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MALAYSIA

Selangor Industrial Master Plan (Connecting Clusters)

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Monash University, Malaysia
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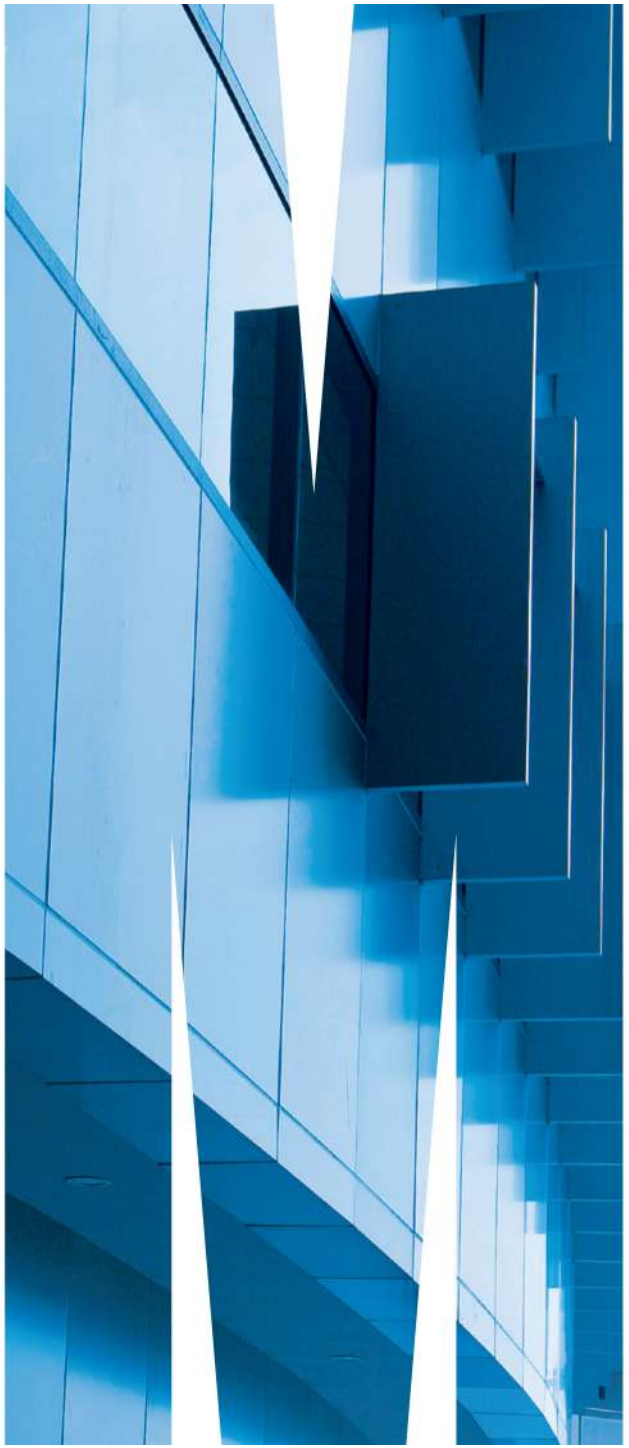

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Outline

- Objectives, clusters defined, methodology and analytical tools
- Cluster findings, including:
  i. Synopsis
  ii. Analysis
  iii. Best practices
  iv. Recommendations
- Survey findings
- Moving forward

Objective & Research Questions

- **Objective:**

  (Re) examine and transform the state's industrial development plan through identification of new infrastructure investments and upgrades on major industry clusters.

- **Research questions:**

  1. Major industry clusters in Selangor?
  2. Gaps in clusters supply chain?
  3. New industries to be developed?
  4. Supporting infrastructure, talent and financial resources?
  5. Investments in regional clusters?

Clusters Explained

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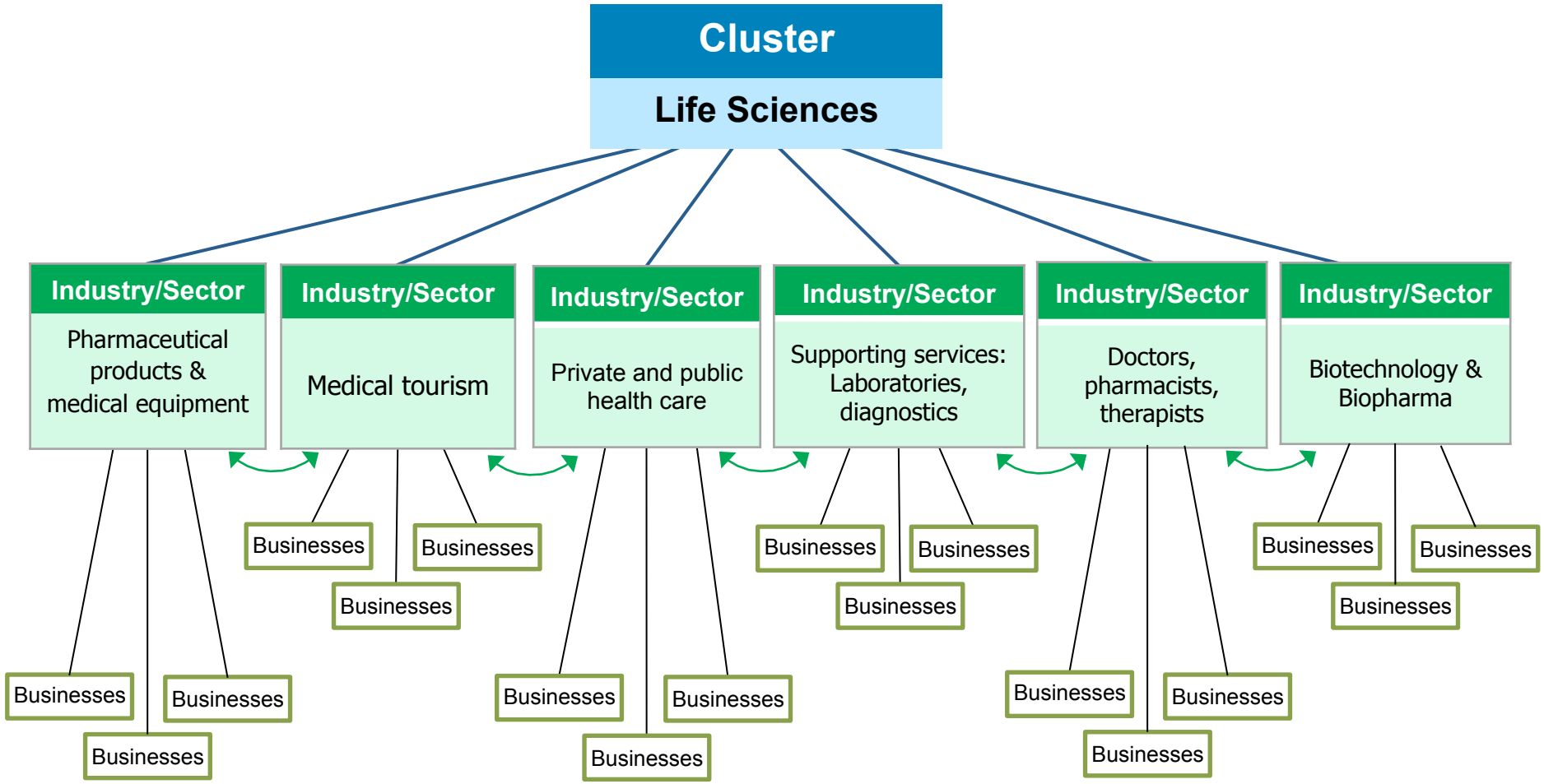
"Clusters are **agglomerations (collections)** of **interconnected** companies and associations. Firms in a cluster produce **similar or related goods or services** and are supported by a range of dedicated institutions located in **spatial proximity**, such as business associations or training and technical assistance providers. Vibrant clusters are home to innovation-oriented firms that reap the benefits of an **integrated support system and dynamic business networks**."

Source: United Nations: Industrial Development Organisations, 2013

Characteristics of Clusters

- Interconnected linkages with interdependence between businesses/industries/sectors
- Common value chains (e.g. production, market), similar labour skill requirements, shared or similar technologies, or knowledge and/or innovation exchange
- Exhibit different stages of development (e.g. existing, emerging or potential)
- National and regional geography

Cluster Analysis – An Example



Why Cluster Development?

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- Reaching out to many industries/sectors/units at the same time
- Provides environment for mutual, collaborative learning & development
- Collective benefits emerging from cluster needs
- Self-sustainability for continuous support
- Provides unique opportunity to address specific needs with specific solutions
- Provides economies of scale and learning
- Increased impact and support from cluster's stakeholders
- Drives economic prosperity (input-output, employment, income, export earnings)

Source: Various

Research Methodology: An Overview

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Phase 1
- Preliminary assessment of established and emergent businesses & industries in the clusters.

Phase 2
- Refine and/or add new list of businesses & industry cluster for further considerations.

Phase 3
- Determine gaps in supply chain that provide the factors of production.

Phase 4
- Conduct DOA, Cluster Map, Location Quotient, Relational Impact Analysis, SWOT and Economic Prosperity Analysis (employment, income, input-output, export earnings)

Phase 5
- Identify and/or prioritise clusters and industries for development

Research Methodology

- Secondary data content analysis (160+ documents)
- **40** one hour + FTF interviews
- **167** online surveys of businesses in clusters. Questions posed:
  i. Nature of their industry
  ii. Local firms and suppliers capabilities
  iii. Factors impacting industry over the next 2-3 years
  iv. Role of the State Government
  v. Cluster with the most growth potential over the next 5 years
- Regional cluster and regional development economic data
- Case studies of global and regional “Best Practices”

Analytical tools

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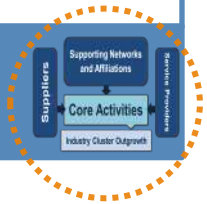
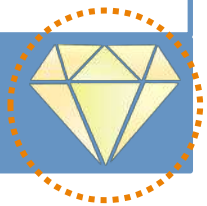
- Identify broad spectrum of stakeholders, supporting networks and outgrowth from the cluster's core activities.

Cluster Map



- Demonstrate the inter-organisational support of the industry and their contributions to the strength and cohesiveness of the cluster.

Diamond of Advantage



- Establish industry's share of regional employment with its share of national employment (LQ > 1).

Location quotient

- Shows important internal strengths and weaknesses and external threats and opportunities affecting cluster's growth.

SWOT analysis

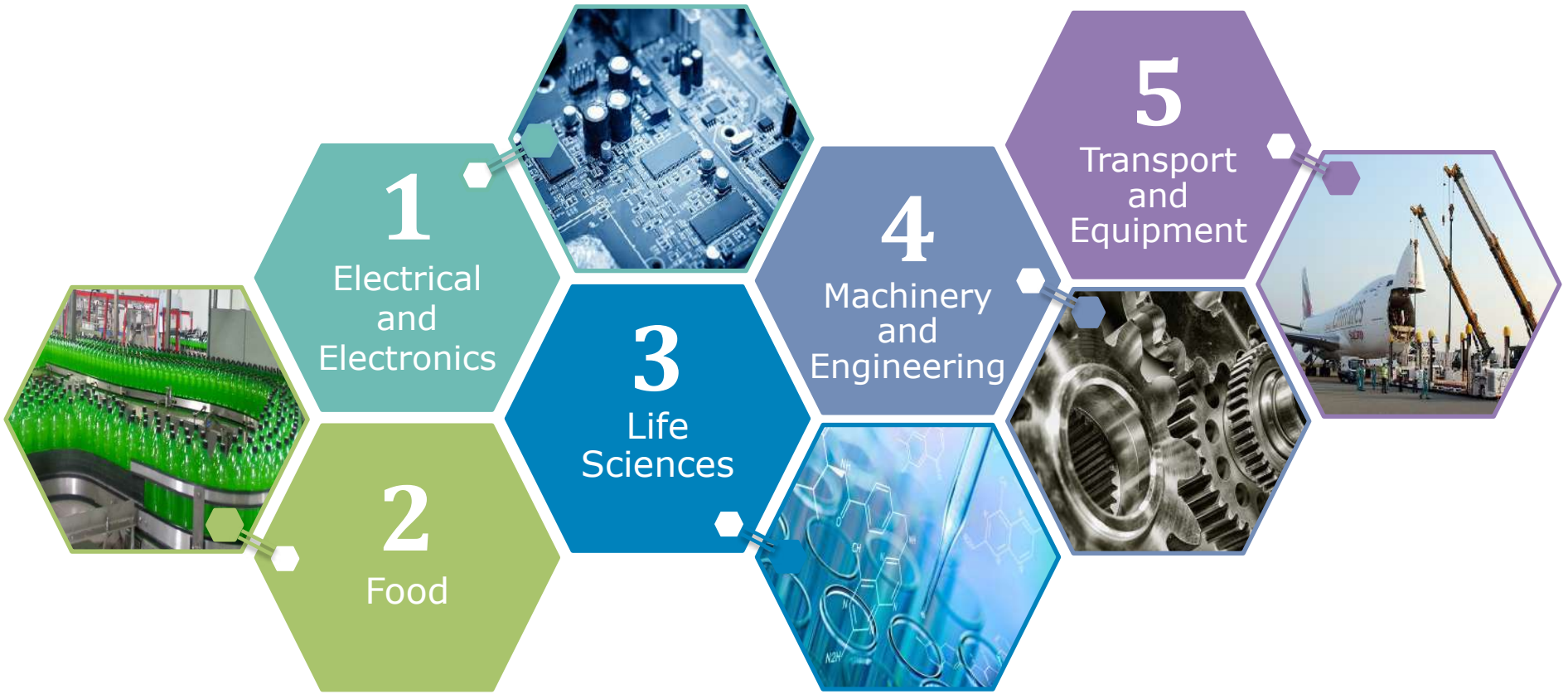
- Establish the strength of interactional relational ties between stakeholders and their distinctive attributes.

Relational impact analysis

- Establish employment, Income, input-output and export earnings growth potential.

Prosperity analysis

Clusters examined in this study



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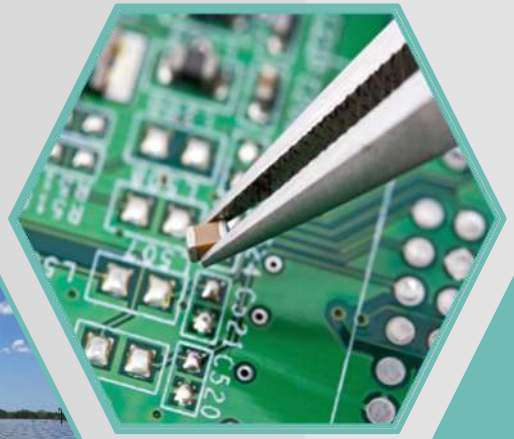

1

Electrical and Electronics

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Cluster Synopsis

The state's historical, structural, administrative and systemic challenges continue to impact the growth prospects in semi-conductor, solar panels & LED manufacture. A decade of missed opportunities, Penang's dominance in E&E, fractured development and an inherent low-value add consumer electronic sector, suggest that:

(a) **Specialised**, **niche targeted infrastructure** spending in design and development through embedded technology, sector & application-specific;

(b) **Export initiatives**, and **OEM** in high end value-add solutions and end products, provide some hope in the region's E&E sector.

1
Electrical and Electronics

1 Electrical and Electronics

Scope

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E&E 1.0

Comprises of the Semiconductors, Solar, Light Emitting Diodes (LED) and Industrial/Integrated Designs sub-clusters.

E&E 2.0

5 more sub-clusters added to the existing four to revitalise the industry, accelerate higher yields and significantly to substitute low value-added assembly operations for high-value added activities.

1 Electrical and Electronics

Cluster Map

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Supporting Networks and Affiliations

- **Educational Institutions**
  - Universities (collaborating with industries on curricula and world class universities)
  - Technical colleges and vocational schools
- **Government Agencies** (e.g. MITI, MIDA, MOSTI, SMEcorp)
- **Industry/Professional Accreditation Groups**
  - Greentech Malaysia - MIMOS
  - Centre of Excellence (CoE) for E&E IC Design - KETTHA
  - Semi-conductor Fabrication Association of Malaysia (SFAM)
  - Talent Development Institution at the Selangor Human Resources Development Centre (SHRDC)

Suppliers

- Test equipment
- Substrate manufacturers
- Wafer producers
- Solar module producers
- Information technology and advanced computing
- Materials suppliers (acid gas and specialty chemicals)
- Moulds, tools, dies, fixtures
- Plastic, ceramic, packaging materials

Core Activities

- Contract manufacturing
- R&D in contextual design
- Developing specialisations and talent
- Synergistic EPP project management (life sciences: medical equipment & devices and transport: automotive)
- Modular manufacturing
- Electricity generation
- Supporting innovation needs and solutions
- Re-engineering developing end applications in clusters (wafer fabrication, substrates and advanced packaging)

Service Providers

- Testing labs
- Failure analysis labs
- IP block marketplace
- Waste management providers
- Refurbishment, retrofitting and parts cleaning
- Electronic manufacturing services

Industry Cluster Outgrowth

- Multimedia Super Corridor (MAC)
- Green Technology Financing Scheme (LED Technology)
- Technology Park Malaysia (TPM), Kuala Lumpur
- Malaysia LED Consortium (MLC)
- CREST Projects

Source: Monash University Malaysia, 2016

1 Electrical and Electronics

Diamond of Advantage

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Factor (Input) Conditions

- State economy
- Access to workforce (skilled and unskilled)
- Proximity to airports, seaports, and haulage
- Good infrastructure and supply of utilities (electricity, water and industrial gas)
- Investment in existing and new facilities manufacturing
- Anchor tenants (MNC's subsidiaries, large local organisations
- Entrepreneurs and technopreneurs
- Supply chain companies (SMEs and Mid-Tiered companies
- National and state intermediary institution coordination

Context for Firm Strategy & Rivalry

- Nation's focus on five (5) new economic corridors
- Perennial structural, administrative and systemic challenges
- Inter-state comparative advantage (Penang)
- Emerging comparative advantage (Johor and Sarawak)
- Shifting development priorities (services)
- Revitalising the E&E (between and within clusters and sub-clusters)
- Pressures in accelerating higher yields

Related & Supporting Industries

- Semi-conductors, LEDs, solar and industrial electronics inter-dependencies
- Sophisticated R&D, creativity, diagnostics, services, logistics
- Retailers of electrical and electronics products and supporting services
- Trainers in solar wafer and cell manufacturing
- Testing, measuring design and certification centres for solar innovation
- Contract manufacturers and design houses

Demand Conditions

- Established, reputable manufacturers
- Access to B2C and B2B local markets
- Proximity to growing regional markets
- Demand in global market
- Location for contract manufacturing and/or OEM
- Long-term relationship with key local and international manufacturers and markets
- Protectionism policies
- Some price sensitivities, especially labour cost

Source: Monash University Malaysia, 2016

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Competitiveness Factors

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No.	Competitiveness Factors Driving E&E Industry	World Ranking				
		Singapore	Taiwan	Malaysia	Korea	China
1	Infrastructure	2nd	11th	25th	14th	46th
2	Labour market efficiency	2nd	32nd	19th	86th	37th
3	Incentives to invest	4th	33rd	10th	106th	44th
4	Low tax rates	27th	58th	65th	30th	13th
5	No. of procedures to start business	10th	10th	10th	32nd	13th
6	Financial market development	2nd	18th	4th	80th	54th
	Overall	2nd	14th	**20th**	26th	28th

Source: The Global Competitiveness Report 2014-2015, World Economic Forum

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SWOT Analysis

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Strengths

- Historical local and FDI in manufacturing
- Large, established E&E manufacturing network structure
- Established reputable manufacturers and MNCs subsidiaries
- Proximity to regional markets
- Access to large local B2C and B2B markets (components, OEMs, distribution & retailing)
- Concentration of related supporting industries within the Selangor/Klang River Basin
- Good infrastructure and supply of utilities (electricity, water and industrial gas)
- Access to workforce (skilled and unskilled)
- Proximity to airports, seaports, and haulage

Weaknesses

- Concentration of lower value adding activities (OEM, test and assembly)
- R&D, engineers
- Low value-added per worker
- Unfocussed and undifferentiated
- Prolonged weaker ringgit
- Over-dependency on certain customers for business
- Capacity building among SMEs
- Engineering talent for R&D
- Marketing, branding and distribution regionally
- Transitioning from middle-tier to large local companies

SWOT

Opportunities

- Higher value wafer fabrication
- Internet of Things (IoT)
- Advanced packaging and design of integrated circuits
- Growth of substrate markets
- Growth of high-end LED market
- 3D imaging censors
- Collaboration through CREST
- Cross fertilisation: Life sciences (equipment and devices) & transportation (automotive)
- Semi-conductors: Demand for memory and logic products and semi-conductor content in automotive and high-end smartphones

Threats

- Price competition, declining margins, and fluctuating global demands
- Global players and clusters (US, Germany, India and China)
- Competition between E&E firms in clusters & lack of cooperation
- Project and not process-driven mindset impacting higher value-adding and yielding activities
- Dominance of Penang E&E clusters

Source: Monash University Malaysia, 2016

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Impact Analysis

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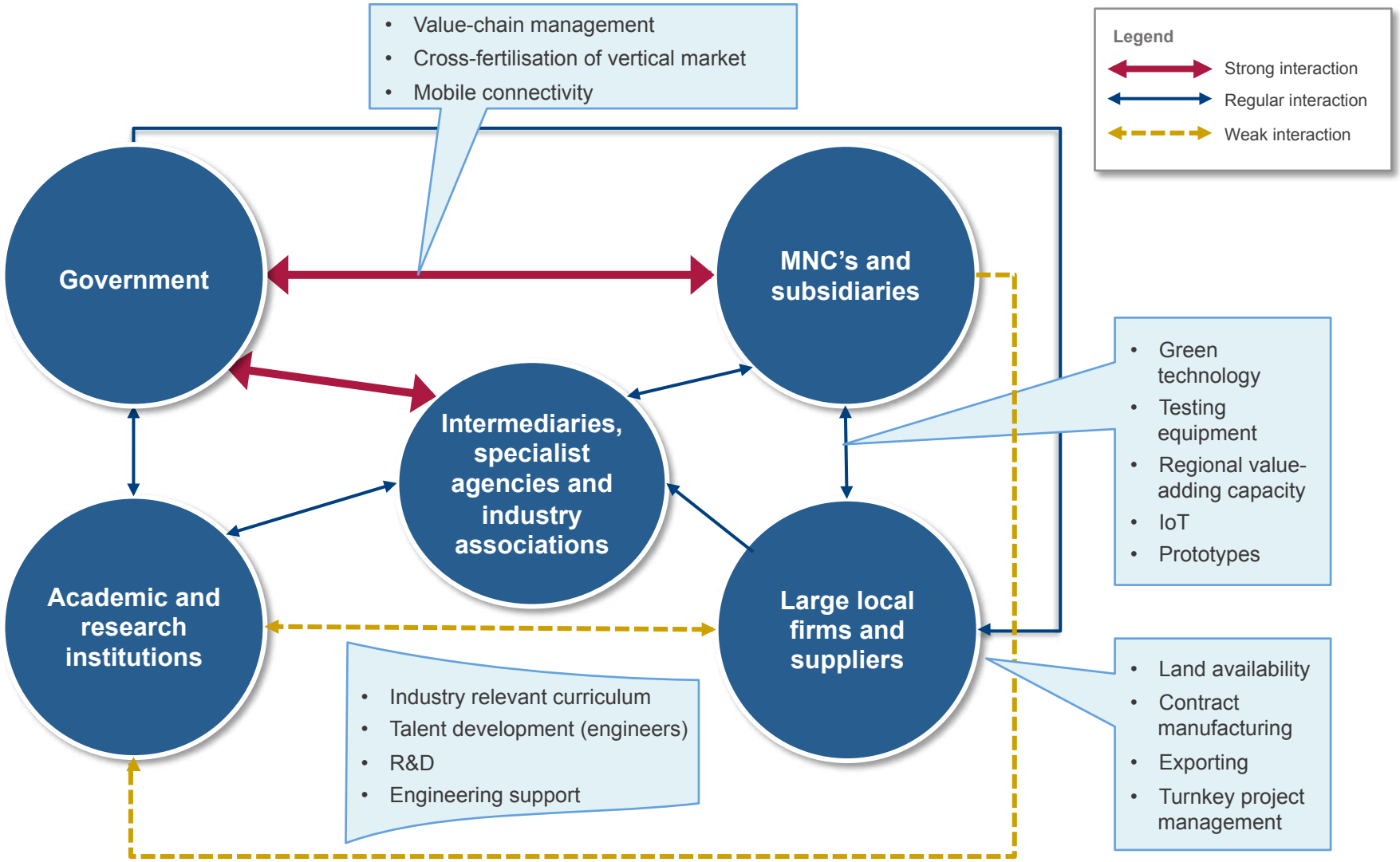

Source: Monash University Malaysia, 2016

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Best Practices

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- Large domestic market, government promotion of industrial policy (tax and financial incentives)
- Targeted R&D development projects, & incentives to accelerate local solar installations.
- Technology spill-over from govt. funded research institutions in semiconductor manufacture, and:
  a) Mutual competition and co-operation in technological emulation among domestic firms
  b) Strategic coupling of regional assets & state mobilising of these assets to negotiate with overseas technology talent for strengthening global linkages
  c) State facilitating the entrepreneurial knowledge adsorption of domestic leading firms.

Source: Various

1 Electrical and Electronics

Recommendations

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- Target **specialised, niche infrastructure** spending in D&D through embedded technology, sector & application-specific solutions (E.g. health care, automotive & aerospace); and OEM in high-end value-adding solutions and end products.
- Set up a **Centre of Excellence for Techno Entrepreneurism,** focusing on science, innovation and business entrepreneurship.
- Position the State as a **regional and global sales and distribution centre.**
- Financial & subsidy **assistance to local consumer electronics manufacturers,** to build design capabilities, improve OEM know-how, undertake R&D, & engagement in collaborative partnerships with MNCs
- **Fill the talent gap** in demand for IC Design Engineers, Embedded System/ Firmware Engineer, RF Engineers and Software Engineers.

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2

Food

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Cluster Synopsis

Changes in **food consumption habit**, growth in **health and wellness food and fast food service**, strength in processed food and the State's position as the nation's regional and global **Halal hub**, will shape the development of the region's food cluster.

2
Food

Scope

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- Revolves around the growing, harvesting and supply of raw materials, processing of food, and the distribution & consumption of processed food.
- includes professional advisors & supporting agents (knowledge and skills, equipment, labour, professional support); infrastructure (transportation, logistics, packaging, warehousing), intermediate operators, retailing & hospitality operators, and export outlets.
- Public sector organisations include government agencies, university/colleges and associations, quality & accreditation bodies

2
Food

Cluster Map

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Supporting Networks and Affiliations

- Food and/or processing affiliations
- Government Agencies
- Educational Institutions
- Industry/Professional Accreditation Groups
- Small Medium Enterprise (SME) Corporations

Suppliers

- Growers, farmers, fishermen (raw materials)
- Packaging and cooking equipment
- Frozen, processed food, food ingredient
- Transportation and logistics
- Cooking utensils, maintenance, cleaning and safety
- Milling and refinery
- Halal (F&B), ingredients pharmaceuticals, industrial chemical materials

Core Activities

- Growing/cultivation and supply of raw materials including transportation
- Processing and packaging
- Sales and marketing (local and overseas)
- Distribution, retailing and wholesaling
- F&B services, tourism
- Halal standards and certification
- Transportation and logistics
- Quality control and certification, research and development, equipment manufacturing and refurbishment

Service Providers

- Food services specialists (food engineers, biochemists)
- Technical advisory specialists (plant packaging, milling and processing engineers)
- Marketing and logistics consultants or providers
- Tourism & hospitality (F&B)
- Research institutions
- Financial Institutions

Industry Cluster Outgrowth

- Pulau Indah Selangor Halal Hub
- PKFZ Halal Flagship Zone

Source: Monash University Malaysia, 2016

2
Food

Number of people employed in accommodation & food services (201-2014)

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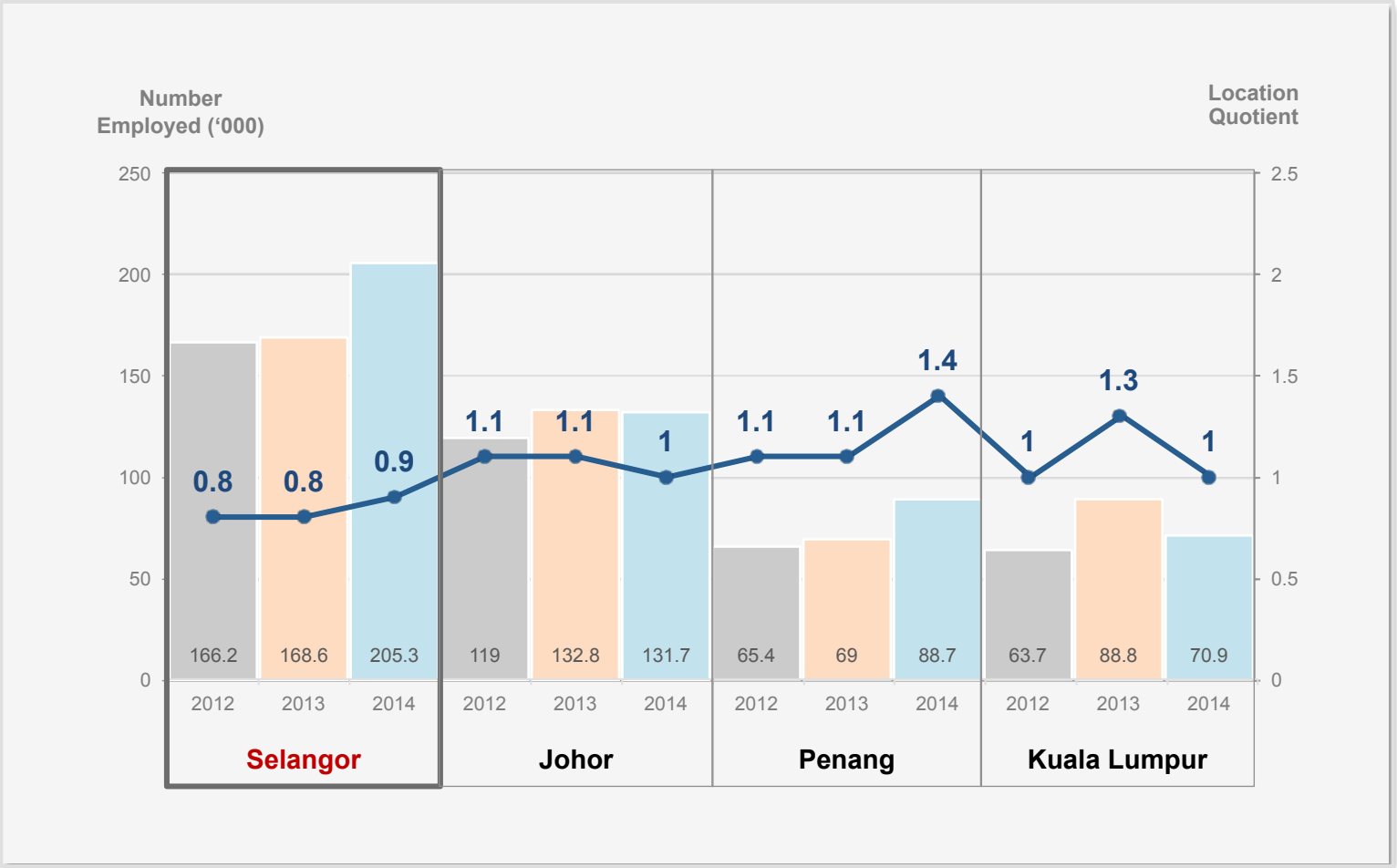
State	Number Employed ('000) in State	% Change	Share of Total Employed in Malaysia	Share of Total Employed in State	LQ
Selangor					
2010	163.8	-	19.1	6.4	0.9
2011	173.3	5.8	18.4	6.6	0.9
2012	166.2	-4.1	17.4	6.0	0.8
2013	168.6	1.4	16.6	6.0	0.8
2014	205.3	21.8	18.5	7.1	0.9
Johor					
2010	104.7	-	12.1	7.3	1.0
2011	109.4	5.5	11.6	7.3	1.0
2012	119.0	8.8	12.4	8.1	1.1
2013	132.8	11.6	13.1	8.5	1.1
2014	131.7	-0.8	11.8	8.3	1.0
Penang					
2010	63.7	-	7.4	8.5	1.2
2011	73.0	14.6	7.7	9.5	1.2
2012	65.4	-10.4	6.8	8.5	1.1
2013	69.0	5.5	6.8	8.8	1.1
2014	88.7	28.6	8.0	11.0	1.4
Kuala Lumpur					
2010	62.2	-	7.3	7.9	1.1
2011	66.8	6.7	7.1	8.2	1.1
2012	63.7	-4.6	6.7	7.7	1.0
2013	88.8	39.4	8.7	10.1	1.3
2014	70.9	-20.2	6.4	8.2	1.0

Source: Department of Statistics, Malaysia

2
Food

Breakdown of Employment and Food Services (2012-2014): Location Quotient



Source: Department of Statistics, Malaysia; Monash University, Malaysia 2016

2
Food

SWOT Analysis

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Strengths

- Feasibility of producing raw materials, ample rich lands for farming activities
- Cultural diversity and demand for range of processed food
- Renowned reputation in exporting spices and spice-related products
- Emerging global halal hub
- Access to established infrastructure and logistic networks
- Modern retail sector

Weaknesses

- Small scale labor intensive operation not competitively viable, especially among SMEs
- Heavy reliance on foreign labor for raw materials production (farming, fishing)
- Lacking technology and innovative processing equipment to move up the value chain
- High dependency on foreign technological machinery knowledge
- Heavy reliance on imports of dairy and poultry products and cereals for processing ingredient

SWOT

Opportunities

- Malaysia is a net importer
- Large global demand for halal certified food
- Increase awareness among consumers towards health, and demand for healthier choices (processed and organic food)
- National plan to focus on food security (paddy and livestock)
- Broadening and international markets
- Strategic shift and realignment towards a service oriented industry (hospitality, tourism and F&B)
- High value adding potential in processed food

Threats

- GST and price sensitivities
- Impending slowdown in economic growth, decline in purchasing power
- Unstable raw materials production due to climate change will undermine state's strength in food processing
- Shift of consumer preferences towards exotic fresh products and fruits will limit opportunities for processed canned fruits and vegetables
- Cheap imports from regional markets

Source: Monash University Malaysia, 2016

2
Food

Best practices

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- Pooling resources, sharing knowledge, entering innovation partnerships with universities and specialist consultants
- Attracting international business, talents and investments
- Improving human, financial and knowledge mobility
- Branding the clusters & creating visibility for members
- Integrating food industry with tourism and culture, specialisation of sub-food clusters with local, regional and global appeal
- Becoming international competitive to compete domestically in processed food
- Solid infrastructure (Advanced cold chain system for frozen & refrigerated products)

Source: Various

2
Food

Region's Value Proposition - Food Sector

Source: Monash University Malaysia, 2016. Adapted from Lee, B. 2016 "Promotion Policies for Food Industry Cluster in Korea."

2
Food

Recommendations

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- Clusters developed around: **(1) processed, (2) health and wellness, and (3) local and traditional food**, appealing to the manufacturing food economy.
- Targeted, **selective funding on export and promotional initiatives**, to increase competitiveness.
- **Learn** from the large and established, form cooperatives, and work with institutional mechanisms.
- **Leverage the Halal Hub** potential to include SMEs, processed food and hybrid areas
- **Strengthen processing machinery and equipment manufacturers**, reduce import substitution, tying multiple manufacturing platforms & manufacturing advanced, customised machinery

Source: Various

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3
Life Sciences

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Cluster Synopsis

How well the State **build and leverage** from its **existing, vast healthcare infrastructure** while having the confidence and wisdom to increase R&D funding, address talent demand, improve labor productivity, and access to equity funds, will provide the necessary impetus to develop an **emerging regional life sciences cluster**.

3 Life Sciences

Scope

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- Brings together “scientists, health, institutions, hospitals and government (PWC, 2014)
- Private sector companies include pharmaceuticals, pharma biotech, medical devices, diagnostics companies & medical tourism.
- Indirect support includes businesses providing essential commercialisation support (e.g. capital, information technology business expertise, services, networks & credibility.)
- Public sector organisations include various government agencies, medical research affiliations, accreditation bodies.

3 Life Sciences

Positive Tell-tale Signs for Cluster Development

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- ✓ 10 public hospitals in Selangor, 1 in KL.
- ✓ 31 private hospitals in Selangor, 27 in KL
- ✓ 9 out of 10 MNC pharmaceutical companies located in Selangor & KL
- ✓ 47 institutions offering LS courses located in Selangor & KL
- ✓ 22 medical devices companies located in Klang Valley
- ✓ In 2013, More than 770,000 medical tourists, and RM680 million in medical tourism receipts.
- ✓ 2 million medical tourists, generating 10% of the nation's annual revenue growth by 2029
- ✓ 15% of Malaysian population will be elderly by 2030

Source: Various

3 Life Sciences

Life Sciences PCT Applications
Selected Countries of Origin

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Country of Origin	Technology Area	2009	2010	2011	2012	2013	2014
Malaysia	Biotechnology	7	16	10	17	21	17
	Pharmaceuticals	9	18	13	17	11	16
	Food Chemistry	6	8	7	10	11	12
	Medical Technology	7	15	14	11	9	8
Singapore	Biotechnology	25	35	49	30	51	69
	Pharmaceuticals	20	32	31	26	25	41
	Food Chemistry	7	10	3	4	5	5
	Medical Technology	33	37	56	39	34	52
China	Biotechnology	79	118	178	259	268	292
	Pharmaceuticals	214	248	321	408	408	479
	Food Chemistry	38	44	44	75	76	83
	Medical Technology	159	178	254	387	381	599

Source: World Intellectual Property Organizations, 2015

3 Life Sciences

Cluster Map

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Supporting Networks and Affiliations

- Medical Research Affiliations
- Government Agencies
- Educational Institutions
- Industry/Professional Accreditation Groups

Suppliers

- Medical devices and equipment
- Pharmaceuticals and therapeutic drugs
- Public and private hospitals (doctors, nurses, technicians, researchers)
- Specialists, diagnosticians, technicians and researchers
- Infrastructure providers (hospitals and leasing)
- Advanced computing in medical & biotechnology
- Food chemicals and nutraceuticals

Core Activities

- Production of off-patent generic and herbal products
- Manufacture of medical equipment and devices
- Treatments
- Clinical trials
- Medical tourism, travel and wellness
- R&D, innovations, patents and commercialisation
- Health policies, reforms and medical education

Service Providers

- Hotels, post-recovery and wellness centres
- Specialised medical and non-medical services
- Facilities and health park management
- Local and international transportation
- Life sciences hospitality, specialists, consultants, contractors, outsources and agents

Industry Cluster Outgrowth

- Health Care Metropolis (Healthcare and Bioscience – Selangor)
- Clinical Research Centre (CRC), Integrated Residential Care Centres and Retirement Villages (to be established)

Source: Monash University Malaysia, 2016

3 Life Sciences

Diamond of Advantage

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Context for Firm Strategy & Rivalry

- Strong local presence among established healthcare providers
- Role of life sciences in national economy (under NKEA for projects, GNI & employment)
- Competitive advantages between private and public healthcare providers, and within
- Inter-state (Penang) and regional competitors
- Access to skilled workforce and retention

Factor (Input) Conditions

- State economy
- Access to skilled workforce (medical doctors, specialists, diagnosticians, clinicians)
- Proximity to teaching and research medical universities
- Investment in life sciences
- Concentrated of healthcare services, "clusters" in Klang Valley

Demand Conditions

- Concentrated market with increasing urbanisation
- Demand for healthcare from public and private health hospitals
- Regional market demands
- Ageing population, health-conscious generations and lifestyle choices
- Government's role in life sciences (regulations, dispensing, reimbursements, patents, R&D, healthcare travel)

Related & Supporting Industries

- Private and public hospitals, clinicians and physician groups
- Education and research medical schools and universities
- Medical equipment, devices and technology producers
- Suppliers, distributors, innovators (R&D)
- Laboratories, diagnosticians
- Cosmetic healthcare and/or healthcare hospitality and tourism

Source: Monash University Malaysia, 2016

3 Life Sciences

Breakdown of employment in Human Health & Social Services (2012-2014)

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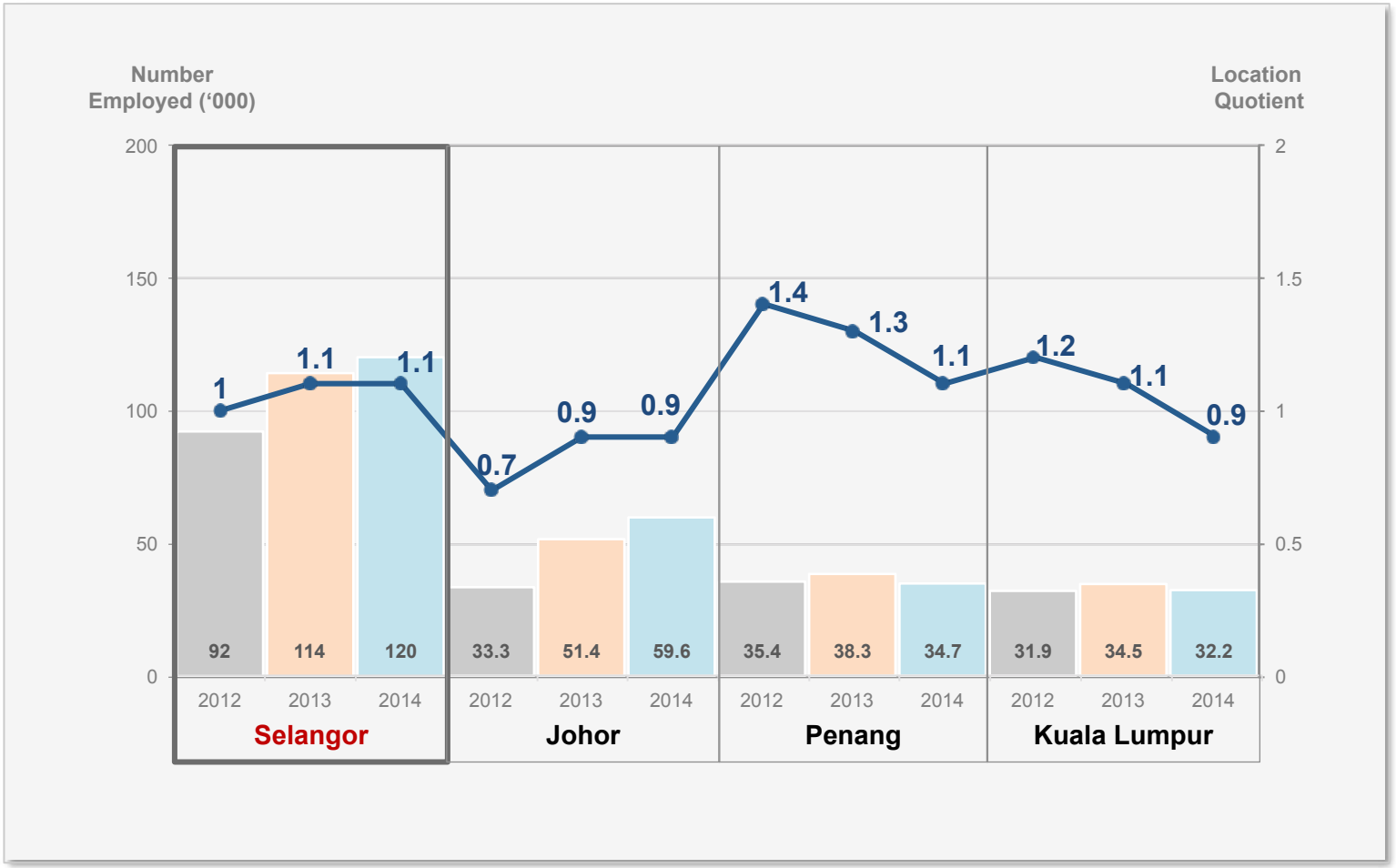

Source: Department of Statistics, Malaysia; Monash University, Malaysia 2016

3 Life Sciences

Breakdown of employment in Professional Scientific & Technical Services (2012-2014)

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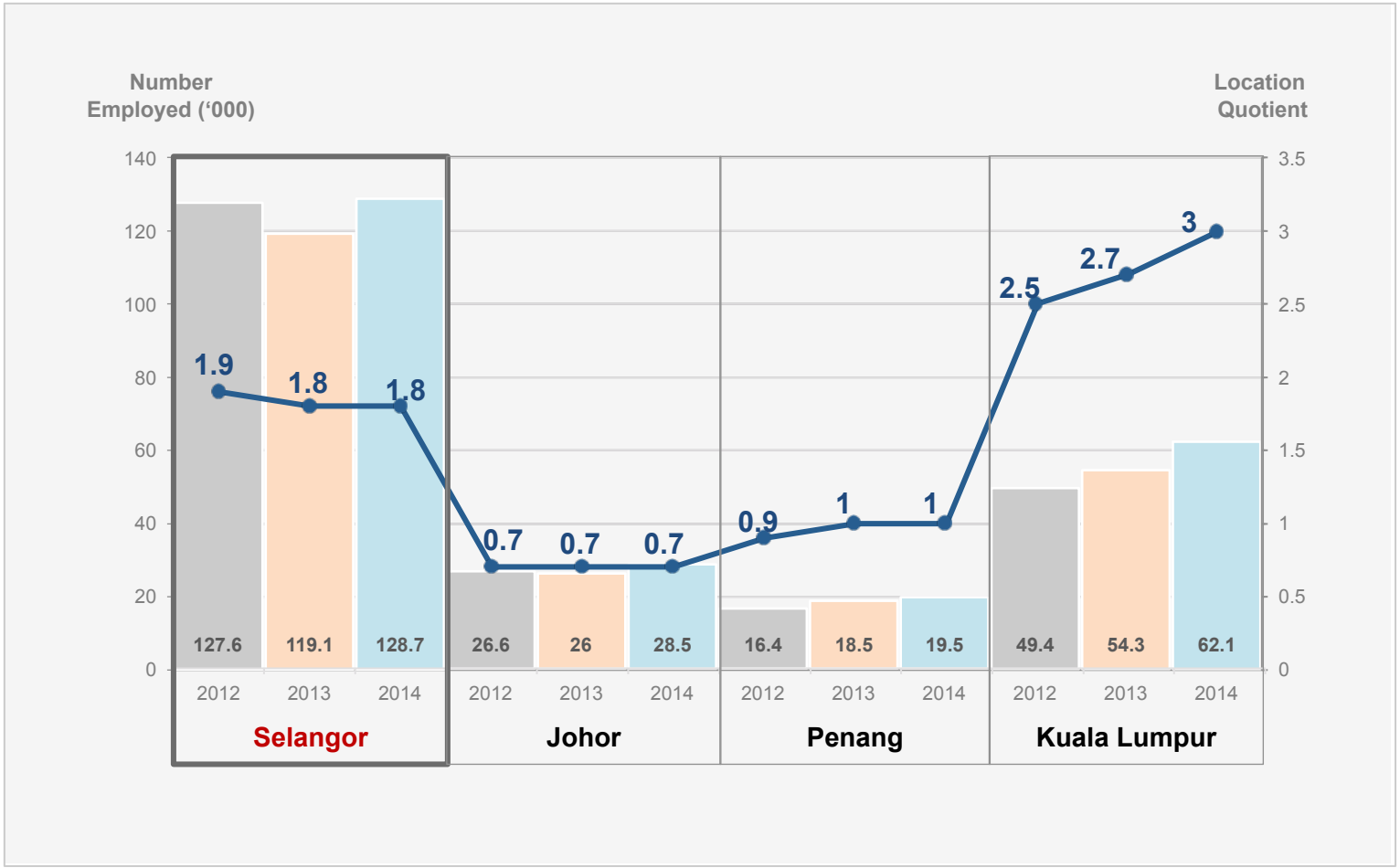

Source: Department of Statistics, Malaysia; Monash University, Malaysia 2016

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Impact Analysis

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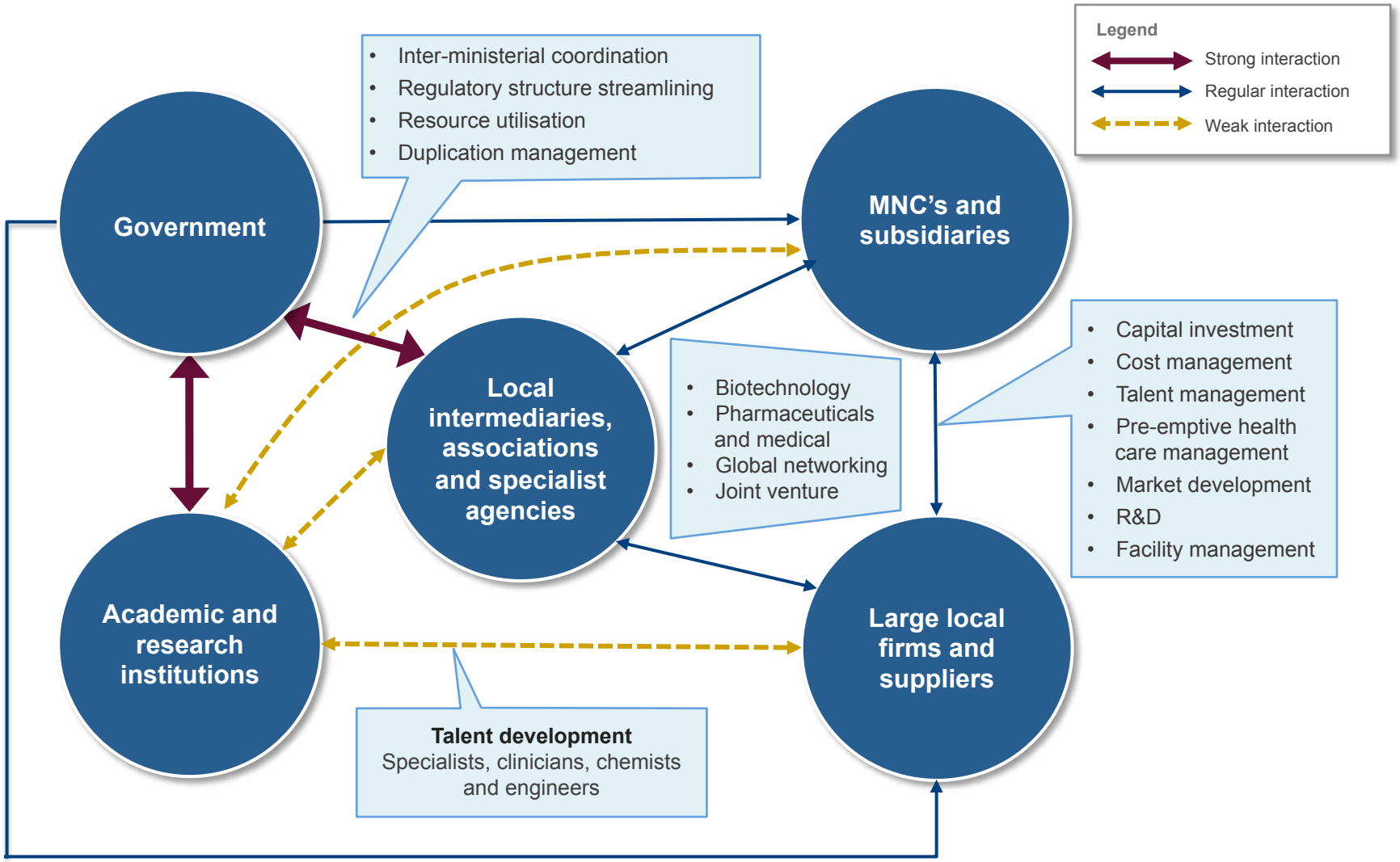

Source: Monash University Malaysia, 2016

3 Life Sciences

Best Practices

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- Knowledge, talent & human capital & highly educated workforce
- Cities with bustling urban environment, anchored by top universities offering cutting edge research programs, co-located with large independent university or university operated teaching hospitals
- Serial entrepreneur, industry leaders, incubators and accelerators, seed funding, private venture & venture capital
- Excellent R&D infrastructure, fast growing biotech start-ups, wide range of medtech companies, Large med tech companies with EU HQ
- Abundance of laboratory & manufacturing space equipped to produce a myriad of drugs, therapies & devices
- Support of an industrial base comprising of established businesses

Source: Various

3 Life Sciences

Recommendations

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- Develop a Cluster strategy on the back of the State's network of **healthcare infrastructure**
- Address the low **number of PCT applications**, via established manufacturers with strong R&D and global manufacturing presence.
- Address **quality talent gaps** in pharmaceutical manufacturing (chemists, pharmacists, biotechnologists), health care tourism (surgeon, anaesthesiologist, internal medicine), and in clinical trials (principal investigator and biostatistician).
- **Focused key development initiatives** to include: (a) Biohalal medicine; (b) Technology transfer in SUD; (c) Integration between health care, medical tourism & food sector; (d) Postgraduate medical training; (e) Incentives for BigPharma from Europe to relocate
- Forming a **life sciences committee**

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4

Machinery and Engineering

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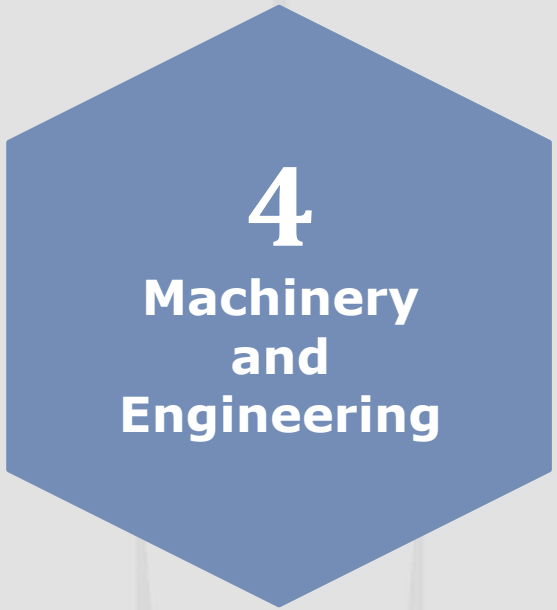
Cluster Synopsis

The success of the region's M&E cluster will be shaped by the State's ability and capacity to develop **core competencies in selected M&E segments** (e.g. custom – made machinery and equipment for power generation, specific and specialised processing) that **leverage off specific applications** (e.g. E&E, aerospace, automotive and medical), through **targeted labor development and R&D and design**, capitalising on the region's strong ESI infrastructure and heritage provided by SMEs.



4 Machinery and Engineering

Scope

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- The M&E cluster manufactures a range of custom-made machinery and equipment for power generation, specific and specialised processing, metalworking and general industrial activities.

- Industries support a range of direct and indirect engineering services covering machining, metal casting, sheet metal working, general fabrication, design, development and prototyping, testing and certification services.

4 Machinery and Engineering

Cluster Map

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Supporting Networks and Affiliations

- Government Agencies
  - Research institutes (design and development of prototypes of machinery and equipment to address localised mechanisation requirements (e.g. SIRIM, MARDI, MPOB, Malaysian Rubber Board and FRIM)
- Industry/Professional Accreditation Groups
  - Machinery & Equipment Manufacturers Association of Malaysia (MEMA)
  - Malaysian Mould & Die Association

Suppliers

- Machinery & equipment manufacturing companies (specialised and general industrial)
- Parts and components suppliers
- Producers of advanced materials handling systems and packaging machinery
- Mould and die and manufacturers
- OEM, trades and distributions

Core Activities

- Production of equipment and machinery (general and specialised for E&E, oil and gas industry, cranes and elevators)
- Parts and components manufacturing
- Design and development (D&D)
- Manpower training and development
- Adaptation & modification for specific industries
- Software development assembly
- System integration, and testing and calibration
- Maintenance, support and engineering services

Service Providers

- Engineering support services on casting, forging, metal forging, iron and steel casting, heat treatment, surface treatment, metal stamping & shaping and metal fabrication

Industry Cluster Outgrowth

- Zurah Industrial Park
- Rasah Machinery and Equipment Technology Center (SIRIM)
- Centre of Execellence for Machine Vision (Vitrox Technologies Sdn Bhd)

Source: Monash University Malaysia, 2016

4 Machinery and Engineering

Breakdown of Employment in Manufacturing (2010-2014)

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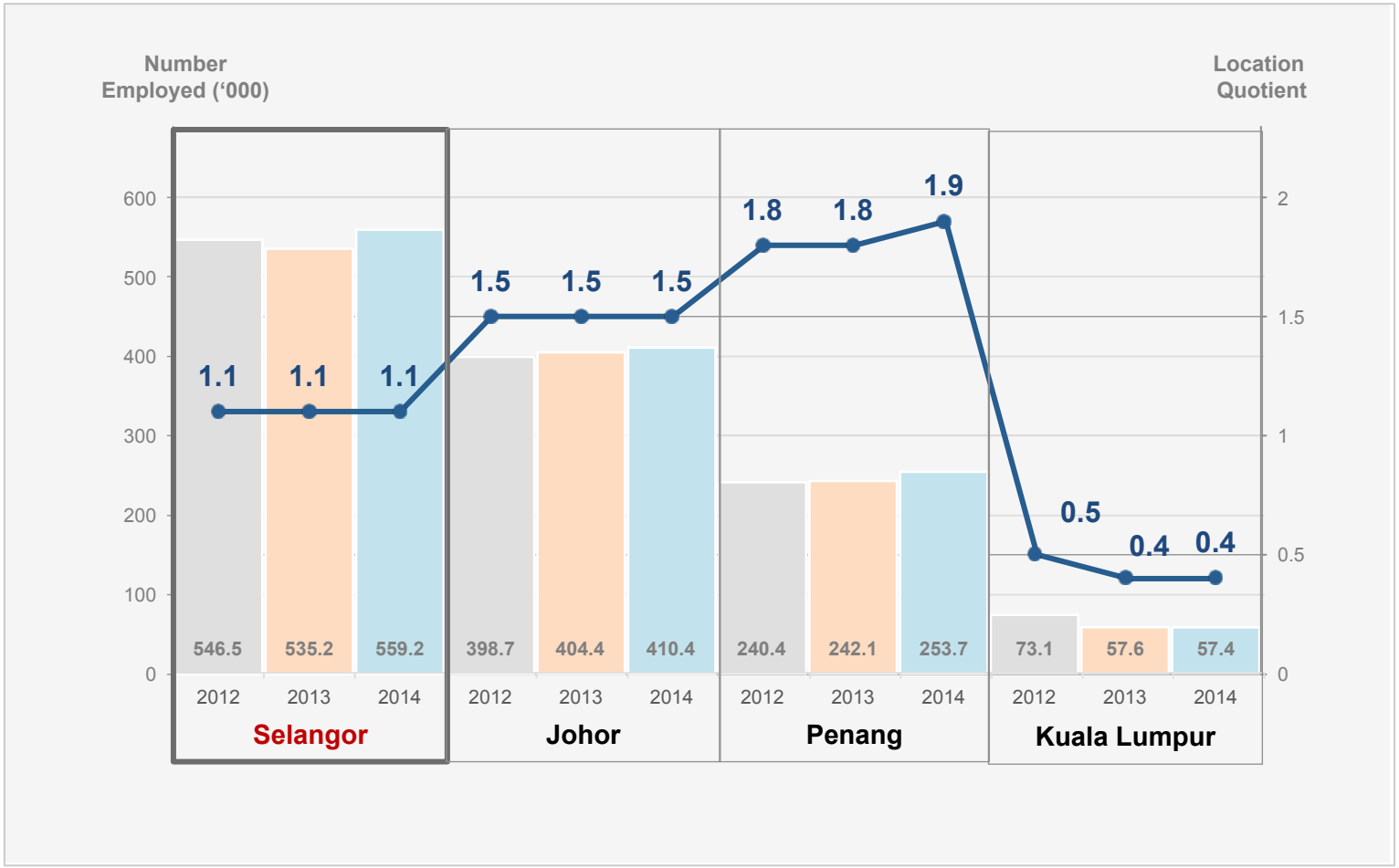

Source: Department of Statistics, Malaysia; Monash University, Malaysia 2016

Productivity Performance of the Manufacturing Sector

Export-oriented Subsectors	Domestic-oriented Subsectors
• Chemicals & chemical products	• Basic metals
• Palm oil	• Pharmaceuticals
• Refined petroleum	• Machinery & equipment
• Electrical & electronics	• Transport equipment
• Textiles	• Food products
• Wearing apparel	• Other non-metallic mineral products
• Wood & wood products	• Fabricated metal products
• Paper & paper products	• Beverages
• Rubber & plastic products	

Source: Malaysia Productivity Commission Corporation, 2014/2015

4 Machinery and Engineering

SWOT Analysis

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Strengths

- Strong diversified industrial base
- Region's proven machining and engineering tradition
- Major, proven systems integrators across M&E segments
- Networks of ESIs among SMEs
- Strong local demand for M&E and ESI services
- Specialised M&E applications in established manufacturing industries
- Networks of business entrepreneurs and a dynamic SMEs business community

Weaknesses

- Continuous dependence on imports
- Intellectual property protection
- R&D and technological capabilities
- Small domestic market limits development of industry with diseconomy of scales
- Shortage of high level technical workforce (engineers & technicians)
- Limited support services for M&E (focusing instead on E&E and automotive industries
- SMEs limited financial resources on R&D & commercialisation
- Unattractive incentive packages
- No independent local service providers of testing facilities for complete machinery & systems

SWOT

Opportunities

- Regional market demands for machineries
- Measures to foster the development of individual fields of application to develop cross-industry competence creation
- Design and development of prototypes for localised mechanisation requirements
- Fabrication of customised components and system integration
- Assembly, testing, evaluation and calibration of machinery
- Promotion of industry training and exchange processes between universities and companies
- JV opportunities with foreign companies through technology sharing and transfer
- Capacity building among SMEs

Threats

- Strong regional players (Singapore, Thailand, China and India)
- Difficulties in attracting producers of high technology M&E from developed countries to expand operations in Malaysia
- Liberalisations and cheap imports
- Compliance with international standards and inability to compete internationally
- Compliance with quality of production standards, not just safety (local) standards, limiting exports

Source: Monash University Malaysia, 2016

4 Machinery and Engineering

Best practices

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- Cross-industry competence creation, measures to foster the development of clusters in individual field of technology, cutting-edge cluster competition
- Complete value chain coverage through numerous research institutions, close proximity to supplier industries, strong industry base to promote innovation and R&D excellence.
- Dynamic labor market, dual education system (classroom-based and on-the-job training over a period of 2-3 years geared specifically to meet industry need).
- Creating investment stability and investment project financial incentives.

4 Machinery and Engineering

Recommendations

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- ✓ Create **regional, cross-industries** competencies & specialisations
- ✓ Set up a **State's-based R&D centre** in M&E services
- ✓ Offer more & better **vocational hands-on** training and development programs
- ✓ Revisit Incentives for **investment projects** for technologically start-ups & existing business
- ✓ Build up a **workforce through subsidies**
- ✓ Develop a marketing and branding "**Made in Selangor**" strategy
- ✓ Target **specialised areas** (e.g. mould and dies, machining, metal casting, surface engineering.)

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5

Transport and Equipment

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Cluster Synopsis

The State's ability to **leverage existing value-add contributions to regional and global transport businesses supply chain**, and moving beyond a market-domestication agenda, will impact the development of the transport equipment cluster.

Specific and purpose-driven infrastructure development activities could focus on advanced MRO, modular engineering, EEV, Aerospace City (Subang), Northern Automotive hub, "last mile connectivity" & the transport and logistic service hub.

5
Transport and Equipment

Scope

- Private sector companies that participate in the automotive, aviation, shipping and rail sub-clusters.
- Primarily involved in maintenance, repair, overhaul, building & constructing (ships), provision of engineering services with differentiated pattern of innovation and technological change.
- Indirect support includes businesses that provides workforce development & training and a loose network of related support services and auxiliary services

5
Transport and Equipment

Cluster Map

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Supporting Networks and Affiliations

- **Government Agencies**
  - Department of Civil Aviation
  - National Space Agency of Malaysia
  - National Maritime Council
  - Maritime Transport
- **Industry/Professional Accreditation Groups**
  - Malaysian Automotive Association
  - Malaysia Ship-owner Association
  - Malaysian Marine and Heavy Engineering Berhad (MHB)
  - Aerospace Malaysia Innovation Centre
- **Educational Institutions**
- **International/Professional Accreditation Groups**

Suppliers

- Transportation companies
- Aircrafts, vessels and rail builders
- Modular technology suppliers
- Maintenance, repair and overhaul companies
- Transportation components, replacement parts, equipment and devices manufacturers
- Researchers, designers and engineers
- Training and recruitment agencies

Core Activities

- Maintenance, repair and overhaul (MRO), analysis, design, building and constructing of light aircrafts and vessels
- Repairs and conversion
- Equipment manufacturing, support and engineering services
- OEM, components part manufacturing, modification and upgrade

Service Providers

- Malaysia Airports Holdings Berhad
- Transportation authorities
- Local and international transportation feeders, warehousing
- Specialised transportation services
- Insurance and legal
- Banks/financial institutions

Industry Cluster Outgrowth

- Automotive Science Park / Proton City (Kuala Selangor)
- Aerospace City, Subang

Source: Monash University Malaysia, 2016

5
Transport and Equipment

Customer Support & MRO – Established & Emergent Clusters

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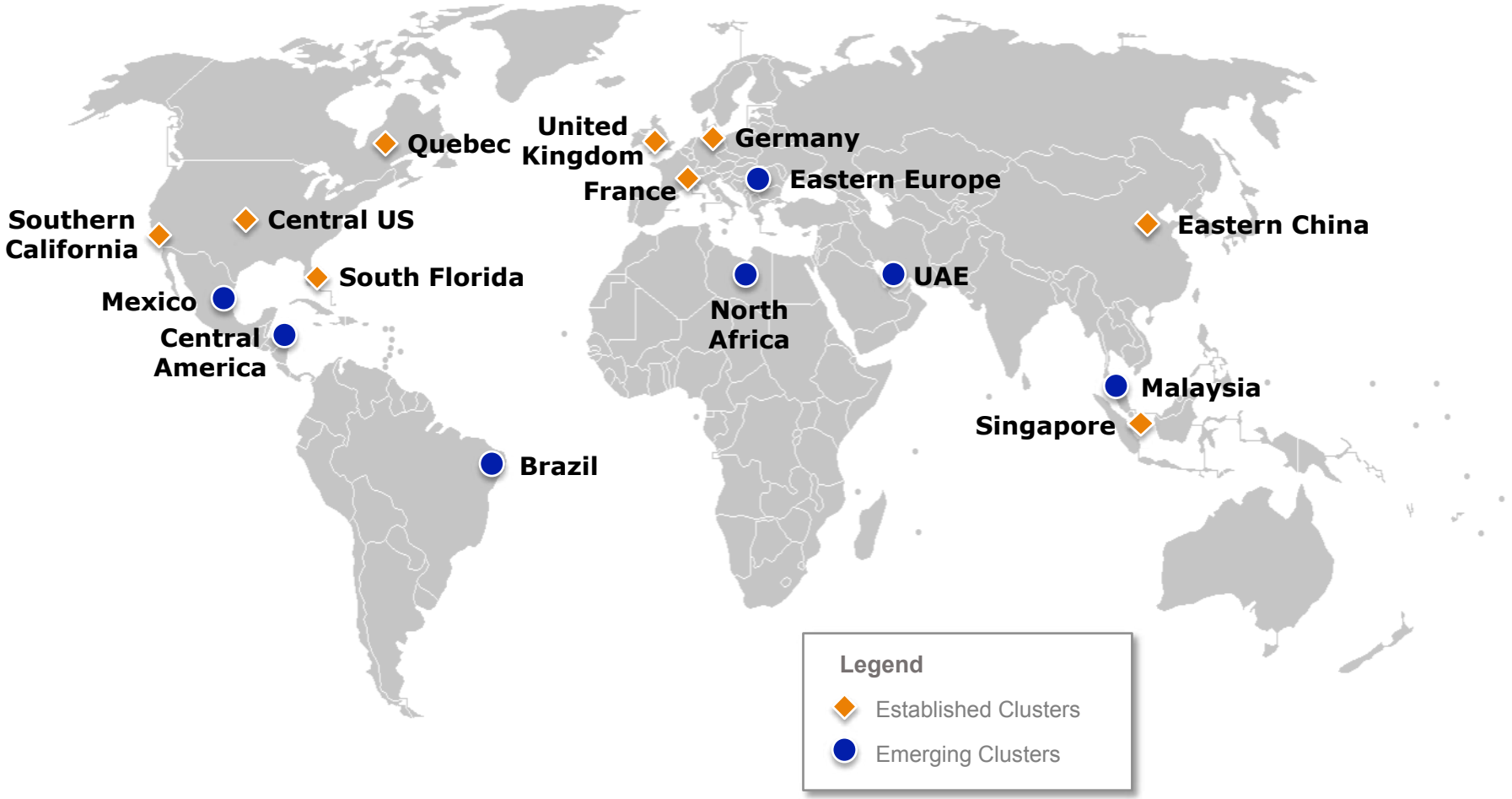

Source: Ling, 2014, "Aerospace Globalisation – The Next Wave Presentation"

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Transport and Equipment

Spatial Mapping Automotive Sector – Northern Selangor

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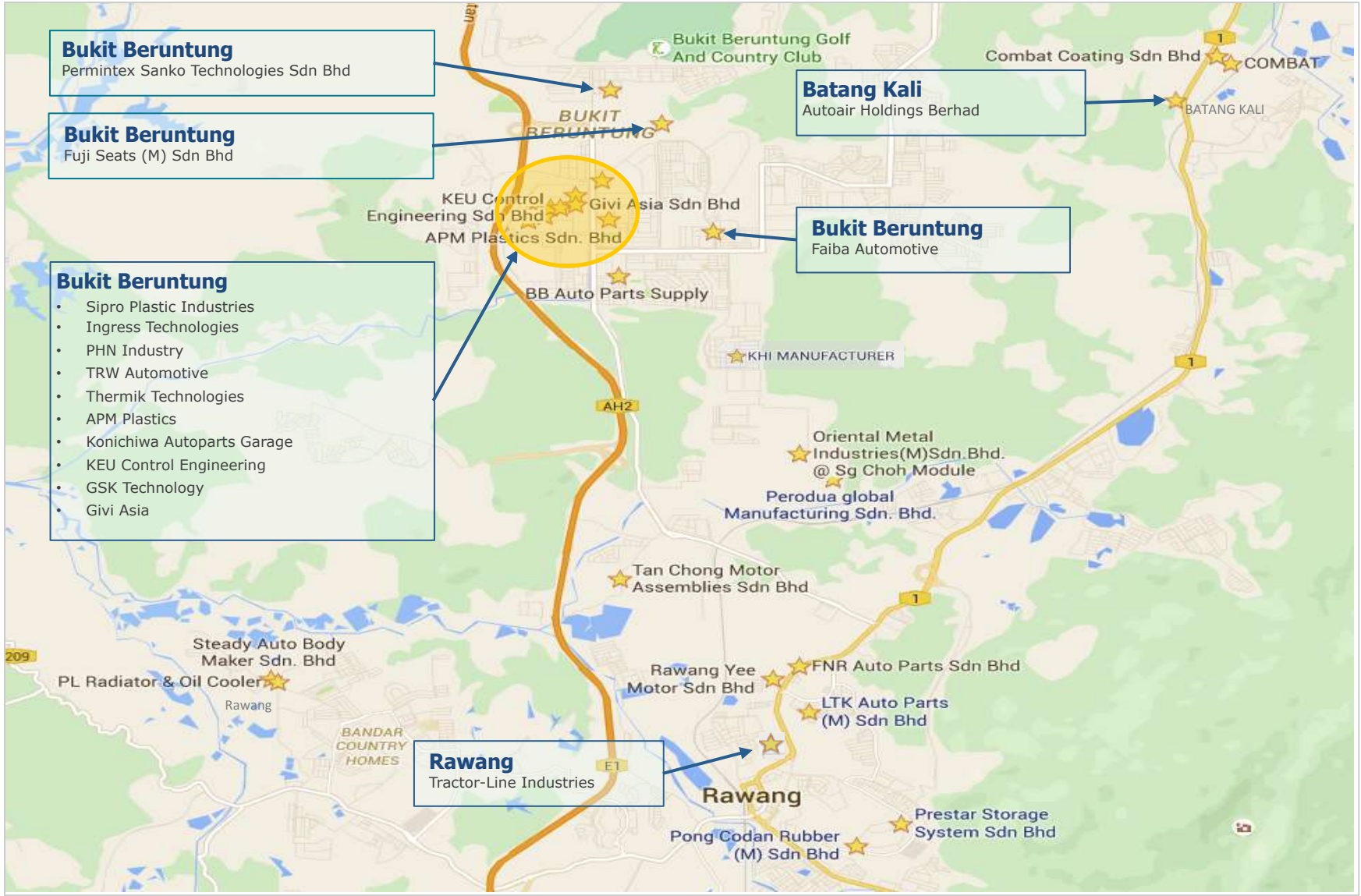

5
Transport and Equipment

SWOT Analysis

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Strengths

- National Automotive Policies and Malaysian Aerospace Blueprint
- 50% of aerospace organisations located in Selangor, 28% in Kuala Lumpur (MIGHT, 2012)
- KLIA 1 and KLIA 2 (regional bubs) located in Selangor
- Automotive Science Park / Proton City (Kuala Selangor); Aerospace City, Subang, Aviation "cluster" (Klang Valley)
- Concentration of related supporting industries within the Selangor/Klang River Basin
- Competitive cost of doing business regionally and better cost structure
- Local anchor tenants

Weaknesses

- International and anchor tenants (aerospace)
- Cooperation among public and private sector to upgrade skilled labour
- Liberalisation to attract foreign firms into the supporting industries (automotive)
- Heavy reliance on government projects
- Heavy reliance on MRO
- Financial and incentive packages and tax systems
- International certification

SWOT

Opportunities

- Demand on local public transport (rail) and growing middle class (aviation)
- Future demand for rail travel fuel more activities in the rail cluster
- Increasing access to well-educated engineers, designers, specialists, technicians, and MRO providers
- Regional player (production of small vessels), MRO & engineering services (aerospace)
- Expansion of low cost carriers locally and regionally will drive the need for MRO and pilot training
- Large MNCs subsidiaries and collaborations occurring
- Increasing emphasis on innovation (Aerospace Manufacturing Innovation Centre)

Threats

- Very strong regional players in aviation (India, China), automotive (Thailand, Indonesia) and shipping (Singapore, Japan)
- Institutional regulations and reliance on government projects limit ability to compete regionally and globally
- Building capacity of skilled labour beyond MRO into ESI and manufacturing of high-end engine components
- Impending slowdown of local economy, limiting further capital expenditure

Source: Monash University Malaysia, 2016

5
Transport and Equipment

Recommendations

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- ✓ **State's role** in aligning transport policy initiatives, supported by infrastructure outgrowths and place marketing.
- ✓ **Differentiating state's contribution** in the regional and global MRO market value chain.
- ✓ Developing state's **"last mile connectivity" & logistic service networks**.
- ✓ **Northern transportation hub**: a possible machinery and engineering hub (heavy engineering) & finished products for cars and rails.
- ✓ **Targeted investments** in pure play engineering, advanced MRO, and advanced modular manufacturing.

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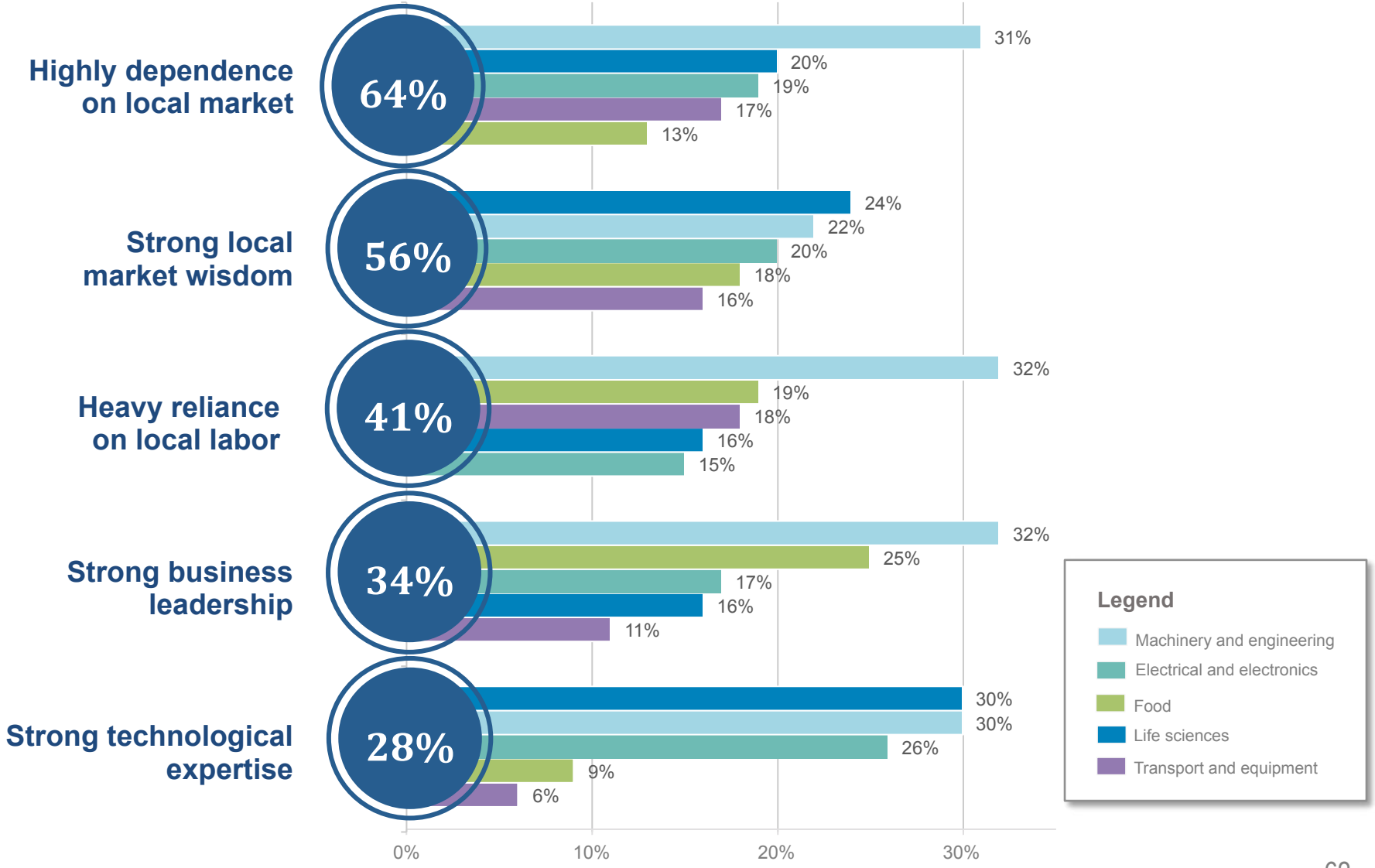
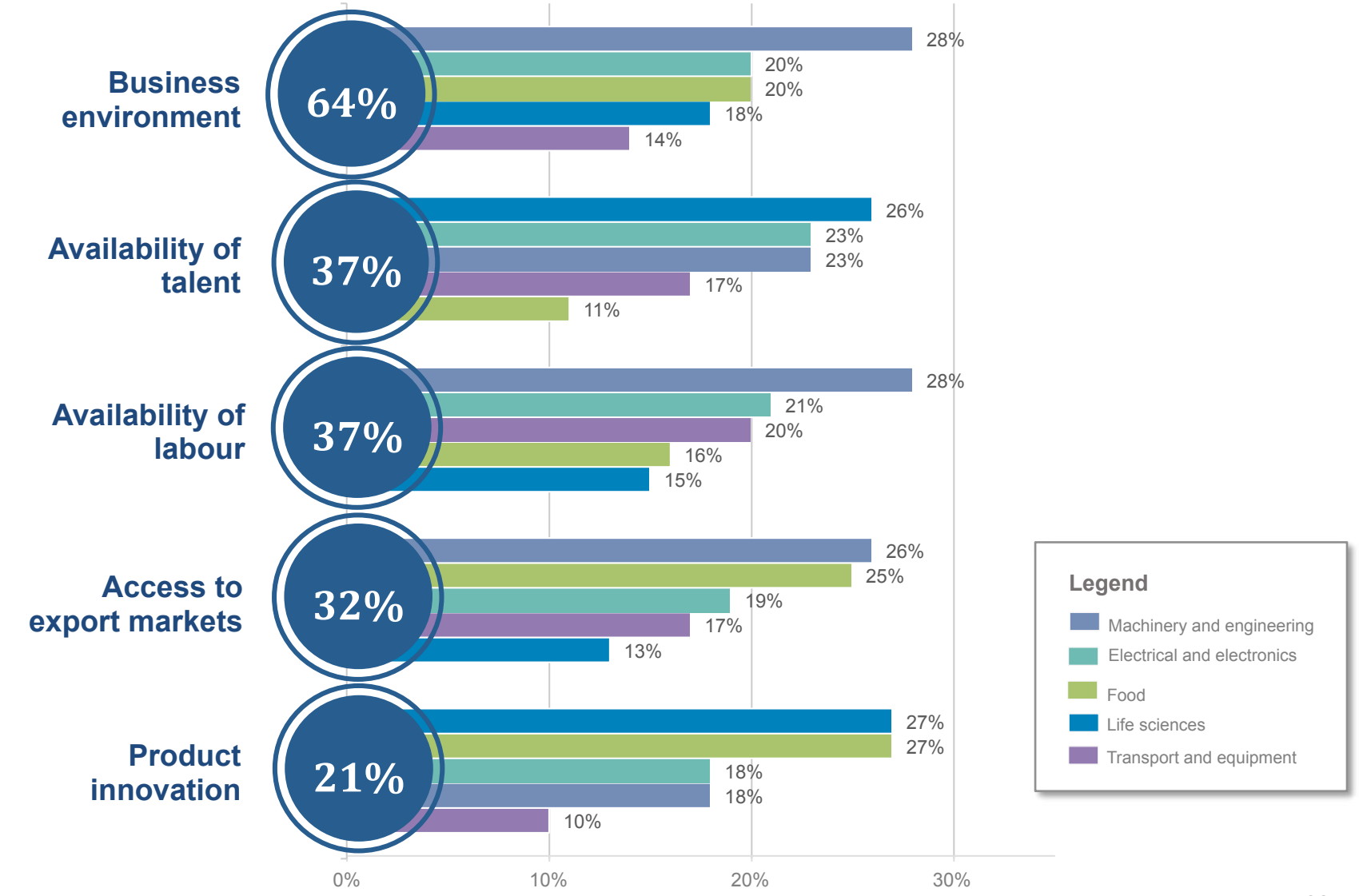
What do 167 businesses operating in the clusters have to say about the issues affecting them?

How would you describe the capabilities of local firms & suppliers in your industry?



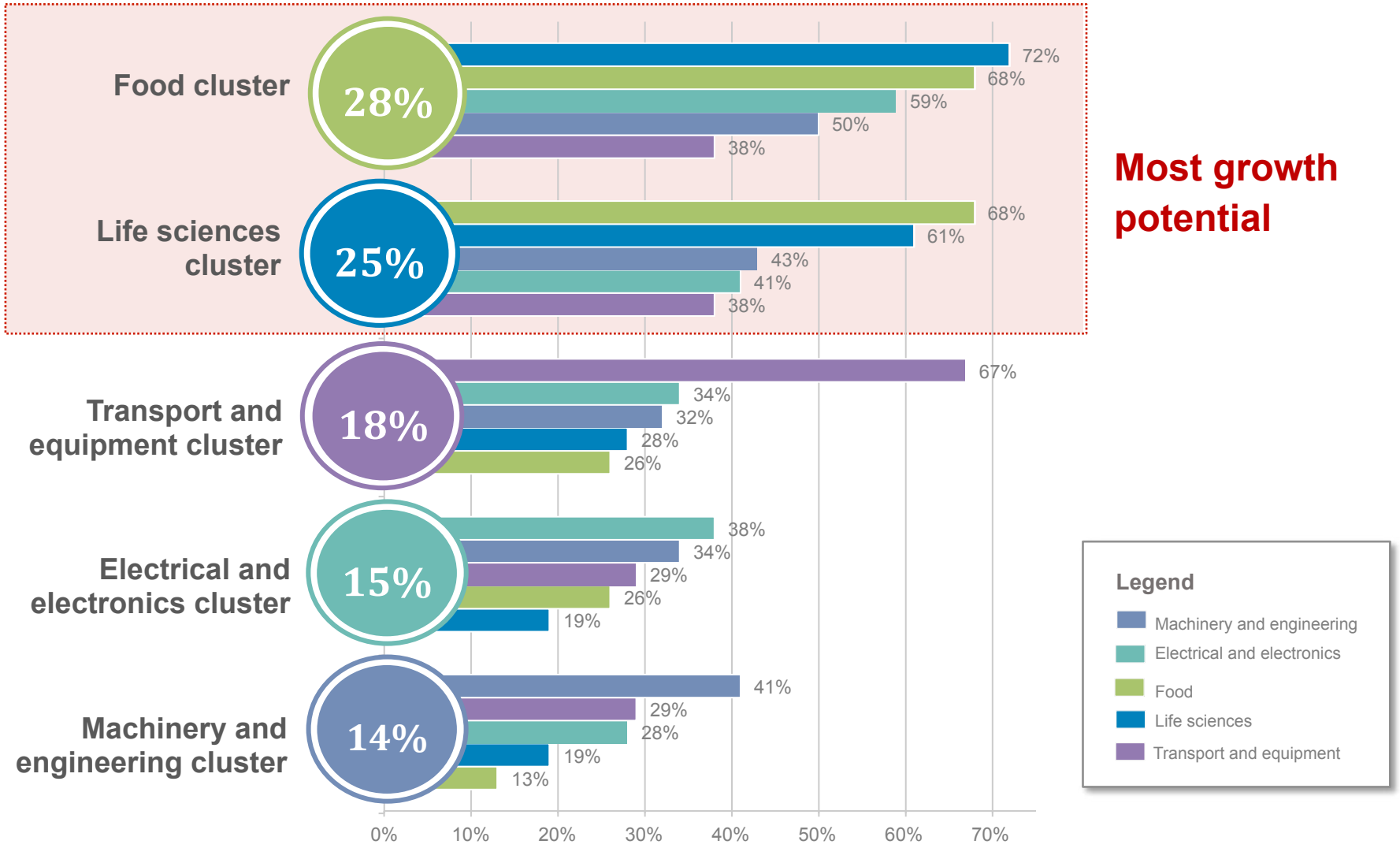
Source: Monash University Malaysia, 2016. Base N=167 respondents

Thinking over the next 2-3 years, which of the following will have the most impact on your industry in Selangor? (rank top 3)



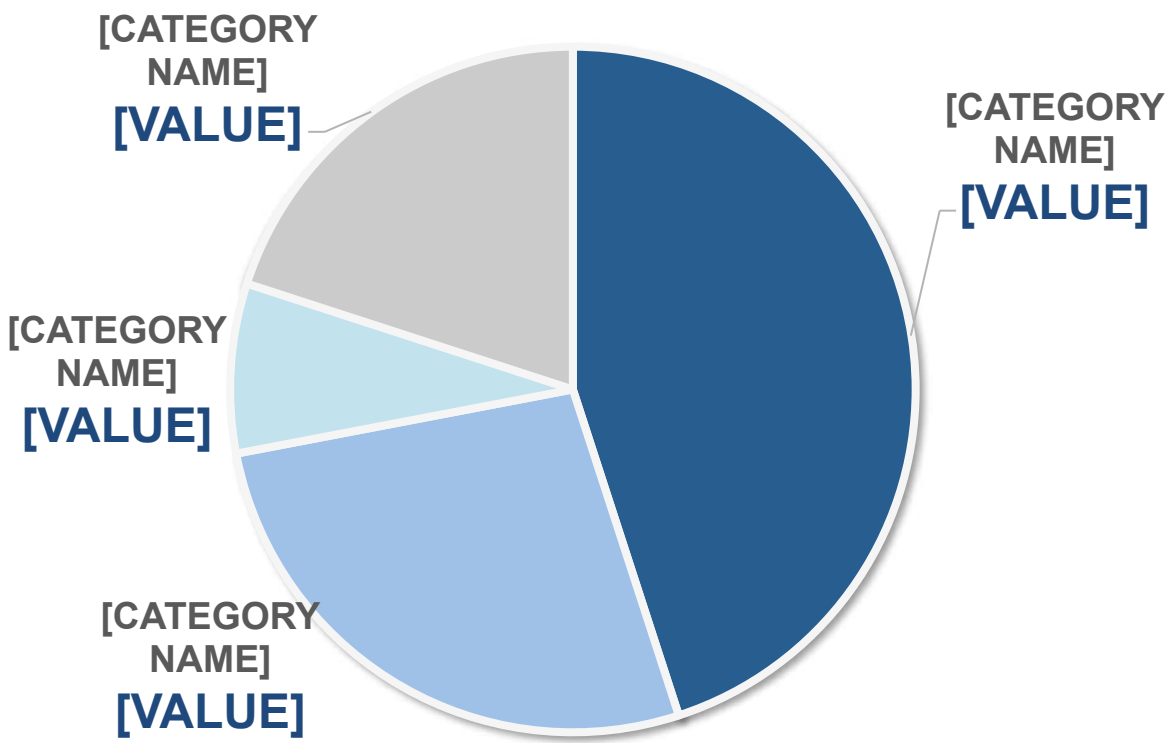
Source: Monash University Malaysia, 2016. Base N=167 respondents

Which cluster offers the most growth potential in Selangor over the next 5 years?



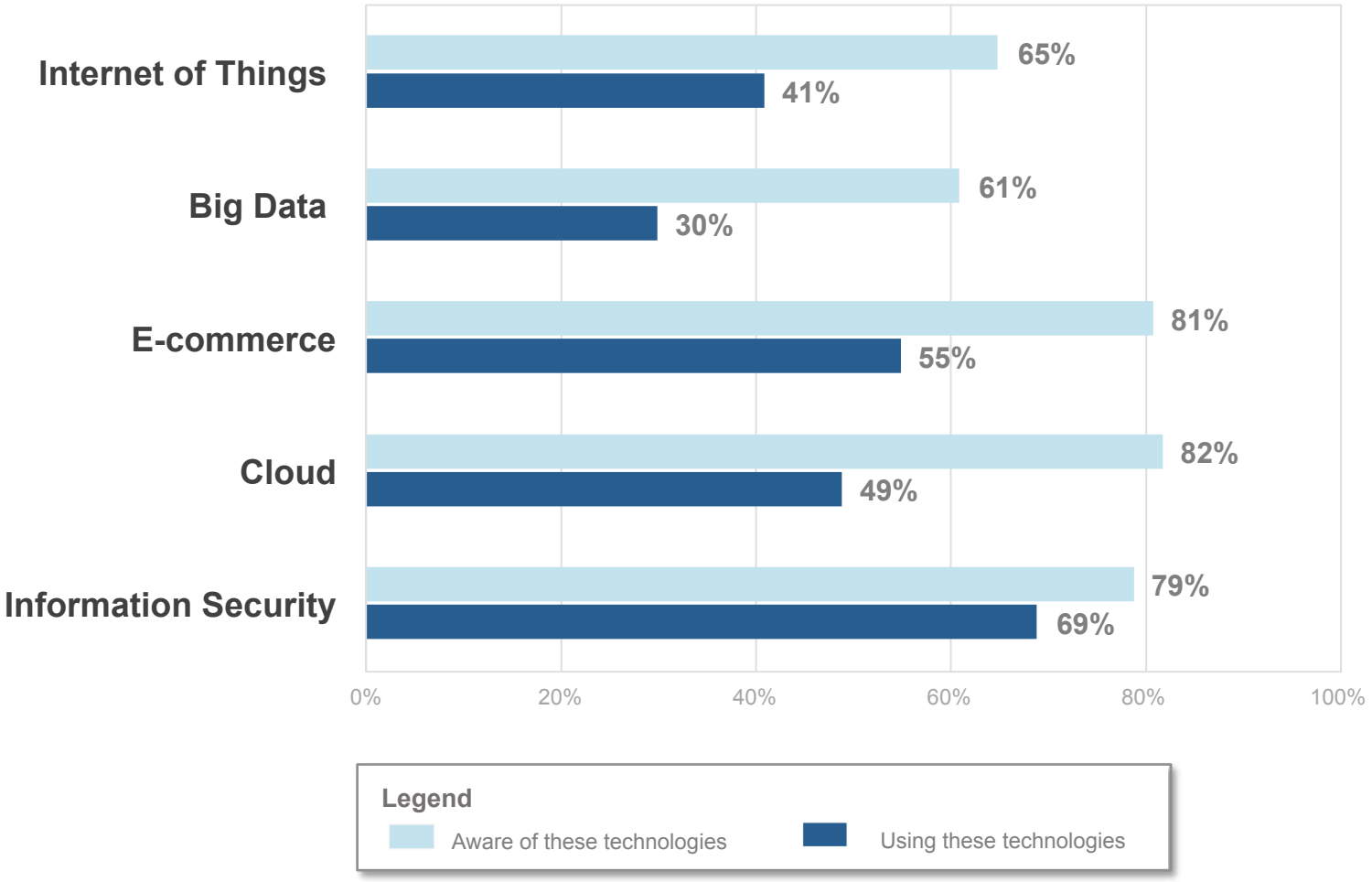
Source: Monash University Malaysia, 2016. Base N=334 respondents

How would you describe the role of the Selangor state government in the development of your industry?



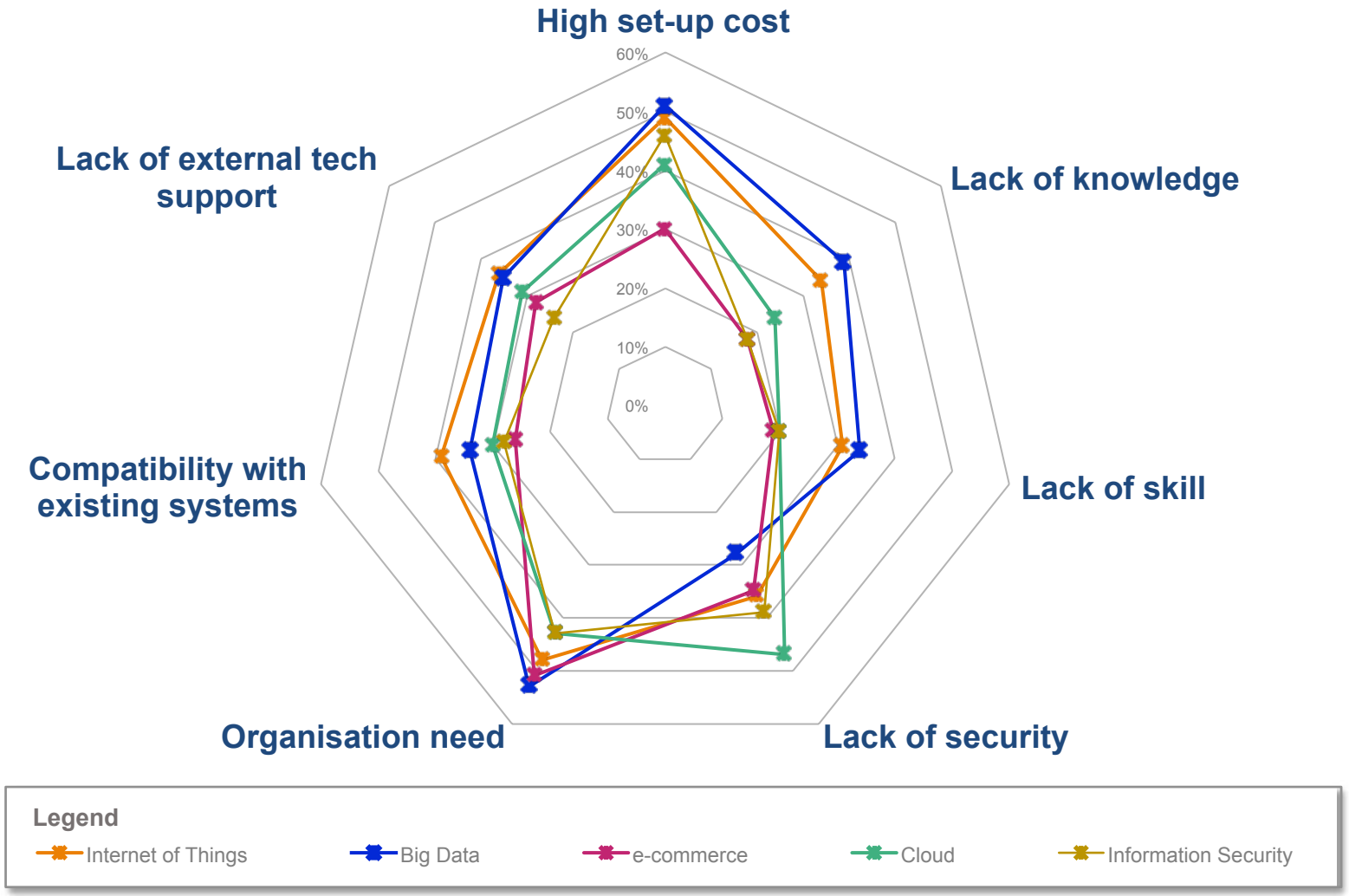
Source: Monash University Malaysia, 2016. Base N=167 respondents

Please tick the statements which reflects your company's awareness & usage of these technologies.



Source: Monash University Malaysia & FMM, 2016. Base N = 148 respondents

Please tick the factors affecting the adoption of new ICT technologies.



Source: Monash University Malaysia & FMM, 2016

What is Next? – Strategic Directions

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- ✓ **Connecting** sectors, industries and cluster
- ✓ Investing in identifiable **soft infrastructure**
- ✓ Drive emerging **service dominant** Life Sciences & Food clusters
- ✓ Create **excellence in core sectors** (e.g. advanced MRO, Halal Food, customised engineering)
- ✓ Cluster strategy in **synergy through diversity** in sector-specific applications (e.g. high end precision engineering in agricultural, aerospace and E&E sectors)

What's Next – Operational Initiatives

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- Cluster leader and/or committee
- Identify economic linkages:
  a) Common values (e.g. supply, production, marketing chains)
  b) Similar labor skills, talent requirements, training needed
  c) Shared or similar technologies
  d) Knowledge and/or innovation exchanges
- Stages of cluster development by:
  a) Geographic concentrations
  b) Economic prosperity (employment, income, input-output, export earnings)
- National and state policy goals


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Thank you!
Q&A Session
GROUP
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AUSTRALIA