Attract and Pool Investments into Key Digital Sectors and Startup Ecosystem

The Fund of Funds (FoF) model pools capital from state, federal and private sources to support Penang's digital startup ecosystem and key digital sectors. It aims to attract venture capital (VC) firms, angel investors and institutional partners to co-invest in these high-growth areas. This initiative will catalyse the establishment of VCs and alternative funding firms in Penang, driving innovation and fostering a sustainable, investment-driven ecosystem.

DE-4 Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services

This initiative focuses on establishing CD2 as a vibrant hub for the creative and creator economy. By leveraging digital platforms and innovation, CD2 will nurture talent in areas such as digital content creation, multimedia, gaming, animation, design and creative arts. The goal is to position CD2 as a centre of excellence for exportable creative services that cater to global markets.

Strategic Pillar II

Digital Economy: Drive economic growth by fostering innovation and digital business opportunities

DE-5 Promote and Support the Adoption of Digital Solutions in Key Sectors, such as Tourism & Hospitality, Food Security and Medical Care to Elevate these Industries Globally

This initiative focuses on driving the digital transformation of Penang's key industry sectors, including Tourism & Hospitality, Food Security and Medical Care, by promoting the adoption of innovative digital solutions. It aims to enhance operational efficiency, improve customer experiences and increase global competitiveness through the integration of technologies.

DE-6 Empower Business MSMEs

This initiative focuses on equipping Penang's MSMEs with essential knowledge and tools to harness the power of digital marketing and innovation. By strengthening their understanding of modern business practices and technology trends, MSMEs will be empowered to stay competitive and capitalise on these emerging trends for growth.

DE-7 Business Continuity Programme for Penang/Northern Region Supply Chain Based on ESG Practices

This initiative focuses on enhancing the resilience and sustainability of the supply chain in Penang and the northern region by integrating environmental, social and governance (ESG) practices into business continuity strategies. By promoting ESG principles within the supply chain, the initiative aims to drive long-term economic stability, improve environmental impact and promote social responsibility, making the region's supply chain more robust, competitive and globally connected.

The seven strategic initiatives comprising two short-term, two medium-term and three long-term initiatives aim to create a vibrant ecosystem for startups, strengthen digital adoption across key industries and empower MSMEs.

The digital economy pillar is a catalyst for driving Penang's transformation into a regional digital powerhouse. By prioritising innovation, investment and sustainability, this pillar will not only drive economic growth but also ensure Penang remains competitive on the global stage.

Strategic Pillar II

Digital Economy

DE-1	Position Penang as a Regional Tech Startup Hub	Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative focuses on establishing Penang as a premier destination for tech startups, with a strategic emphasis on hard tech and deep tech verticals, such as robotics, semiconductors, advanced manufacturing, AI and clean technology. By leveraging Penang's strategic location, industrial ecosystem and talent pool, the state aims to attract high-potential startups, foster innovation and strengthen its position as a key player in the regional technology landscape.
Expected Outcomes	• Startup ecosystem growth • Investment attraction • Creation of a skilled workforce • Recognition of Penang as an innovation leader • IP commercialisation • Growth of DDIs and FDIs in advanced tech
Impact	• Economic Diversification: Enhanced economic resilience by expanding into high-value, knowledge-driven sectors • Job Creation: Generation of high-quality jobs in technology, R&D and advanced manufacturing industries • Brand Positioning: Strengthened reputation of Penang as a forward-thinking and innovation-driven state, attracting global interest and partnerships
Enabling Factors	• Access to advanced R&D facilities, innovation labs and co-working spaces for startup development • Availability of competitive grants, VC funding and incentives to support startup growth and scalability • Willingness of regional stakeholders to collaborate and contribute to the development of Penang's startup ecosystem

Strategic Pillar II

Digital Economy

DE-1	Position Penang as a Regional Tech Startup Hub		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-1.1**	Hardtech and Deeptech Commercialisation Accelerator Lead: Digital Penang Support: MyStartup, ASM, MOSTI, Institutes of Higher Learning (IHLs)	• Number of TRL7 prototypes commercialised to market • Value of tech commercialisation • Skilled workforce growth
	DE-1.2	Penang Startup Growth Programme Lead: Digital Penang Support: MyStartup, MDEC, Venture Capitals (VCs), MBAN	• Number of startups nurtured • Number of startup activities supported • Value of funding and grants secured by startups
	DE-1.3	Penang Deeptech Regional Summit Lead: Digital Penang Support: PCEB, Institute of Electrical and Electronics Engineers (IEEE), MOSTI	• Number of attendee growth • Increase in global reputation
	DE-1.4	Penang Seed Accelerator for Tech Startups Lead: Digital Penang Support: MyStartup, MDEC, VCs	• Number of startups graduated at seed stage • Size of funding secured • Increase in value of startups
	DE-1.5	Research Labs and Makers Lab Access Programme Lead: Digital Penang Support: IHLs, Corporate, Private Labs	• Number of applications by startups • Number of lab partnerships

Strategic Pillar II

Digital Economy

DE-1	Position Penang as a Regional Tech Startup Hub		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-1.6**	Market Access and Development Programme for Tech Startups Lead: Digital Penang Support: Regional Ecosystem Partners	• Revenue multiple returns • Number of partnerships and collaborations forged • Number of successful market entries
	DE-1.7	ASEAN Startups Soft Landing Programme Lead: Digital Penang, MDEC Support: Regional Ecosystem Partners	• Number of foreign startups set up in Penang • Number of MD status obtained
	DE-1.8	Green and Climate Tech Sandbox @Penang Lead: Digital Penang Support: MGTC, PGC, MDEC, IHLs, VCs	• Number of collaboration projects incubated and trialed • Number of commercially viable projects identified for post Sandbox phase
	DE-1.9	Startup Venture Vibes Summit Lead: Digital Penang, MBAN Support: Cradle Fund, MDEC, NCIA, VCs, Angel Investors, Regional Partners	• Number of attendees – startups, VCs, corporates, etc. • Number of collaborations • Number of exhibits

Strategic Pillar II

Digital Economy

DE-1	Position Penang as a Regional Tech Startup Hub		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-1. 10**	Startup Seminar(s) Lead: 1337 Ventures Support: Digital Penang	• Number of attendees and startups raising funds
	DE-1.11	Nexea Entrepreneurs Program Lead: Nexea Support: Digital Penang	• Number of Startups (10 Startups)
	DE-1.12	Nexea Entrepreneur Camp Lead: Nexea Support: Digital Penang	• Number of Startups (10 Startups)

Strategic Pillar II

Digital Economy

DE-2	Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	This initiative focuses on upscaling the value chain of high-tech manufacturing into advanced manufacturing by encouraging the production of advanced components and materials. It aims to enhance productivity, innovation and sustainability within the manufacturing ecosystem while fostering growth in complementary sectors.
Expected Outcomes	• Increased adoption of 4IR technology • Growth in FDIs • Economic growth • Talent upskilling
Impact	• Economic Diversification: Reduced dependence on traditional industries, with a focus on high-value, sustainable sectors • Job Creation: Creation of well-paying, high-skilled jobs in manufacturing, R&D and engineering • Supply Chain Strengthening: Development of a robust, resilient and sustainable supply chain ecosystem to support the advanced manufacturing industry
Enabling Factors	• Continued government commitment to creating an investor-friendly environment with streamlined policies and incentives • Availability of world-class industrial parks, digital infrastructure and efficient logistics networks • Access to a skilled and adaptable workforce, supported by reskilling programmes and partnerships with educational institutions

Strategic Pillar II

Digital Economy

DE-2	Foster Development of Advanced Manufacturing and Related Sectors to Attract FDI			Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-2.1**	GBS 2.5 Talk Series & Networking Lead: Invest Penang Support: Penang GBS Focus Group	• Number of attendees • Number of programmes	
	DE-2.2	Penang Silicon Design @5km+ Lead: Invest Penang Support: PSD@5KM+ Technology Collaborators from Government and Industry Players	• Number of IC design companies attracted or expanded within the 5km+ radius • Number of engineers and graduates upskilled • Information on the availability of office space to attract IC design and Digital Investment	
	DE-2.3	Set up Global Business Services (GBS) Spaces in Penang Lead: Invest Penang Support: PDC, NCIA	• Number of GBS attracted • Number of jobs created	
	DE-2.4	POC Accelerator Lead: 1337 Ventures Support: Digital Penang	• Number of POC launched • Number of corporate collaboration	

Strategic Pillar II

Digital Economy

DE-3	Develop a Fund of Funds to Attract and Pool Investments Into Key Digital Sectors and Startup Ecosystem	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	The Fund of Funds (FoF) model pools capital from state, federal and private sources to support Penang's digital startup ecosystem and key digital sectors. It aims to attract Venture Capital firms, angel investors and institutional partners to co-invest in these high-growth areas. This initiative will catalyse the establishment of VCs and alternative funding firms in Penang, driving innovation and fostering a sustainable, investment-driven ecosystem.
Expected Outcomes	• Higher level of investment flow • Growth of digital startups • Diversified investment portfolios • Economic growth
Impact	• Innovation Acceleration: Increased funding will lead to faster commercialisation of innovative digital solutions and new technologies. • Job Creation: The growth of startups and digital businesses will generate high-quality, knowledge-based jobs across various industries. • Long-Term Sustainability: By supporting early-stage companies, the initiative will contribute to the long-term sustainability of the digital sector in the state.
Enabling Factors	• Sufficient interest from both local and international investors to fund the FoF and contribute to the growth of the digital economy • Government support through favourable policies, tax incentives and a conducive regulatory environment for investment in the digital sector • A mature pipeline of high-potential startups and scale-ups that are ready to benefit from the investments

Strategic Pillar II

Digital Economy

DE-3	Develop a Fund of Funds to Attract and Pool Investments Into Key Digital Sectors and Startup Ecosystem		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-3.1**	Hardtech and Deeptech Pre-Seed Fund Lead: Digital Penang, State Government Support: Jelawang Capital, Bintang Capital, VCs	• Nett fund multiplier or MOIC • Current market value of investments • Fund proceeds from exit
	DE-3.2	Corporate Venture Development Programme Lead: Digital Penang, Collaboration Partner Support: State Government, MBAN, Corporate	• Number of angel investors • Number of certified corporate ventures established • Number of corporate startup spin-offs
	DE-3.3	Advance Technology Research Funding for High Impact Technologies Lead: Digital Penang, State Government, Akademi Sains Malaysia Support: Industries, Institutes of Higher Learning (IHLs)	• Number of advance tech prototypes from TRL5 to TRL7 • Number of commercially viable TRL7 prototypes validated
	DE-3.4	Angels and Investment Certification Programme Lead: MBAN, Digital Penang Support: Securities Commission, VCs	• Number of individuals or organisations expressing interest in establishing funds post-programme

Strategic Pillar II

Digital Economy

DE-3	Develop a Fund of Funds to Attract and Pool Investments Into Key Digital Sectors and Startup Ecosystem		Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-3.5**	Development of Blended Financing Mechanism Lead: C4IR Malaysia Support: Bank Negara Malaysia, Securities Commission, JC3 Committee, Private Sectors, World Economic Forum	• Number of investments deployed through Licensed Blockchain platforms
	DE-3.6	Pitch Tuesdays: Penang Lead: 1337 Ventures Support: Digital Penang	• Number of startups looking for investment
	DE-3.7	Penang Micro VC fund Lead: Nexea Support: State Government, Angels, General Partners of Venture Capitals	• Support top-performing funds and fund managers with

Strategic Pillar II

Digital Economy

DE-4	Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	This initiative focuses on establishing CD2 as a vibrant hub for the creative and creator economy. By leveraging digital platforms and innovation, CD2 will nurture talent in areas such as digital content creation, multimedia, gaming, animation, design and creative arts. The goal is to position CD2 as a centre of excellence for exportable creative services that cater to global markets.
Expected Outcomes	• Creative economy growth • Talent development and retention in creative and digital industry • Enhanced partnerships between creative professionals, tech companies and educational institutions
Impact	• Global Competitiveness: Establishment of CD2 as a key player in the global creative and digital service ecosystem • Job Creation: Creation of high-value employment opportunities within the creative and digital industries • Cultural Promotion: Amplification of local culture and talent on the global stage through digital and creative outputs
Enabling Factors	• Adequate investment in creative spaces, digital tools and high-speed connectivity to support creative industries • Active involvement of government, private sector and academia to foster a conducive creative ecosystem • Presence of a skilled workforce and willingness to upskill in response to industry trends

Strategic Pillar II

Digital Economy

DE-4	Develop Creative Digital District into a Hub for the Creative and Creator Economy with Exportable Solutions and Services		Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-4.1**	Creative Startup and Creator Incubator Programme Lead: Digital Penang Support: MDEC, MyCreative, PWDC, PYDC, IHLs	• Number of graduated creative startups with MVP and Market Traction • Number of graduated creative creator with minimal viable content metrics
	DE-4.2	Annual Digital Creative Week Lead: Digital Penang, PCEB Support: State Government, State GLCs, MyStartup, Corporates	• Number of event attendees • Number of events and activities • Number of partnerships • Degree of regional participation
	DE-4.3	Public-private Collaboration Programmes to Encourage Co-creation & Innovation Lead: Digital Penang Support: State Govt, Corporates, Industry Association, MDEC	• Number of co-creation projects launched • Amount of funding secured • Number of products, services, or technologies developed

Strategic Pillar II

Digital Economy

DE-5	Promote and Support the Adoption of Digital Solutions in Key Sectors, such as Tourism & Hospitality, Food Security and Medical Care to Elevate These Industries Globally	Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative focuses on driving the digital transformation of Penang's key industry sectors, including Tourism & Hospitality, Food Security and Medical Care, by promoting the adoption of innovative digital solutions. It aims to enhance operational efficiency, improve customer experiences and increase global competitiveness through the integration of technologies.
Expected Outcomes	• Accelerated adoption of digital technologies • Increased global visibility and competitiveness of Penang-based businesses in these industries • Enhanced operational efficiency • Better customer experiences
Impact	• Economic Growth: Strengthened and diversified economic growth through the digital modernisation of key sectors • Sector Resilience: Increased resilience of key industries in the face of global market challenges by adopting scalable digital solutions • Job Creation: Creation of new job opportunities in tech-driven roles, particularly in areas like data science, digital marketing and cybersecurity • Sustainability and Efficiency: Greater sustainability within industries like Food Security and Medical Care, driven by smarter resource management and technology-driven solutions
Enabling Factors	• The readiness of businesses in key sectors to embrace digital transformation and adopt new technologies • Sufficient digital infrastructure, such as broadband connectivity, cloud computing and cybersecurity systems, to support the digital adoption process • Active participation from industry players, government agencies and technology providers in promoting and implementing digital solutions

Strategic Pillar II

Digital Economy

DE-5	Promote and Support the Adoption of Digital Solutions in Key Sectors, such as Tourism & Hospitality, Food Security and Medical Care to Elevate These Industries Globally		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-5.1**	Penang AgriTech & FoodTech Industry Council Lead: Invest Penang Support: Enza Zaden, Federal Oat Mills, Ghee Hiang, Golden Fresh, Kilang Mata Spices, Produk Makanan Enak Gembira (Ocean Planet), Tropical Consolidated, ViTrox, FMM Penang	• Quarterly meetings among council members to ensure regular dialogue and progress tracking. • Significant adoption in technologies
	DE-5.2	Centralised Super Apps for Streamlined Services and Enhanced Government-community Engagement Lead: BPEN Support: Digital Penang	• Number of app downloads • Number of active users • Community engagement metrics (poll participation, feedback volume, etc.)
	DE-5.3	Agritech Drone Pilot Development Programme Lead: Department of Agriculture Penang Support: Federal and State Government	• Number of projects and activities implemented • Number of exposure or participation (where relevant)
	DE-5.4	Cultural Heritage Trail: Preserving our Past for the Future Lead: Private Sector-Driven Support: Federal and State Government	• Number of projects and activities implemented • Number of exposure or participation (where relevant)

Strategic Pillar II

Digital Economy

DE-5	Promote and Support the Adoption of Digital Solutions in Key Sectors, such as Tourism & Hospitality, Food Security and Medical Care to Elevate These Industries Globally		Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-5.5**	Archaeological Heritage Trail: Preserving our Archaeological Legacy for the Future Lead: CMI Support: ThinkCity	• Number of projects and activities implemented • Number of exposure or participation (where relevant)
	DE-5.6	Ecotourism Trail: Preserving our Natural Heritage for the Future Lead: CMI	• Number of projects and activities implemented • Number of exposure or participation (where relevant)
	DE-5.7	Sedusun Technology Valley Lead: Department of Agriculture Penang Support: State Government	• Number of projects and activities implemented • Number of exposure or participation (where relevant)
	DE-5.8	Nexea Accelerator Program Lead: Nexea Support: Digital Penang	• Number of technology startups accelerated per year (20 Tech Startups accelerated per year)

Strategic Pillar II

Digital Economy

DE-6	Empower Business MSMEs	Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)

Description	This initiative focuses on equipping Penang's MSMEs with essential knowledge and tools to harness the power of digital marketing and innovation. By strengthening their understanding of modern business practices and technology trends, MSMEs will be empowered to stay competitive and capitalise on these emerging trends for growth.
Expected Outcomes	• Increased digital adoption in MSMEs • Improved brand visibility • Sustained competitive advantage
Impact	• Stronger MSME Sector: Strengthened Penang's MSME sector, enabling local businesses to scale, innovate and adapt to changing market conditions • Job Creation and Economic Diversification: Growth in the MSME sector will lead to job creation and a more diversified local economy • Sustainable Growth: Businesses will be better equipped to build long-term sustainability through the adoption of innovative practices and technologies
Enabling Factors	• MSMEs are open to adopting new technologies and business models to stay competitive. • Penang's digital infrastructure will support MSMEs in implementing the necessary changes. • Active collaboration between government, industry stakeholders and MSMEs will drive the programme's success.

Strategic Pillar II

Digital Economy

DE-6	Empower Business MSMEs		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plan & Key Metrics (Policy / Programme / Project)	**DE-6.1**	MSME LevelUP Programme Seberang Perai/Pulau Pinang Lead: Digital Penang Support: Local Dewan Undangan Negeri (DUNs), JPWK, Local Trade Associations	• Create 1000 MSMEs with significant web-presence • At least a 20% increase in revenue compared to the period before the programme. • Ability to hire locals to be part of team
	DE-6.2	MSME LevelUP Market Access Programme Seberang Perai/Pulau Pinang Lead: Digital Penang Support: Local DUNs, JPWK, Local & Foreign Trade Associations	• Have a market presence in countries in ASEAN or beyond • Capability to expand into foreign markets by acquiring a minimum of 10 customers. • At least 300 qualified MSMEs
	DE-6.3	MSME Exchange Programme to enhance the global competitiveness of MSMEs Lead: Digital Penang Support: Local MSME group, Local & Foreign Trade Associations	• Mutual exchange on business and networking opportunities • Workshops on how to do businesses in each other's countries

Strategic Pillar II

Digital Economy

DE-6	Empower Business MSMEs		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plan & Key Metrics (Policy / Programme / Project)	**DE-6.4**	NCER Technology Innovation Centre (NTIC) Enhancement Lead: NCIA Support: Federal and State Government	• Number of companies participated under the CoE programme • Number of talents participated under the ATMP programme • Number of companies participated under the Technology & Innovation programme
	DE-6.5	SMEs Seminar Lead: Leet Capital Support: 1337 Ventures	• 4 seminars a year (200 participants)

Strategic Pillar II

Digital Economy

DE-7	Business Continuity Programme for Penang/Northern Region Supply Chain based on ESG Practices	Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative focuses on enhancing the resilience and sustainability of the supply chain in Penang and the northern region by integrating ESG practices into business continuity strategies. By promoting ESG principles within the supply chain, the initiative aims to drive long-term economic stability, improve environmental impact and promote social responsibility, making the region's supply chain more robust, competitive and globally connected.
Expected Outcomes	• Increase in the number of SMEs achieving ESG certification and complying with SEDG standards • Widespread adoption of environmentally sustainable and socially responsible practices • Stronger regional competitiveness
Impact	• Economic Stability: A more resilient and sustainable supply chain will contribute to long-term economic stability and growth in Penang and the northern region. • Environmental and Social Benefits: The integration of responsible practices across industries will lead to a reduction in environmental footprints and improvements in social outcomes. • Competitive Advantage: The Penang/Northern region will strengthen its position as a global leader in responsible and sustainable business practices, attracting ethical investments.
Enabling Factors	• Local businesses are committed to adopting ESG practices and improving their supply chain resilience. • Companies are receptive to ESG training and integration, understanding the long-term benefits of sustainability and responsible business practices. • Successful implementation will require collaboration between government agencies, industry stakeholders and businesses to build a strong ESG-based framework.

Strategic Pillar II

Digital Economy

DE-7	Business Continuity Programme for Penang/Northern Region Supply Chain based on ESG Practices		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-7.1**	Sustainable Accelerator Programme (SAP) - ESG Certification and Compliant Programme for SMEs in Penang and Northern Region Lead: Digital Penang, Thoughts In Gear (TIG) Support: PGC, NCIA, Academia, MNCs	• Number of SMEs trained, certified and compliant to SEDG • Ability to do self-audit and commit to GHG reductions • Ability to show customers on the GHG reduction based on the services/products offered • The use of digital tools to reduce cost of ESG compliance, including automated data collection and the use of AI to identify company-specific solutions

Strategic Pillar II

Digital Economy

DE-7	Business Continuity Programme for Penang/Northern Region Supply Chain based on ESG Practices		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DE-7.2**	Bi-annual Seminars, Workshops & Award Night to Showcase and Collaborate among Alumni Lead: Digital Penang, Thoughts In Gear (TIG) Support: PGC, NCIA, Academia, MNCs	• Continuous learning for the Alumni to upgrade themselves on ESG development via seminars and workshops • Award Night to showcase and encourage the industry to steadfast in their journey to achieve excellence • Promotion of innovative use of digital tools to further streamline production and improve social and environmental footprints
	DE-7.3	Development of Circular Economy Waste Management Ecosystem for Penang Island Lead: C4IR Malaysia, Private Sectors Support: Local Council	• Number of dead landfills cleared and repurposed for development

Strategic Pillar III

Digital Society: Promote inclusivity and ensure equitable access to digital opportunities for all citizens

In an era where digital technologies are reshaping how we live, work and connect, building an inclusive digital society is not merely an aspiration—it is a necessity. A digitally inclusive society ensures that every individual, regardless of age, gender, socioeconomic background, or geographic location, has equitable access to digital opportunities, resources and tools. This pillar emphasises empowering citizens with digital skills, fostering community resilience through technology and building a digitally inclusive culture where no one is left behind.

The digital society pillar recognises that true digital transformation begins with people. It focuses on addressing societal challenges, such as the digital divide, unequal access to connectivity and the varying levels of digital literacy across communities. By enhancing digital participation and creating opportunities for lifelong learning, this pillar aims to enable citizens to harness digital tools for personal growth, economic empowerment and social advancement.

Strategic Pillar III focuses on:

DS-1 Enhance Digital Literacy and Access

This initiative aims to bridge the digital divide by improving digital literacy and ensuring equitable access to technology and digital services for all segments of society. It focuses on empowering individuals and communities with the skills and knowledge needed to thrive in a digitally-driven world. By addressing the digital literacy gap, the initiative fosters sustainable socioeconomic development and empowers individuals to actively participate in the economy.

DS-2 Community Digital Empowerment

This initiative aims to promote active participation in the digital economy and society by fostering digital awareness, skills development and engagement in locally relevant programmes. It emphasises building confidence and capacity among individuals to use digital platforms for education, entrepreneurship, civic participation and community development. Special focus will be given to underserved populations, such as rural communities, low-income households, women and the elderly, to ensure equitable access to opportunities in the digital era.

DS-3 Increase Awareness and Adoption of Technology in Addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity

This initiative focuses on raising awareness and promoting the adoption of digital technologies that address green and climate challenges. By leveraging innovative technology solutions, businesses and industries in Penang will be able to meet increasing environmental regulations, reduce their carbon footprint and enhance their resilience against climate-related risks. The initiative aims to empower industries to adopt sustainable practices that improve business continuity and competitiveness while also fostering the development of scalable green solutions.

Strategic Pillar III

Digital Society: Promote inclusivity and ensure equitable access to digital opportunities for all citizens

The three strategic initiatives comprising one short-term, one medium-term and one long-term initiative are designed to ensure that digital transformation remains people-centric, inclusive and equitable.

Penang is committed to building a society where digital opportunities are accessible to everyone, where technology empowers rather than excludes and where citizens feel safe, confident and capable in navigating the digital world. This strategic pillar envisions a future where the benefits of digitalisation are shared by all, contributing to a stronger, more inclusive and resilient Penang society.

Strategic Pillar III

Digital Society

DS-1	Enhance Digital Literacy and Access	Timeline: **Short** (<2 years) / **Medium** (2-5 years) / **Long** (>5 years)

Description	This initiative aims to bridge the digital divide by improving digital literacy and ensuring equitable access to technology and digital services for all segments of society. It focuses on empowering individuals and communities with the skills and knowledge needed to thrive in a digitally-driven world. By addressing the digital literacy gap, the initiative fosters sustainable socioeconomic development and empowers individuals to actively participate in the economy.
Expected Outcomes	• Increased digital skills • Expanded connectivity • Inclusive participation • Economic empowerment
Impact	• Reduced Digital Divide: A more inclusive digital society with equal opportunities for all, regardless of location or socioeconomic status • Workforce Readiness: A digitally skilled workforce that meets the demands of an evolving job market • Community Resilience: Strengthened community resilience by enabling greater adaptability to technological and economic changes
Enabling Factors	• Willingness of communities to adopt digital tools and participate in literacy programmes • Infrastructure Development: Continued investment in broadband infrastructure to ensure reliable connectivity across all areas • Support and participation from the government, private sector and non-governmental organisations in implementing digital literacy programmes

Strategic Pillar III

Digital Society

DS-1	Enhance Digital Literacy and Access		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DS-1.1**	Eco-Entrepreneurship & Youth Entrepreneurship Workshop Lead: PYDC, PWDC Support: MMK Keusahawanan, Iman Ikhlas Sdn Bhd, Big Domain, Big Academy, Howei	• Number of youth-led businesses • Number of participation in workshop • Participation rate in programme
	DS-1.2	Digital Clinic Workshop (DahDigital) Lead: Digital Penang Support: NADI, JPWK, MCMC, PYDC, PWDC	• Number of classes conducted • Number of participants completed the modules • Possible economic outcomes after applying what has been learnt

Strategic Pillar III

Digital Society

DS-2	Community Digital Empowerment	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	This initiative aims to promote active participation in the digital economy and society by fostering digital awareness, skills development and engagement in locally relevant programmes. It emphasises building confidence and capacity among individuals to use digital platforms for education, entrepreneurship, civic participation and community development. Special focus will be given to underserved populations, such as rural communities, low-income households, women and the elderly, to ensure equitable access to opportunities in the digital era.
Expected Outcomes	• Increased digital participation • Growth in entrepreneurial ventures and employment opportunities • Improved digital literacy across different age groups
Impact	• Social Inclusion: Reduction of social disparities by ensuring all communities have equal opportunities to thrive in the digital age • Community Development: Strengthened community resilience and collaboration, driving collective growth and innovation • Civic Engagement: Greater involvement in governance and decision-making processes through digital channels
Enabling Factors	• Active participation is available from stakeholders, including government, private sector and community organisations. • Communities are receptive to digital literacy programmes and are willing to adopt new practices. • Long-term funding and resources are available to maintain education and empowerment programmes.

Strategic Pillar III

Digital Society

DS-2	Community Digital Empowerment		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DS-2.1**	Adoption of Digital Technology by NGOs Lead: Digital Penang Support: NADI, NGOs	• Number of classes conducted • Number of participants who completed the modules • Percentage of participants able to renew/review their socmed account after learning
	DS-2.2	Industry-academia Collaboration for Future-ready Workforce Development Lead: 42 Penang, Digital Penang Support: Industries, Academic Institutions	• Number of collaborations established • Employment rate of the graduates
	DS-2.3	Community Tech Centres to Drive Digital Empowerment and Innovation Lead: Digital Penang Support: Penang Institute (PI)	• Number of community-driven projects • Number of attendees of the community projects • Patents filed or products developed
	DS-2.4	Community Advocacy and Public Awareness on Telecommunication Electric and Magnetic Fields (EMFs) Lead: SUK Support: MCMC	• Percentage of complaints on telecommunication structure

Strategic Pillar III

Digital Society

DS-3	Increase Awareness and Adoption of Technology in addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity	Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative focuses on raising awareness and promoting the adoption of digital technologies that address green and climate challenges. By leveraging innovative technology solutions, businesses and industries in Penang will be able to meet increasing environmental regulations, reduce their carbon footprint and enhance their resilience against climate-related risks. The initiative aims to empower industries to adopt sustainable practices that improve business continuity and competitiveness while also fostering the development of scalable green solutions.
Expected Outcomes	• Increased innovation in green and climate solutions • Enhanced public awareness and engagement • Industries that are more resilient and competitive in the future • Commercialisation of high-potential green solutions
Impact	• Reduced Environmental Impact: The integration of green technologies will reduce carbon emissions and improve resource efficiency, contributing to a sustainable future for Penang. • Stronger Industry Competitiveness: Businesses adopting green solutions will have a competitive edge in global markets, aligning with international ESG and SDG standards. • Increased Green Technology Investment: The regulatory framework and supportive environment will attract both local and international investments in green technology and sustainable practices.
Enabling Factors	• Local businesses and startups are eager to explore and adopt emerging green technologies to address climate challenges. • The regulatory framework and digital infrastructure will be flexible enough to support the trialing and commercialisation of new technologies. • Strong cooperation between government, industry players and academia will be key to developing impactful and scalable green solutions.

Strategic Pillar III

Digital Society

DS-3	Increase Awareness and Adoption of Technology in addressing Green and Climate Issues while Fostering Industry Competitiveness and Business Continuity		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DS-3.1**	Series of Events, Conferences and Seminars on Green and Climate Related Initiatives to Promote Awareness on Challenges, Regulatory Requirements and Adoption of Technology Lead: PCG Support: Digital Penang, Invest Penang, PCEB	• Number of events, conferences and seminars held • Number of participants
	DS-3.2	Promote ESG Reporting to Enhance Transparency, Sustainability and Long-term Value Creation Across Sectors Lead: Digital Penang Support: Penang Institute (PI)	• Percentage of companies adopting recognised ESG reporting standards • Percentage of businesses complying with national or international ESG regulations

Strategic Pillar IV

Digital Foundation: Act as the backbone to support and sustain long-term digital growth and innovation

In an increasingly interconnected world, a robust digital foundation serves as the backbone for sustainable digital transformation, economic growth and societal progress. The **digital foundation** pillar recognises that digital transformation is not an isolated effort but an ongoing, evolving process. A solid foundation ensures that digital initiatives under other strategic pillars—Digital Government, Digital Economy and Digital Society—are effectively implemented, scalable and future-proof.

Through targeted investments, policy frameworks and public-private collaborations, Penang can establish a digital foundation that supports a thriving digital economy, efficient digital governance and an inclusive digital society.

This strategic pillar focuses on:

DF-1 Enhance Digital Infrastructure and Readiness

This initiative aims to improve and expand Penang's digital infrastructure and connectivity to support the growing demand for fast, reliable and secure digital services. It focuses on key areas, such as connectivity, digital services and citizen engagement, that will create a robust and adaptable digital ecosystem, positioning Penang as a competitive and future-ready city.

DF-2 Foster Digital Talent and Innovation

This initiative focuses on developing a skilled digital workforce and fostering a culture of innovation in Penang. It helps to foster innovation by creating spaces and opportunities for startups and businesses to collaborate, ideate and develop new technologies and solutions that contribute to Penang's digital economy.

DF-3 Strengthen Cybersecurity and Data Privacy

This initiative focuses on enhancing the cybersecurity infrastructure and data privacy practices of government agencies, businesses, organisations and community in Penang. With the growing reliance on digital platforms and technologies, safeguarding sensitive data and ensuring secure online operations is crucial for businesses to build trust, ensure compliance and protect themselves from cyber threats.

The three strategic initiatives comprising one short-term, one medium-term and one long-term initiative are designed to set the stage for Penang to become a regional leader in digital innovation and transformation.

A strong digital foundation not only empowers the state to address immediate challenges but also equips it to seize future opportunities, ensuring that Penang remains competitive, secure and resilient in the global digital economy.

Strategic Pillar IV

Digital Foundation

DF-1	Enhance Digital Infrastructure and Readiness	Timeline: Short (<2 years) / Medium (2-5 years) / **Long (>5 years)**

Description	This initiative aims to improve and expand Penang's digital infrastructure and connectivity to support the growing demand for fast, reliable and secure digital services. It focuses on key areas, such as connectivity, digital services and citizen engagement, that will create a robust and adaptable digital ecosystem, positioning Penang as a competitive and future-ready city.
Expected Outcomes	• Optimised utility systems • Continuous digital growth • Stronger digital ecosystem
Impact	• Smart City Development: Strengthened infrastructure and digital services will contribute to Penang's evolution into a smart city. • Economic Growth: Increased digital competitiveness will attract investments and support new business opportunities. • Digital Readiness Insights: Continuous evaluation of Penang's preparedness for digital transformation will inform future growth. • Data-driven Decision-making: Regular evaluations will provide valuable insights to guide policymakers and stakeholders in making informed, strategic decisions for sustainable and inclusive digital development in Penang.
Enabling Factors	• Strong partnerships between government, utilities and the private sector, ensuring seamless integration of digital tools and infrastructure • Ongoing investment in state-of-the-art technologies and systems to support the initiative's objectives • Commitment from local authorities to allocate resources and foster an environment conducive to digital transformation • Active stakeholder engagement to ensure alignment with Penang's long-term strategic goals and sustainable growth

Strategic Pillar IV

Digital Foundation

DF-1	Enhance Digital Infrastructure and Readiness		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-1.1**	Penang Utility Corridor to Coordinate and Organise The Underground Utility Mapping System Lead:CMI Support: MCMC, BKT	• Establishment of One-Stop Agency (OSA)
	DF-1.2	SMARTPLAN Map Services to Improve Community Services In Penang Lead: PlanMalaysia Pulau Pinang Support: State Government	• User adoption rate • Accuracy rate of mapped data • Satisfaction levels of users
	DF-1.3	Regular Penang Digital Readiness Assessment to Assess Penang's Digital Readiness Lead: Digital Penang Support: Industry	• Digital readiness score • Stakeholder engagement rate
	DF-1.4	Internet Exchange (IX) Hub Lead: DE-CIX Support: Federal and State Government	• N/A

Strategic Pillar IV

Digital Foundation

DF-1	Enhance Digital Infrastructure and Readiness		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-1.5**	Connectivity Infrastructure Quality Enhancement Lead: BKT (SUK) Support: MCMC	• Percentage of 4G/5G coverage in Coverage of Populated Areas (COPA) • Percentage of fiber connectivity • Average bandwidth speed • Implementation of second 5G network
	DF-1.6	Strengthening Connectivity Governance and Regulatory Lead: BKT (SUK) Support: MCMC	• Number of Policies and Standard Operating Procedures (SOP)

Strategic Pillar IV

Digital Foundation

DF-2	Foster Digital Talent and Innovation	Timeline: **Short** (<2 years) / **Medium** (2-5 years) / **Long** (>5 years)

Description	This initiative focuses on developing a skilled digital workforce and fostering a culture of innovation in Penang. It helps to foster innovation by creating spaces and opportunities for startups and businesses to collaborate, ideate and develop new technologies and solutions that contribute to Penang's digital economy.
Expected Outcomes	• Increased digital workforce • Improved workforce skills • Attraction of global talent • Increased support and resources for digital startups that will lead to a higher rate of success
Impact	• Enhanced Economic Growth: A digitally skilled workforce will enhance productivity and innovation, driving economic growth and attracting investments in technology-driven industries. • Increased Innovation: The focus on innovation will lead to the creation of new digital products, services and solutions that contribute to Penang's development as a smart and sustainable economy. • Enhanced Industry Resilience: By nurturing talent and fostering innovation, Penang's industries will become more adaptable to technological disruptions, improving long-term business sustainability.
Enabling Factors	• Successful implementation requires strong partnerships between government, educational institutions, businesses and innovation hubs to provide the necessary training and resources. • Penang's educational institutions have the capacity and flexibility to develop and deliver relevant digital training programmes aligned with industry needs. • Adequate funding and investment will be provided for digital talent development initiatives, including scholarships, training programmes and innovation support.

Strategic Pillar IV

Digital Foundation

DF-2	Foster Digital Talent and Innovation		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-2.1**	Penang Chip Design Academy Lead: Invest Penang Support: PSDC, TalentCorp, Industry Players, Academia	• Number of IC designs • Number of industry-ready IC Design Engineers trained annually • Volume of upskilled/reskilled individuals through Academy programs
	DF-2.2	MakerLab and Advanced MakerLab Tracks Lead: PSC Support: TalentCorp, Digital Penang	• Number of schools equipped with MakerLabs • Number of students and schools participate
	DF-2.3	Penang2030 Innovation Bootcamp Lead: PSC Support: Digital Penang	• Number of students • Number of prototypes
	DF-2.4	Coding for All Lead: PSC Support: Digital Penang	• Number of teachers trained • Number of students and projects
	DF-2.5	Computer Science Core Skills Lead: PSC Support: Digital Penang	• Number of students • Number of projects • Percentage of alumni opting for STEM post-secondary education

Strategic Pillar IV

Digital Foundation

DF-2	Foster Digital Talent and Innovation		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-2.6**	Girls in Engineering and Tech Lead: PSC Support: Talent Corp, Digital Penang	• Number of students • Number of projects • Percentage of alumni opting for STEM post-secondary education
	DF-2.7	FIRST Tech Challenge Lead: PSC Support: Digital Penang	• Number of students • Number of projects • Percentage of alumni opting for STEM post-secondary education
	DF-2.8	AI Initiatives Lead: PSC	• Number of teachers trained • Number of students • Number of projects
	DF-2.9	Careers Awareness Workshops/Program Lead: PSC Support: PSDC, TalentCorp, Industry Players, Academia	• Enrolment rates in STEM courses • Number of graduates
	DF-2.10	AI Education Consortium Lead: Tech Dome Penang Support: State Government, MOSTI, Academia, TalentCorp	• Number of participants • Number of STEM workshops & activities
	DF-2.11	AI for Schools Lead: Tech Dome Penang Support: State Government, MOSTI, Academia, TalentCorp	• Number of participants • Number of STEM workshops & activities

Strategic Pillar IV

Digital Foundation

DF-2	Foster Digital Talent and Innovation		Timeline: Short (<2 years) / Medium (2-5 years) / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-2.12**	Digital Innovation Hub: Fostering Tech Ecosystem for Economic Growth Lead: Private Sector Support: Federal Agencies, State Government, TalentCorp	• N/A
	DF-2.13	How to start a startup - Alpha Startups Series Lead: 1337 Ventures	• Number of attendees and startup created
	DF-2.14	Access to Leet Academy Online Accelerator Lead: 1337 Ventures	• Number of attendees and startup created

Strategic Pillar IV

Digital Foundation

DF-3	Strengthen Cybersecurity and Data Privacy	Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)

Description	This initiative focuses on enhancing the cybersecurity infrastructure and data privacy practices of government agencies, businesses, organisations and community in Penang. With the growing reliance on digital platforms and technologies, safeguarding sensitive data and ensuring secure online operations is crucial for businesses to build trust, ensure compliance and protect themselves from cyber threats.
Expected Outcomes	• Enhanced cybersecurity practices • Improved data privacy compliance • Stronger trust in digital platforms • Increased awareness and skills
Impact	• Economic Stability and Growth: By reducing cybersecurity risks, businesses can avoid costly data breaches and disruptions, contributing to a stable and thriving economy. • Enhanced Reputation and Global Competitiveness: Penang's businesses will become more attractive to global partners and clients who prioritise data security and privacy, boosting international trade and investment. • Improved Consumer Confidence: Consumers will feel more confident interacting with businesses that prioritise their data security, leading to better customer retention and loyalty.
Enabling Factors	• Local businesses are willing to invest in cybersecurity and data privacy measures to protect their operations and customers. • Penang has access to the necessary cybersecurity experts and training programmes to equip businesses with the skills required to implement effective security measures. • Successful implementation will require cooperation between government agencies, private sector companies and industry experts to share knowledge, resources and best practices.

Strategic Pillar IV

Digital Foundation

DF-3	Strengthen Cybersecurity and Data Privacy		Timeline: Short (<2 years) / **Medium (2-5 years)** / Long (>5 years)
Key Action Plans & Key Metrics (Policy / Programme / Project)	**DF-3.1**	Penang Security Operations Centre (PSOC) to Provide Proactive Monitoring and Real-time Response to Cybersecurity Threats and Incidents Lead: Digital Penang Support: State Government	• Establishment of Penang Security Operation Center (PSOC)
	DF-3.2	Cybersecurity Awareness Programmes to Educate Community to Understand, Identify And Avoid Cyber Threats Lead: Digital Penang Support: PSDC, TalentCorp, NCIA	• Number of awareness program organised
	DF-3.3	Strengthening the Network Infrastructure and Security for Enhanced Digital Resilience (SUK) Lead: BTMK (SUK)	• Number of infrastructure

07

Governance Structure

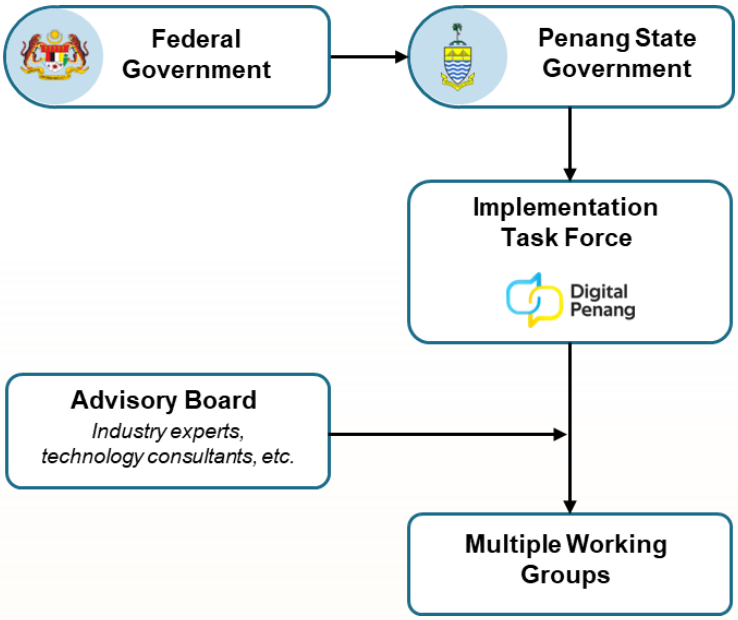
DEMP's Governance Structure & Funding Mechanism

Establish clear oversight, ensure accountability and provide sustainable financial support for the successful implementation and long-term success of DEMP.

Governance Structure

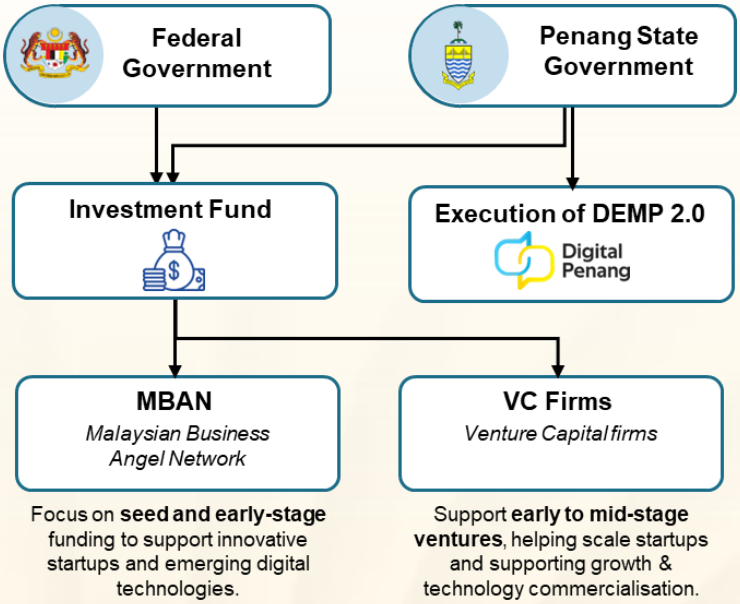
The governance structure for implementing DEMP ensures effective coordination, transparency and accountability across stakeholders.

Through public, private and community partnerships and clear timelines for measurable outcomes, DEMP empowers the state to drive initiatives that are tailored to Penang's specific economic landscape and digital ambitions.



Funding Mechanism

To foster innovation and growth in the digital economy sector, federal and state governments shall jointly commit capital to a pooled fund, partnering with the MBAN and leading VC firms to co-manage, augment and invest in promising startups.



Focus on **seed and early-stage** funding to support innovative startups and emerging digital technologies.

Support **early to mid-stage ventures**, helping scale startups and supporting growth & technology commercialisation.

Risk and Mitigation Plan

The success of DEMP relies on a cohesive approach to risk management, integrating strategic foresight, stakeholder collaboration and financial sustainability.

DEMP's successful implementation requires meticulous planning, strategic foresight and proactive management of potential risks. Given the dynamic and rapidly evolving nature of the digital landscape, the plan must anticipate and address a wide range of challenges, including below:

Risks	Mitigation Plans
i. **Lack of Stakeholder Engagement**	• Create a dedicated platform for ongoing feedback and collaboration with stakeholders. • Develop a stakeholder engagement strategy that includes clear roles, responsibilities and expectations. • Regularly update stakeholders on progress and challenges.
ii. **Insufficient Funding or Resources for Digital Projects**	• Identify and apply for grants and funding programmes available from federal or international sources. • Explore innovative financing models. • Build financial resilience by creating a reserve fund for digital projects.
iii. **Resistance to Digital Transformation**	• Implement digital champions within industries to advocate for transformation. • Pilot small-scale projects with a select group of businesses to showcase the benefits of digital adoption.
iv. **Delays in Implementation of Digital Projects**	• Implement a robust PMO to track project progress and adjust schedules as needed. • Break down large projects into manageable phases with clear milestones. • Assign clear accountability for delays.
v. **Fragmented Implementation across Sectors**	• Regularly review and update DEMP to ensure alignment and integration of all initiatives. • Foster cross-departmental collaboration through shared goals and joint performance indicators.

Risk and Mitigation Plan

Risks	Mitigation Plans
vi. Digital Divide and Unequal Access to Technology	• Implement targeted outreach programmes to ensure equitable access to digital tools and internet connectivity in rural or underserved areas of Penang. • Empower diverse groups, ensuring broad and equitable participation in the digital economy.

The successful implementation of DEMP requires comprehensive risk management, including proactive strategies to address challenges such as technological disruptions, cybersecurity, talent shortages and stakeholder alignment.

A robust framework, continuous monitoring and agile governance will be essential in mitigating risks such as lack of engagement, resource shortages, resistance to change and unequal access to technology. Financial sustainability, cross-sector collaboration and inclusive policies will be key to ensuring the plan's success.

By proactively addressing these risks, DEMP aims to safeguard the blueprint's objectives, create resilience against uncertainties and ensure the long-term success of Penang's digital transformation journey. Through careful risk management and adaptive strategies, the plan aspires to build a connected, competitive and future-ready digital economy, positioning Penang as a leader in digital innovation, economic growth and societal well-being.

Governance Structure

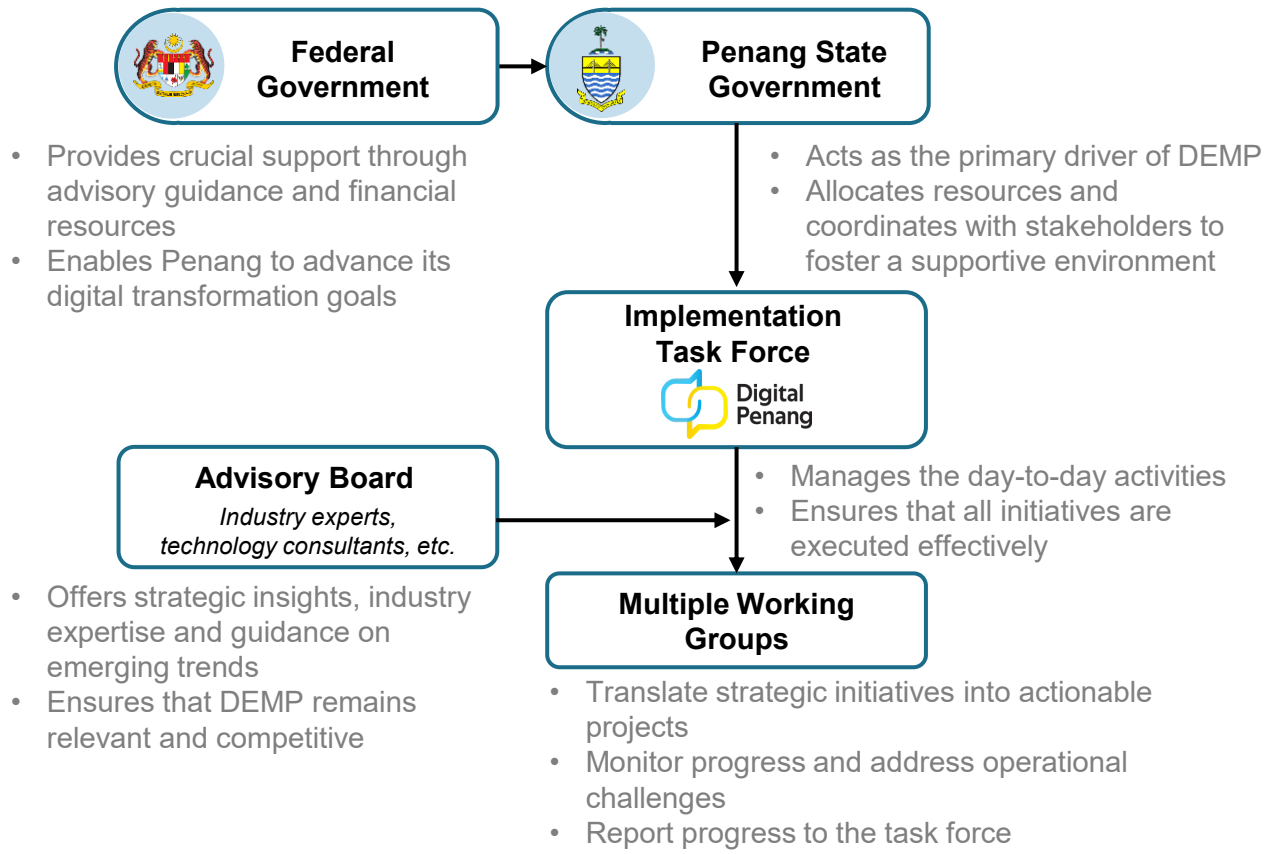
DEMP's governance ensures coordination, transparency and accountability, empowering Penang to drive tailored initiatives through partnerships and clear timelines.

The governance structure for implementing DEMP is designed to ensure effective coordination, transparency and accountability among all stakeholders involved. By clearly defining roles, responsibilities and decision-making processes, it facilitates seamless collaboration and communication among government bodies, private sector players and community organisations. This structure fosters a collaborative environment that promotes the active involvement of all relevant parties in shaping and executing the digital transformation initiatives.

Through a combination of public, private and community partnerships, the governance framework maximises the strengths and expertise of each sector, ensuring that initiatives are designed and implemented in a way that reflects the diverse needs and aspirations of Penang's stakeholders.

By empowering the state with a solid governance foundation, DEMP ensures that the initiatives are not only well-executed but also tailored to Penang's unique economic landscape and long-term digital ambitions.

Proposed DEMP Governance Structure and its Role



Governance Structure

The governance structure for DEMP comprises several key entities, each playing a crucial role in ensuring the successful implementation and ongoing development of the digital transformation strategy.

The governance structure comprises:

i. Federal Government

ii. Penang State Government

iii. Implementation Task Force

iv. Advisory Board

v. Multiple Working Groups

Roles and Responsibilities

i. **Federal Government:** Provides essential advisory guidance and financial resources, supporting Penang's efforts to advance its digital transformation. The federal government ensures that Penang aligns with national policies and strategies, helping the state achieve its digital economy goals.

ii. **Penang State Government:** Acts as DEMP's primary driver, leading the charge in resource allocation and coordination with various stakeholders. The state government fosters a supportive environment for digital economic growth, ensuring that initiatives are aligned with Penang's specific needs and aspirations.

iii. **Implementation Task Force:** Responsible for managing the day-to-day activities of DEMP. The task force ensures that all initiatives are executed effectively. Digital Penang coordinates with other stakeholders and oversees the operational aspects of the plan, making sure it stays on track and meets its objectives.

iv. **Advisory Board:** Offers strategic insights, industry expertise and guidance on emerging trends. Comprised of industry experts, technology consultants and thought leaders, the advisory board ensures that DEMP remains relevant, competitive and adaptable to the rapidly changing digital landscape.

v. **Multiple Working Groups:** Responsible for translating the strategic initiatives into actionable projects. The groups monitor progress, address operational challenges and report their findings and achievements to the task force, ensuring continuous alignment with the overarching goals of DEMP. Each working group contributes to the implementation of specific components, driving Penang's digital transformation forward.

Funding Mechanism

The Fund of Funds in DEMP provides financial support to drive innovation, empower startups and accelerate Penang's digital transformation for sustained growth and competitiveness.

The digital economy is rapidly reshaping industries globally and Penang is keen to harness its potential through DEMP. To support this transformative journey, a robust funding mechanism is essential. The FoF serves as a critical enabler, providing the necessary capital to fuel innovation, empower startups and accelerate digital initiatives across the state.

What is the Fund of Funds?

The FoF is a strategic financial model designed to pool capital from multiple sources, including the federal and state governments, along with private sector partners, such as VC firms and angel investors. This collective fund is co-managed by these stakeholders, ensuring that financial resources are directed towards high-potential projects, innovative startups and digital transformation initiatives in Penang.

How the Fund of Funds Works

The FoF operates by allocating pooled capital into various funds or investment vehicles managed by experienced professionals. These funds target startups and initiatives that align with Penang's strategic goals in digital innovation, technology development and economic growth. By leveraging the expertise of the government and private investors, the mechanism ensures that the most promising ideas receive the resources needed to scale.

Fostering Innovation and Growth

To foster innovation and growth in the digital economy sector, both the federal and state governments will jointly commit capital to a pooled fund, collaborating with MBAN and leading VC firms to co-manage, augment and invest in promising startups. This partnership aims to stimulate the development of new digital technologies and business models, supporting the growth of the digital economy in Penang. Additionally, the state government will allocate necessary funds to ensure the successful execution of key initiatives under DEMP, driving Penang's digital transformation and enhancing its position as a leader in the digital economy.

Benefits of the Fund of Funds for DEMP

- Fosters innovation by supporting the development of new technologies and business models.
- Empowers startups with the necessary financial resources to grow and scale.
- Accelerates the execution of DEMP's initiatives, driving Penang's digital transformation.
- Promotes sustained economic growth through long-term support for high-potential ventures.
- Encourages collaboration between the government and private sector, ensuring effective funding and development.

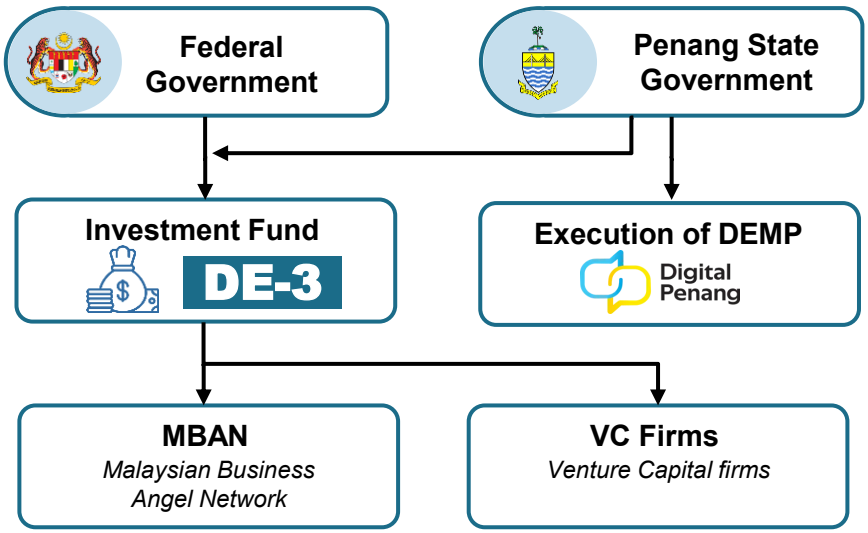
Funding Mechanism

Proposed Funding Mechanism for DEMP

This structure allows Digital Penang to effectively implement DEMP's initiatives and the FoF, backed by adequate state funding to fully harness Penang's digital transformation potential.

MBAN - Focuses on **seed and early-stage** funding

VC Firms - Support **early to mid-stage ventures**



Roles and Responsibilities

i. **Federal Government:** Provides matching funds or additional incentives to enhance the fund's capacity and ensure alignment with national priorities. It also offers regulatory support and policy guidance for effective fund operation.

ii. **Penang State Government:** Commits initial capital to the pooled fund and provides sufficient funding for Digital Penang to execute additional initiatives outlined in DEMP.

iii. **Digital Penang:** Acts as the coordinator, channeling funds to the investors and overseeing DEMP's initiatives. It sets the fund's objectives, defines the high-priority sectors and outlines criteria for investments. In addition, it provides regular updates to the federal and state government on fund performance, DEMP's progress and sectoral impact.

- MBAN - Focuses on seed and early-stage funding to support innovative startups and emerging digital technologies.
- VC Firms - Support early to mid-stage ventures, helping scale startups and supporting growth and technology commercialisation.

08

Appendix

Appendix I

Acknowledgements

Acknowledgements

Digital Penang extends its sincere appreciation to all individuals, departments, agencies and ministries listed below for the valuable insights and contributions toward the development of the DEMP.

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- Equator Academy of Art
- Federation of Malaysian Manufacturers (FMM) Penang
- Forward College
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- INTI International College Penang
- InvestPenang
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- Karuna Kshosee Venture Capital
- Lembaga Perumahan Negeri Pulau Pinang (LPNPP)
- Lifesyle Resources (E3 Capital)
- Majlis Bandaraya Pulau Pinang (MBPP)
- Majlis Bandaraya Seberang Perai (MBSP)
- Malaysia Budget & Business Hotel Association (MyBHA)
- Malaysia Digital Economy Corporation (MDEC)
- Malaysia Research Accelerator for Technology and Innovation (MRANTI)
- Malaysian Association of Hotels Penang (MAH)
- Malaysian Communications and Multimedia Commission (MCMC)
- Malaysian Business Angels Network (MBAN)
- Malaysian Green Technology And Climate Change Corporation (MGTC)
- MIMOS Berhad
- Ministry of Science, Technology and Innovation (MOSTI)
- Mobula Research Sdn Bhd
- MyCreative Ventures Group
- MyDocLab Sdn Bhd
- MYStartup
- Nexea Angels
- Non-Governmental Organisations (NGO)
- Northern Corridor Implementation Authority (NCIA)
- Pejabat Tanah & Galian (PTG) Pulau Pinang
- Penang Convention & Exhibition Bureau (PCEB)
- Penang Development Corporation (PDC)
- Penang Foundry & Engineering Industries Association (PENFEIA)
- Penang Green Council (PGC)
- Penang Harmony Centre
- Penang Infrastructure Corporation (PIC)
- Penang Institute (PI)
- Penang Science Cluster (PSC)
- Penang Skills Development Centre (PSDC)
- Penang State Executive Council
- Penang State Government (PSUKPP)
- Penang Women's Development Corporation (PWDC)
- Penang Youth Development Corporation (PYDC)
- PenangGIS
- Persatuan Usahawan Maju Malaysia (PUMM)
- PIKOM
- PlanMalaysia
- PTS Industrial Solutions
- Pusat Sebaran Maklumat Nasional (NADI)
- Securities Commission (SC)
- Small and Medium Enterprises Association Malaysia (SAMENTA)
- SME Association Seberang Perai
- TechDome Penang
- Telebort Technologies Sdn Bhd
- The One Academy Penang
- Thoughts In Gear (TIG)
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- Universiti Sains Malaysia (USM)
- University of Wollongong Malaysia (UOW Malaysia)
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DEMP's Technical Strategy Committee and Project Team

- YB Zairil Khir Johari – Chairman, Technical Strategy Committee
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- Ms. Mirza Batrisyia binti Nadzri – Project Management Officer

Digital Penang

DIGITAL ECONOMY MASTER PLAN

DEMP
2025-2030

Appendix II

Stakeholder Engagement

Stakeholder Engagement

Setting state aspirations and targets by triangulating data points from multiple perspectives to establish SMART goals for a just transition.

Three Focus Group Discussions (FGDs) were conducted with leaders from public and private sectors from various backgrounds to understand their visions on digital transformation.

Based on the visioning workshop, a multi-criteria analysis was developed to assess factors affecting the setting of the national aspirations from various perspectives to establish the logics in defining the state aspirations, commitments and targets.

Sample factors included the following:

1 **Government and policy**

Key perspectives:

- Vision and strategy alignment
- Regulatory framework

2 **National digital goals**

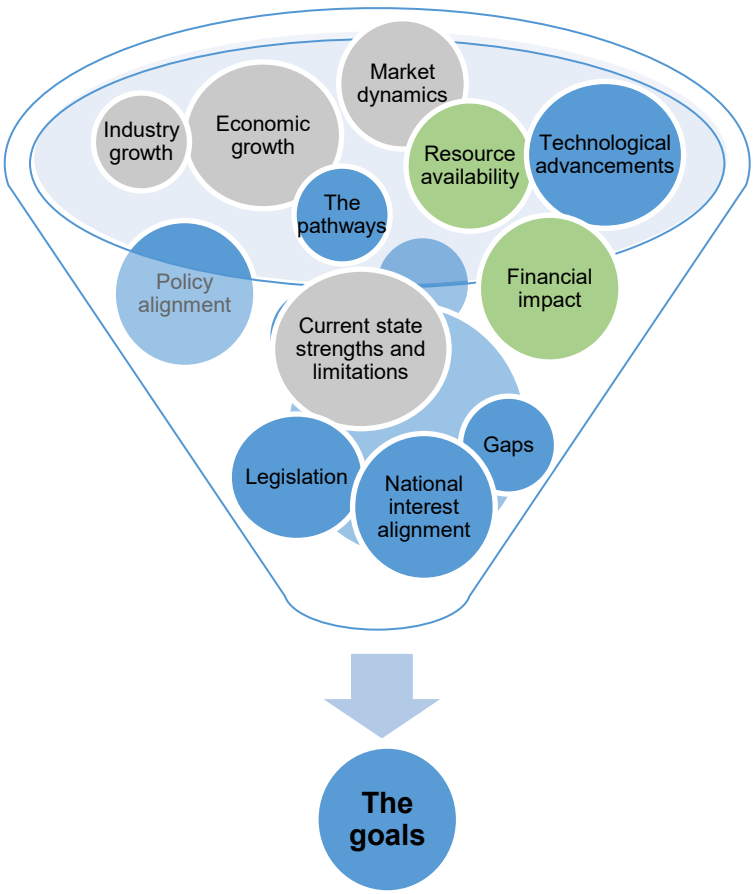
Key perspectives:

- Infrastructure requirements
- Resource availability
- Resource affordability

3 **Stakeholders' support**

Key perspectives:

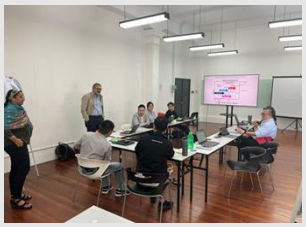
- Interests of the public sector
- Interests of the private sector
- Power to influence
- Change management



Stakeholder Engagement

Each of the FGDs was conducted with tailored objectives to gather in-depth insights and perspectives from key stakeholders.

Focus Group Discussion 1



FGD1	Visioning Workshop
Date	4 October 2024
Time	9.00am–4.00pm
Participants	Digital Penang

Objectives

1. **Discuss Current Issues and Challenges:** Address the existing issues and challenges in the digital landscape and present preliminary assessments related to DTMP 1.0.
2. **Understand DTMP 1.0 Mission & Vision:** Clarify the mission, vision and objectives of DTMP 1.0 to guide the development of DEMP.
3. **Formulate Development Direction for DEMP:** Set the direction for future development.

Focus Group Discussion 2

FGD2	Stakeholder Engagement Workshop
Date	29 October 2024
Time	10.00am–4.30pm
Participants	Digital Penang and Relevant Stakeholders

Objectives

1. **Discuss Current Issues and Challenges:** Address the existing issues and challenges in the digital landscape in Penang.
2. **Cultivate Early Ideas:** Gather preliminary input from stakeholders to generate initial ideas for initiatives, programmes and/or projects.
3. **Formulate Development Direction for DEMP**: Set the direction for future development.

Stakeholder Engagement

Each of the FGDs was conducted with tailored objectives to gather in-depth insights and perspectives from key stakeholders.

Focus Group Discussion 3

FGD3	Stakeholder Syndication Workshop
Date	25 April 2025
Time	8.30am–12.30pm
Participants	Digital Penang and Relevant Stakeholders

Objectives

1. **DEMP Solution Syndication:** Syndicate and finalise the proposed solutions under the DEMP.
2. **Strengthen Stakeholder Buy-In:** Secure consensus and support from key stakeholders for the final direction.
3. **Refine Action Plans for Execution**: Review and refine key action plans to ensure they are practical and aligned with stakeholder priorities.

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