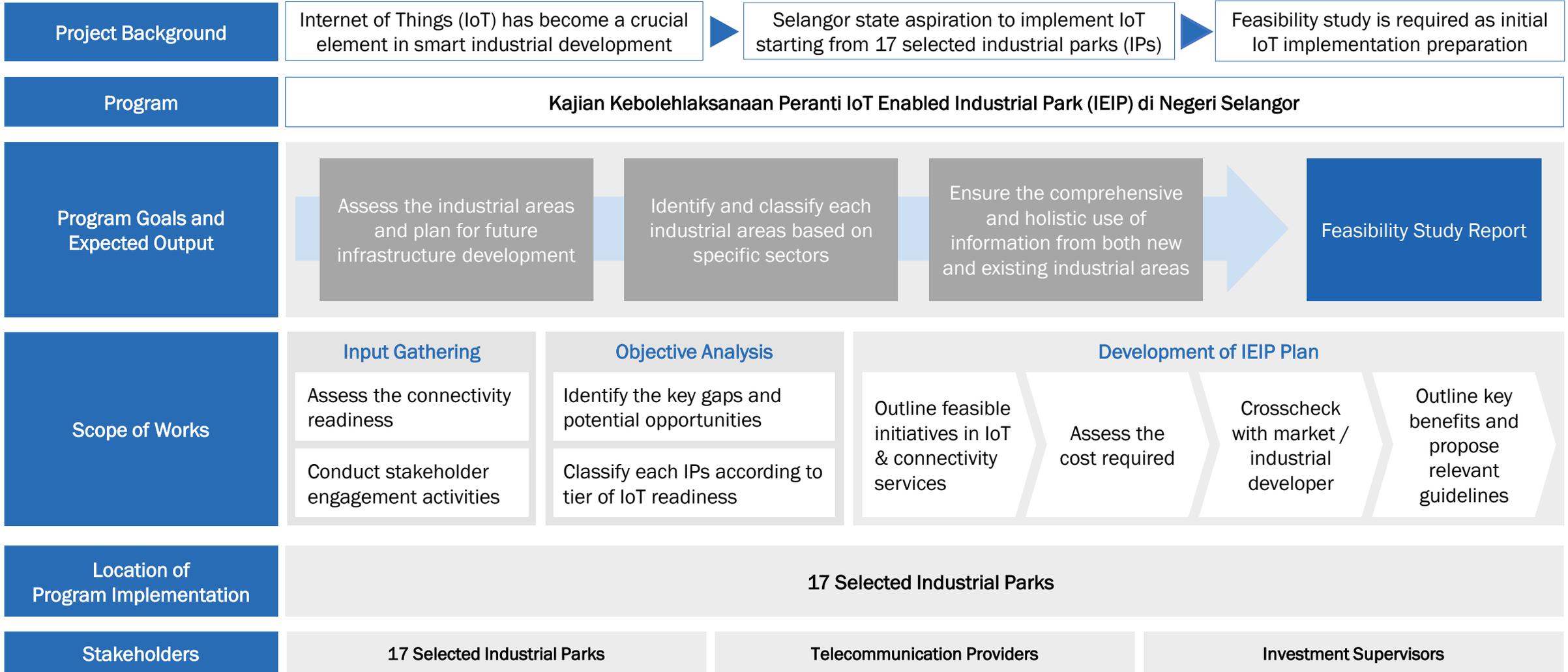


IOT ENABLED INDUSTRIAL PARK (IEIP)

KAJIAN KEBOLEHLAKSANAAN PERANTI
IOT ENABLED INDUSTRIAL PARK (IEIP) DI NEGERI SELANGOR

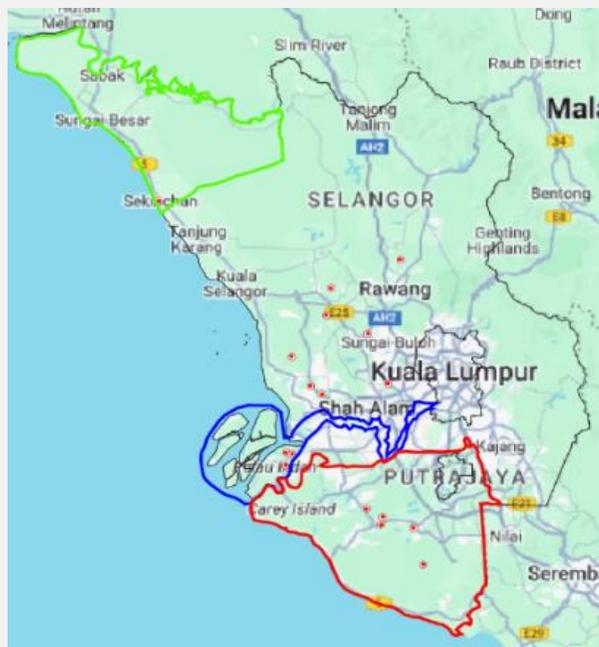
Selangor, October 2025

Project background, assessment scope, goals, and expected output



The project covers 17 selected industrial parks (IPs) with different business models, zones, development stage, and stakeholders

Industrial Zones in Selangor



— Kawasan Pembangunan Sabak Bernam (SABDA)

— Zon Pembangunan Ekonomi Selangor Maritime Gateway (ZPE SMG)

— Wilayah Pembangunan Bersepadu di Selangor Selatan (IDRISS)

17 Selected Industrial Park (IP) Segmentation

No	Name of Industrial Park (IP)	Company	Zone	Business Model	Development Stage
1	Pulau Indah Industrial Park, Phase 3C	Central Spectrum	ZPE SMG	Land Free/Lease Hold	Brownfield
2	Banting Industrial City	Lion Group	IDRISS	Ready Built Factory	Brownfield
3	Compass @ Kota Seri Langat	PNB & KWEST	IDRISS	Managed Industrial Park	Brownfield
4	ETP @ KIIP Jenjarom Industrial Park	Klang Group	IDRISS	Ready Built Factory	Brownfield
5	Eco Business Park V	Ecoworld	Others	Managed Industrial Park	Brownfield
6	Elmina Business Park	Sime Darby Property	Others	Managed Industrial Park	Brownfield
7	Subang Aerotech Park	MAHB	Others	Land Free/Lease Hold	Brownfield
8	UMW High Value Manufacturing Park	UMW Development	Others	Ready Built Factory	Brownfield
9	Kompleks Pendaratan Hasil Laut Sekinchan	Sekinchan Development	SABDA	Land Free/Lease Hold	Greenfield
10	Costa Lagenda Industrial Park	Benalec	ZPE SMG	Land Free/Lease Hold	Greenfield
11	SBB Industrial Park, Phase 1 A	Central Spectrum	ZPE SMG	Land Free/Lease Hold	Greenfield
12	IOI Industrial Park @ Banting	IOI Properties Group	IDRISS	Ready Built Factory	Greenfield
13	NCT Smart Industrial Park	NCT Group	IDRISS	Managed Industrial Park	Greenfield
14	Bandar Bukit Raja Industrial Park	Sime Darby Property	Others	Ready Built Factory	Greenfield
15	Bandar Bukit Raja IV	Sime Darby Property	Others	Managed Industrial Park	Greenfield
16	Green industrial Park (GRIP) Kota Puteri	PKNS	Others	Managed Industrial Park	Greenfield
17	KIIP @ Kapar 2 Industrial Park	Klang Group	Others	Land Free/Lease Hold	Greenfield

The Ideal of a Smart Industrial Park

Phase 7 : Achieving Goals

Increased Productivity, Sustainability, Economic Growth, Innovation Ecosystem

Phase 6 : Sustainability & Scalability

Green Certification, Continuous Innovation, Scalability Planning

Phase 5 : Performance Monitoring

KPI Tracking, Digital Twin Implementation, Feedback Loops, Predictive Maintenance

Phase 4 : Smart Services & Cyber Security

Adoption of IoT use cases with security measures starting in small scale

Phase 3 : Basic Infrastructure & Connectivity

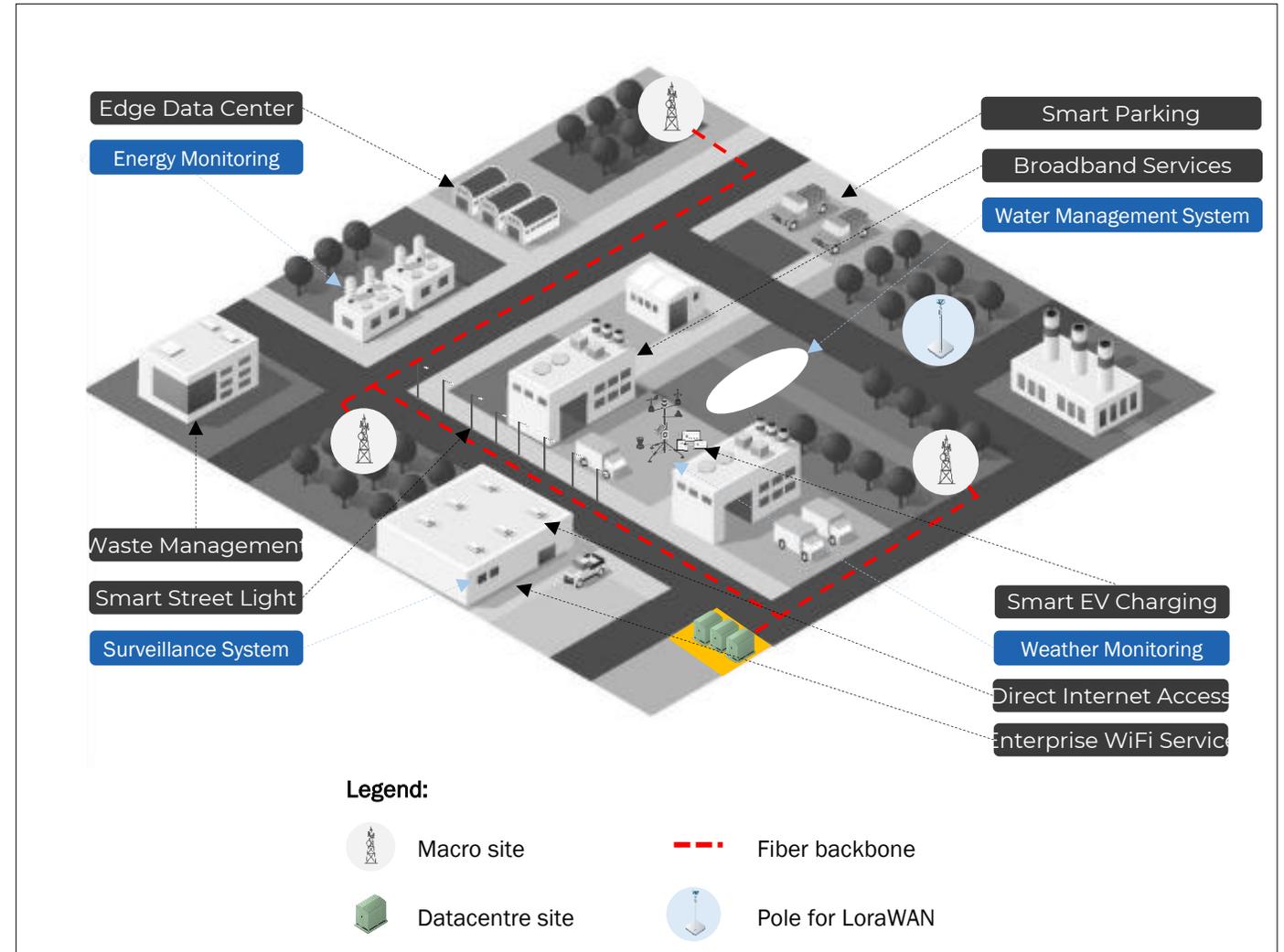
Enablement of Mobile Coverage and Internet Access

Phase 2 : Planning & Design

Site selection, Digital Master Plan, Sustainability Design, Zoning and Land Use

Phase 1 : Policy & Guideline

Vision & Objectives, Regulatory Framework, Funding & Investment Strategies, Environmental Regulations, Standardization



From the FGD, industrial parks aim to transition to sustainable smart models and seek partnerships for tailored IoT solutions

IoT Readiness and Current Infrastructure



Connectivity gaps of cellular and wireless connectivity



Power supply is stable, IoT systems are in early planning stages

Key Challenges Identified



Funding hurdles and innovative models to drive adoption and success



Skills gap for IoT with training plans in progress

Addressing key challenges



Other stakeholders may support funding of IoT implementation



All related stakeholders need to participate in closing the gap of digital infrastructure

Needs and Expectation



Sustainability goals through IoT



Model for smart industrial solutions in ASEAN.

Interest in Collaboration



Off-the-shelf/customized IoT solutions for tenants to build a strong digital ecosystem



Reliance on external expertise and partnerships for advanced IoT skills.

And collaboration with all stakeholders to address the connectivity gap and the infrastructure challenges and limitations

Current Connectivity Infrastructure
 Infrastructure is ready with diverse connectivity options (4G, 5G, fiber, satellite) to provide connectivity for IoT requirements

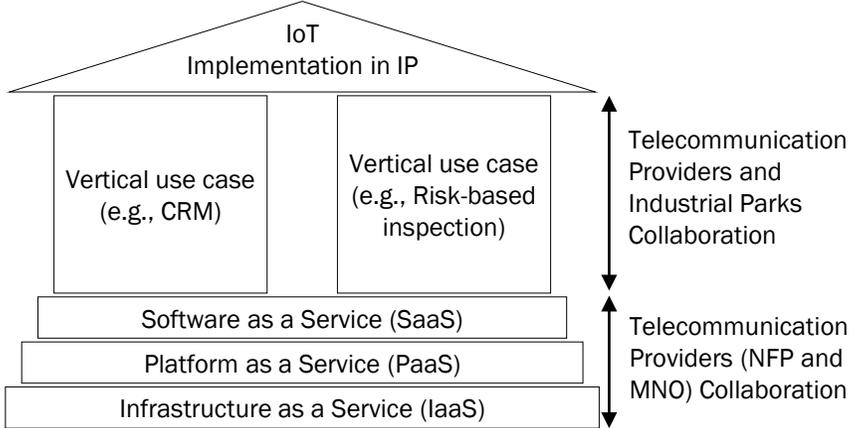
Infrastructure Challenges and Limitations

-  The need of **tailored/customized connectivity** for IoT implementation
-  **Future demand for IoT-need infrastructure** is hard to be forecasted.
-  With unpredicted forecast demand, it is hard to **justify the need of IoT-related infrastructure investment**
-  **Underutilized asset** and difficult to **scale-up** the existing services
-  **Exposure and communication between all stakeholder** on IoT implementation is minimum



Proposed Solutions and Potential Partnership

All stakeholders need to collaborate for the successful of the IoT implementation in industrial parks



Government Support Needed

-  **Public-Private Partnership model**
-  **Policy/regulation enforcement** for the IoT implementation

...which should be aligned with the opportunities of funding, business model, and policy



Investment

	<p>Alignment with Business Model Funds and grants are available but require alignment with clear business model</p>
	<p>Sustainable Financial The business should focus on managing risks and ensuring financial sustainability</p>
	<p>Collaboration Collaborative business model is essential for investor management and sustainability</p>
	<p>Public-Private Partnerships (PPP) PPP can encourage collaborations for IoT implementation and foster engagement</p>



Development

	<p>Public-Private Partnerships (PPP) PPP is essential to reduce entry barriers by sharing costs</p>
	<p>Seed Funding for Sandboxing State governments needs to provide initial funding to kickstart innovative projects</p>
	<p>Leveraging Existing Infrastructure Avoiding redundant investments and using current infrastructure to develop IoT</p>
	<p>State Funding Provide financial support for new connectivity enablement and projects</p>



Policy/Regulatory

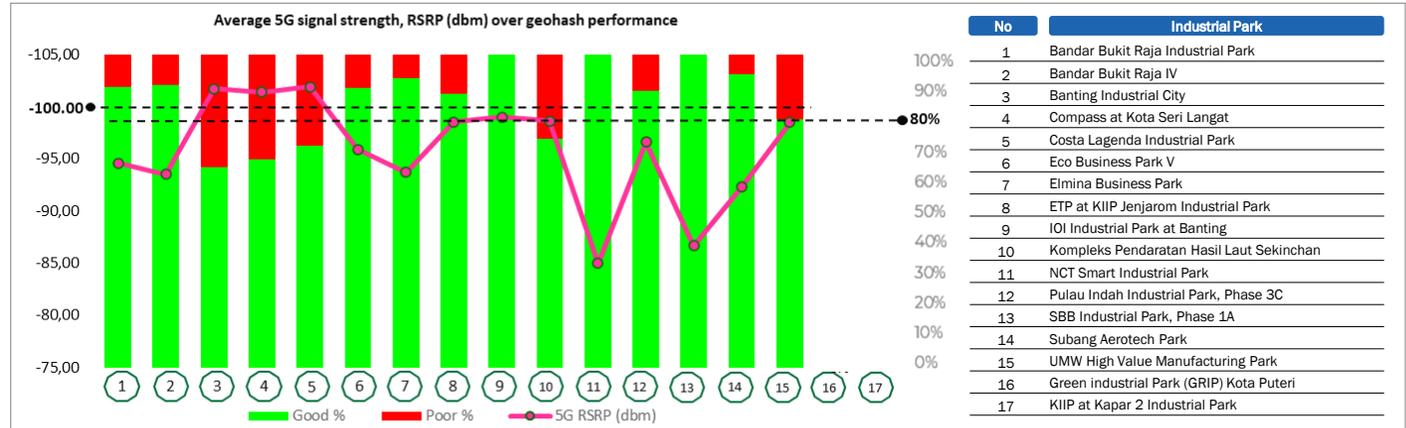
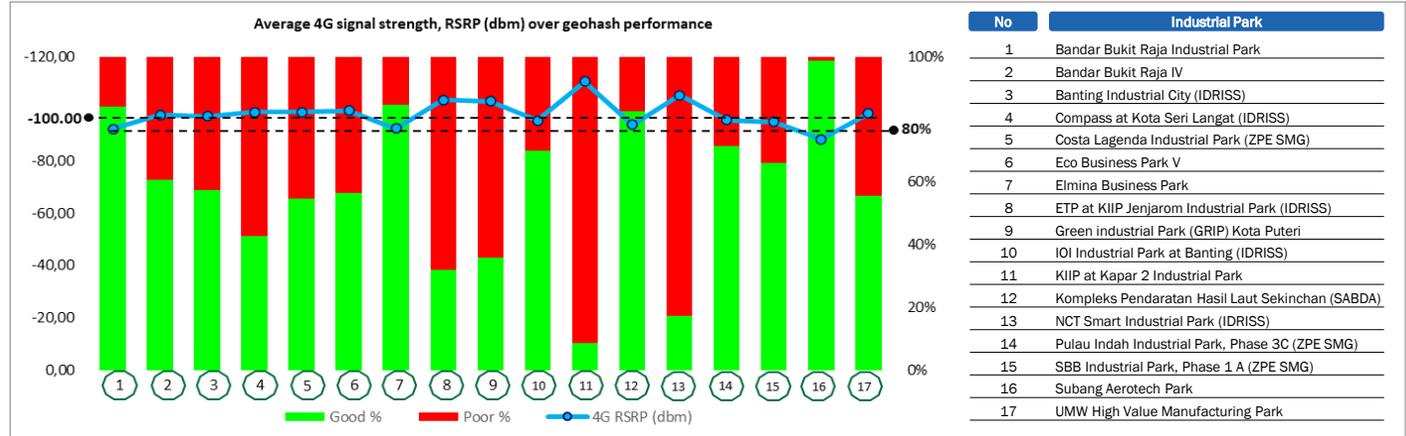
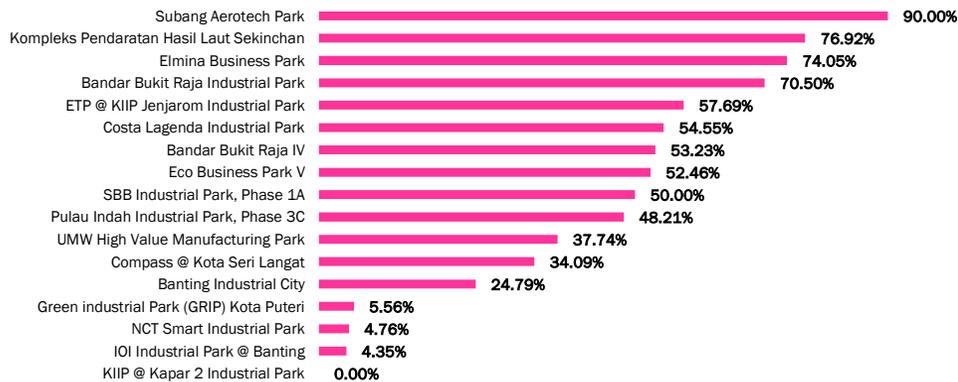
	<p>Policy Visibility and Enforcement Incentives and clear guidelines are necessary for the IoT implementation</p>
	<p>Policy Development The policy is developed for 1-2 years and 6 months dor the initiation</p>
	<p>Collaboration and Engagement Stakeholders and related institutions have an influence on the success of policies</p>
	<p>Standardization of IPs and Regulation They play a critical role in the sustainability and implementation of IoT solutions</p>

Based on-site assessment, 4G coverage on average is fair and only 9 out of 17 industrial parks have 5G

4G is minimum requirement to enable smart services.

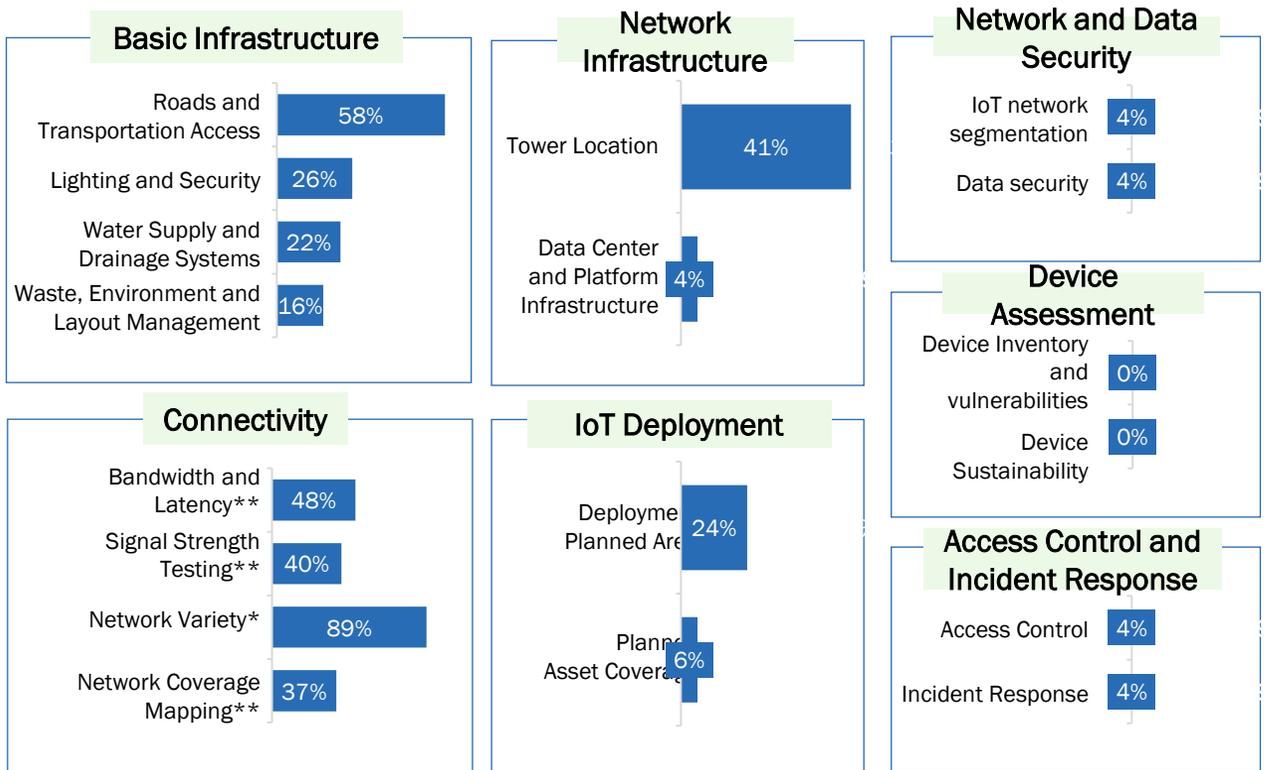


Comparison on 5G covered area against 4G covered area based on geohash level 7



Most of the greenfield industrial parks are still not ready in connectivity and basic infrastructure aspects

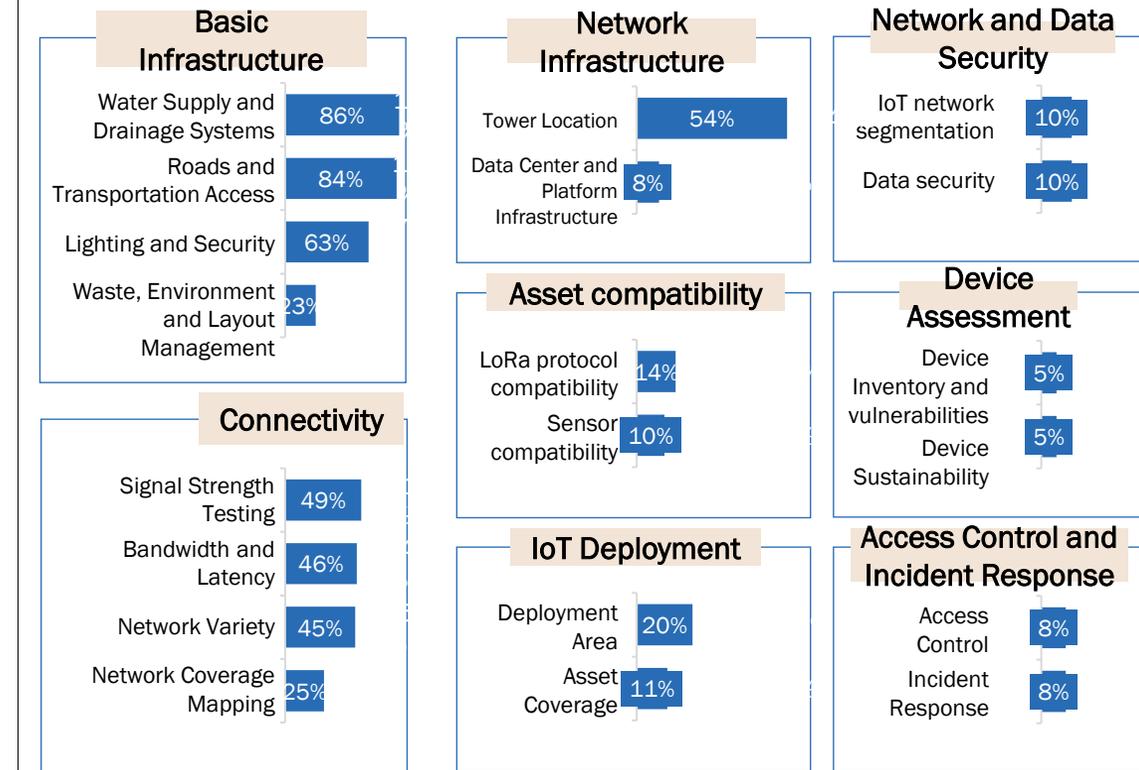
GREENFIELD



of Respondents: 8 Greenfield Industrial Parks

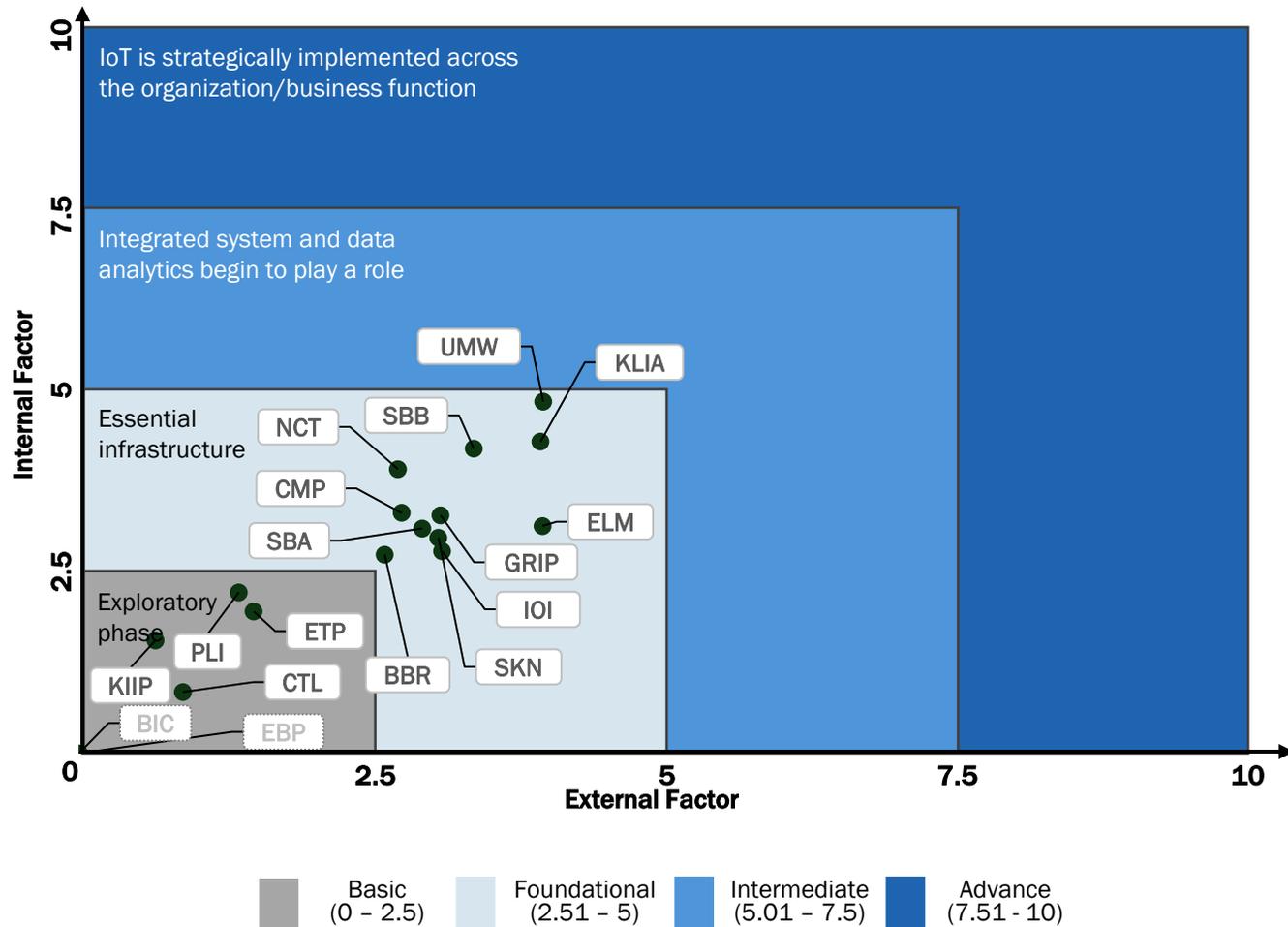
Notes: *SBB already has a fiber optic network ; **IOI, GRIP, KLIA, and SBB have good signal strength, bandwidth, and coverage mapping due to towers located near the IPs

BROWNFIELD



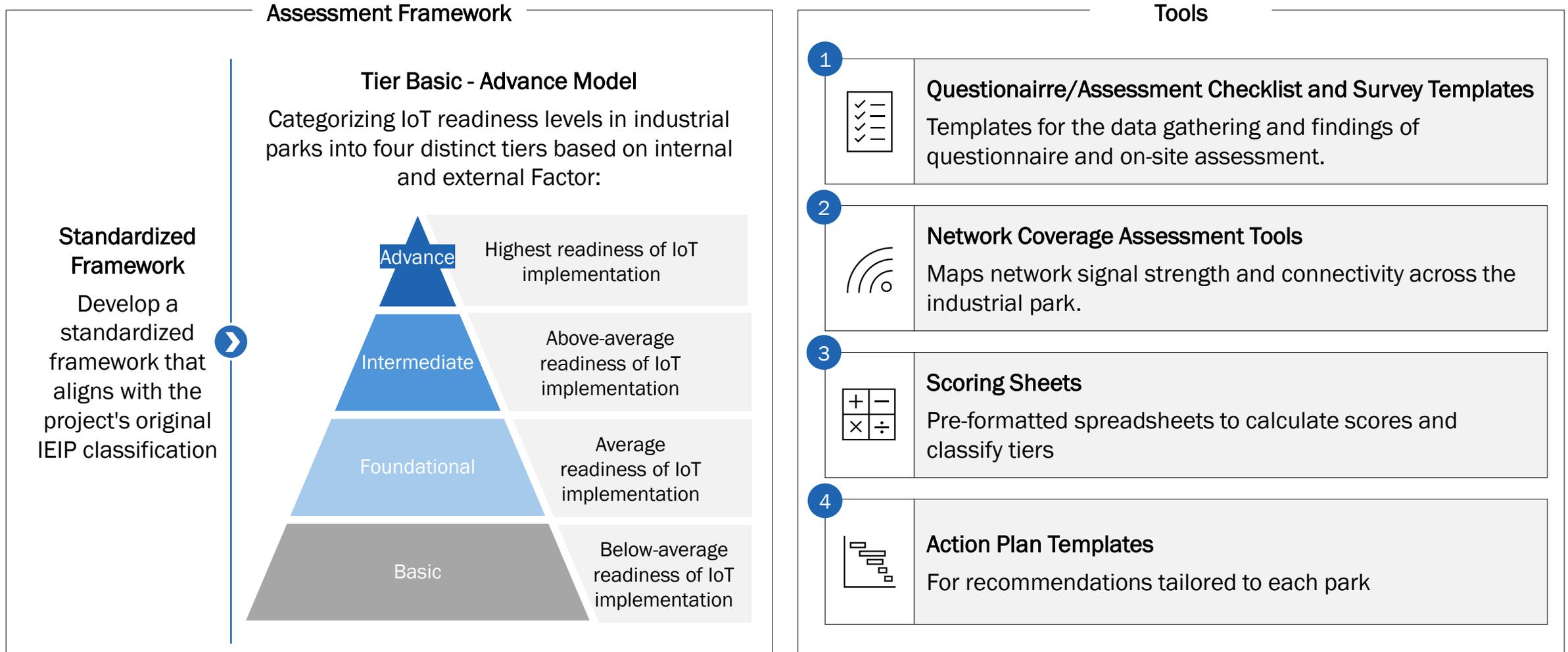
of Respondents: 7 Brownfield Industrial Parks

Based on a comprehensive input gathering, 65% of the industrial parks are within foundational level of IoT- readiness while others are in basic level



No	Industrial Park Name	Code Sign	Internal Factor	External Factor
1	NCT Smart Industrial Park	NCT	3.92	2.74
2	Green Industrial Park (GRIP) Kota Puteri	GRIP	3.28	3.10
3	Elmina Business Park	ELM	3.13	3.98
4	Bandar Bukit Raja	BBR	2.74	2.62
5	Compass at Kota Seri Langat	CMP	3.31	2.77
6	ETP at KIP Jenjarom Industrial Park	ETP	1.95	1.50
7	KIIP at Kapar 2 Industrial Park	KIIP	1.56	0.66
8	IOI Industrial Park at Banting	IOI	2.78	3.12
9	Pulau Indah Industrial Park, Phase 3C	PLI	2.22	1.37
10	SBB Industrial Park, Phase 1A	SBB	4.20	3.39
11	Costa Lagenda Industrial Park	CTL	0.85	0.89
12	UMW High Value Manufacturing Park	UMW	4.85	3.98
13	Subang Aerotech Park	SBA	3.10	2.94
14	Kompleks Pendaratan Hasil Laut Sekinchan	SKN	2.97	3.08
15	KLIA Aeropolis SDN BHD	KLIA	4.29	3.96
16	Eco Business Park V	EBP	N/A	N/A
17	Banting Industrial City	BIC	N/A	N/A

Tools and frameworks



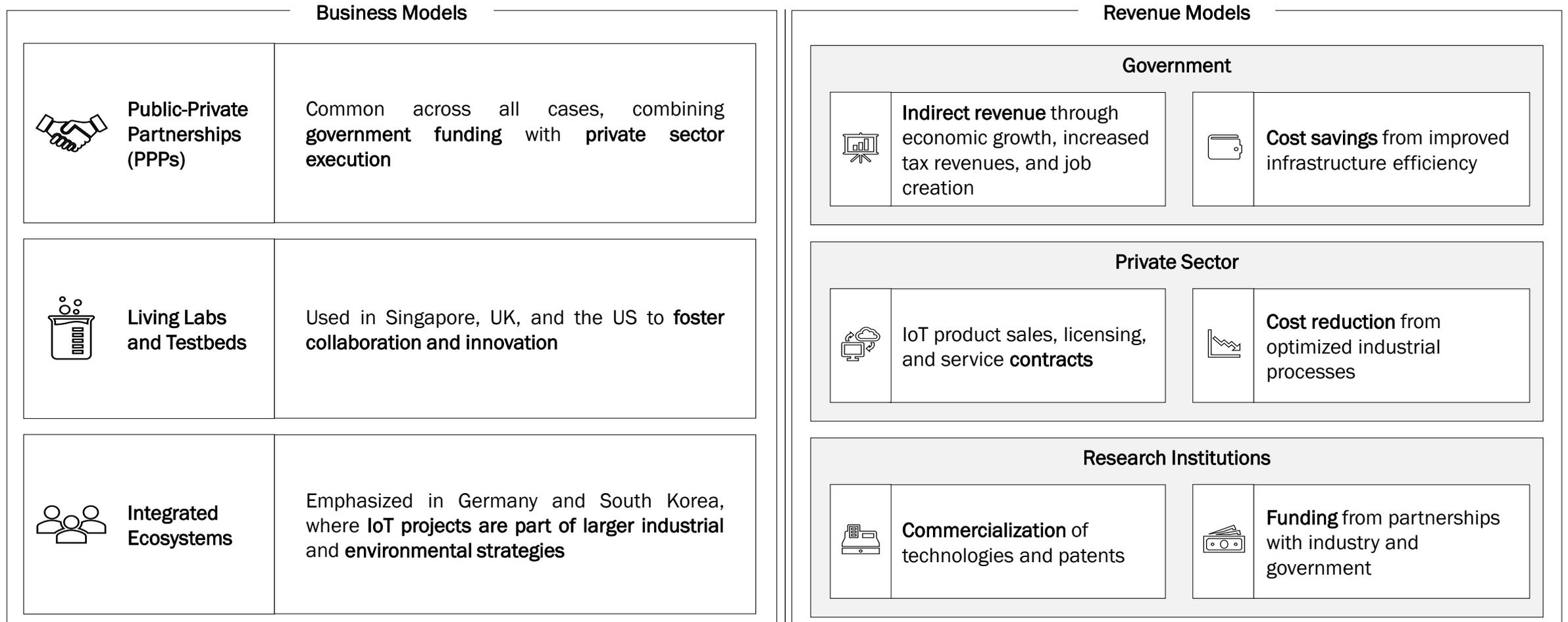
Overall findings, there are gaps in infrastructure, stakeholder engagement, policy, operational, and financial point of view from the 17 industrial parks

Category	Key Gaps	Key Potential Solutions
 Infrastructure	Limited connectivity, basic utilities, IoT device incompatibility	Deploy 5G/broadband, develop smart utilities, adopt modular IoT solutions
 Stakeholder Engagement	Low awareness, limited collaboration, resistance to change	Conduct workshops, establish collaboration frameworks, offer financial incentives
 Policy and Governance	Lack of IoT-specific policies, governance gaps, ESG enforcement	Develop IoT regulations, form governance bodies, integrate IoT with ESG standards
 Operational	Readiness variability, lack of pilot projects, tenant resistance	Roll out pilots in high-readiness parks, provide operational support, demonstrate ROI
 Financial	High costs, unclear revenue models, limited incentives	Use flexible business models, increase funding support, explore data monetization

Five cases in UK, US, Singapore, Germany, South Korea showcase different approaches to IoT intervention based on their national priorities

 Germany Smart Services Initiative	 United Kingdom Glasgow IoT Innovation Hub	 United States of America NIST Smart Cities Framework	 South Korea Smart Green Industrial Complex	 Singapore Punggol Digital District
 Policy Framework Aligning IoT development with the "Industrie 4.0" strategy	 Policy Support Development of innovation hubs and partnerships with the private sector	 Standards Development Creation of a framework to ensure interoperability and scalability of IoT solutions	 Infrastructure Investment Significant funding to modernize industrial parks with IoT and green technologies	 Centralized Planning Integration of IoT into urban planning through government-led initiatives
 R&D Focus Supporting research institutions like Fraunhofer IFF to drive IoT innovation	 Funding Direct investment in infrastructure like the "thebeyond" facility	 Pilot Projects Funding pilot initiatives to demonstrate practical IoT applications	 Environmental Emphasis Incorporating sustainability into IoT implementation	 Incentives Offering grants and support for R&D in IoT and cybersecurity
 Standardization Developing operational standards for IoT in industrial parks	 Collaboration Engaging local startups and tech accelerators for IoT innovation	 Public-Private Partnerships (PPPs) Collaboration between municipalities, tech companies, and academia	 Technology Integration Establishing smart energy platforms and fine dust reduction systems	 Living Labs Establishing testbeds for real-world IoT application testing

From the benchmarking cases, PPP is a common business model in IoT implementation with direct and indirect revenue and efficiency as the benefits



There are six business model options for the potential use cases implemented in both MIP and Non-MIP industrial parks

Use Case	MIP Best Model	Non-MIP Best Model	
	Energy Management	Subscription, Outcome-Based	Pay-Per-Use, Infrastructure Leasing
	Surveillance	Subscription, Hybrid	Pay-Per-Use, Infrastructure Leasing
	Water Management	Outcome-Based, Subscription	Pay-Per-Use, Infrastructure Leasing
	Weather Monitoring	Subscription, Data Monetization	Pay-Per-Use, Outcome-Based

KPI for the IoT implementation in the industrial parks should be developed based on the use cases and related stakeholders

Stakeholder	Energy Management	Weather Monitoring	Surveillance Management	Water Management
 Government	Policy Adoption, Subsidy Utilization, Carbon Reduction	Weather Data Integration, Disaster Response	Security Compliance, Reporting Efficiency	Conservation Compliance, National/State Water Goals
 Telco/Tech Providers	Deployment Success, Revenue, Device Reliability	Installation Rate, Data Accuracy, Revenue	Adoption Rate, False Positive Reduction, Revenue	Leak Detection, Revenue, Customer Retention
 Industrial Parks	Cost Savings, Tenant Adoption, Incident Response	Operational Adjustments, Cost Savings	Incident Response, Reduction in Incidents	Wastage Reduction, Recycling Rate, Cost Savings
 Tenants	Cost Reduction, Usage Tracking, Feedback	Downtime Reduction, Alert Utilization	Safety Perception, Participation in Alerts	Leak Detection Savings, Usage Tracking, Satisfaction
 Other Stakeholders	Community Impact, Investor ROI, Research Outputs	Awareness, Partnerships, Investor Confidence	Public Trust, Safety Metrics, Innovations	Engagement, ESG Reporting, Academic Contributions

Recommendation (1/3)



Establish an IoT-Specific Policy and Governance Framework

Key Actions

Develop Comprehensive IoT Policies:

- Address data privacy, cybersecurity, and interoperability in a cohesive regulatory framework.
- Align policies with international standards like GDPR (General Data Protection Regulation) to attract global investors and partners.

- Government
- IoT Expert

Create a Centralized IoT Governance Body:

- Form a multi-stakeholder task force to oversee IoT implementation, monitor progress, and resolve conflicts.

- Government
- IoT Expert

Integrate Sustainability Objectives:

- Mandate the use of IoT for meeting ESG (Environmental, Social, and Governance) targets, such as reducing carbon emissions and optimizing resource usage.

- Government
- IoT and ESG Expert

Expected Outcome

Clear guidelines and centralized oversight will accelerate adoption, ensure compliance, and align IoT implementation with regional and national goals.



Promote Stakeholder Engagement and Capacity Building

Key Actions

Educate Stakeholders:

- Conduct workshops, seminars, and on-site training sessions to demonstrate IoT benefits and return on investment (ROI) to industrial park operators and tenants.

- Education Agency
- IoT Expert

Enhance Collaboration:

- Facilitate regular communication and collaboration among government bodies, industrial parks, tenants, telco providers, and other stakeholders.

- Government
- Academic Institution

Upskill the Workforce:

- Introduce IoT-focused training programs for park operators, tenants, and local communities.
- Partner with universities and research institutions to drive innovation and create a skilled workforce.

- IoT Expert
- Academic Institution

Expected Outcome

A well-informed, collaborative, and skilled stakeholder ecosystem will drive the successful implementation and adoption of IoT solutions.

Recommendation (2/3)



Design Flexible and Inclusive Business Models

Key Actions

Implement Tailored Models:

- Use subscription and pay-per-use models for high-readiness parks to attract tenants with varying needs.
- Offer infrastructure leasing or outcome-based pricing for low-readiness parks to lower financial barriers.

- Government
- IoT Provider
- Industrial Parks
- Tenants

Incentivize Early Adoption:

- Provide grants, tax incentives, or subsidized rates for early adopters of IoT solutions.

- Government

Monetize Data Assets:

- Develop frameworks to monetize aggregated IoT data by selling insights to external stakeholders, such as logistics companies or weather agencies.

- Government

Expected Outcome

Flexible business models will reduce financial burdens, encourage widespread adoption, and create sustainable revenue streams for industrial parks and IoT providers.



Build a Robust and Scalable IoT Infrastructure

Key Actions

Deploy Connectivity Solutions:

- Expand 5G and broadband coverage to all industrial parks, prioritizing high-readiness parks.
- State to partner with infra and telco providers to implement cost-sharing mechanisms for infrastructure development.

- Government
- MNO/NFP

Develop IoT-Ready Utilities:

- Install smart utilities, such as IoT-enabled energy grids, water management systems, and surveillance networks.
- Use modular infrastructure to enable gradual scalability based on readiness levels.

- MNO/NFP
- IoT Expert
- End User

Enhance Interoperability:

- Standardize IoT systems to ensure compatibility across devices, platforms, and operators.

- Government
- IoT Expert

Expected Outcome

A strong and future-proof IoT infrastructure that enables seamless integration of advanced use cases like energy management, surveillance, and water conservation.

Recommendation (3/3)



Implement Phased Rollouts with Pilot Projects

Key Actions

Prioritize High-Readiness Parks:

- Launch pilot projects in parks that are most prepared for IoT adoption, focusing on high-impact use cases such as energy management and surveillance.

- Government
- IoT Provider
- Industrial Parks
- Tenants

Demonstrate ROI:

- Use pilot project outcomes to showcase measurable benefits, such as cost savings, operational efficiency, and sustainability improvements.

- Government
- IoT Provider
- Industrial Parks
- Tenants

Scale Gradually:

- Leverage pilot project insights to refine strategies for moderate- and low-readiness industrial parks, ensuring a smooth transition.

- Government
- IoT Provider
- Industrial Parks

Expected Outcome

Phased rollouts with pilot projects will build confidence among stakeholders, minimize risks, and create a scalable roadmap for IoT implementation.

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