



MINISTRY OF
HUMAN RESOURCES



Institute of Labour Market
Information & Analysis



KEMENTERIAN
SUMBER MANUSIA

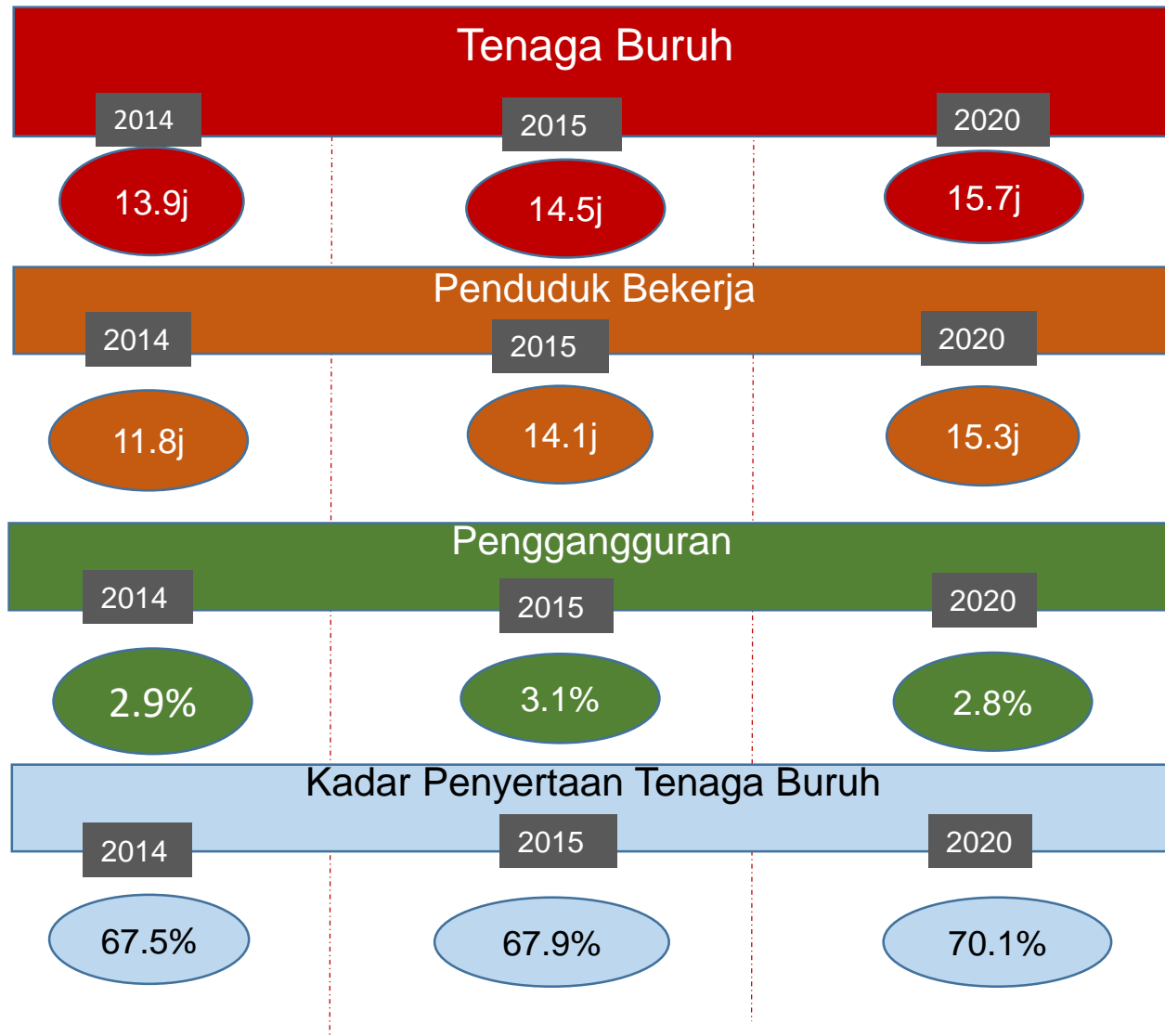
PERMINTAAN DAN PENAWARAN GUNA TENAGA MENGIKUT SEKTOR EKONOMI

Kandungan

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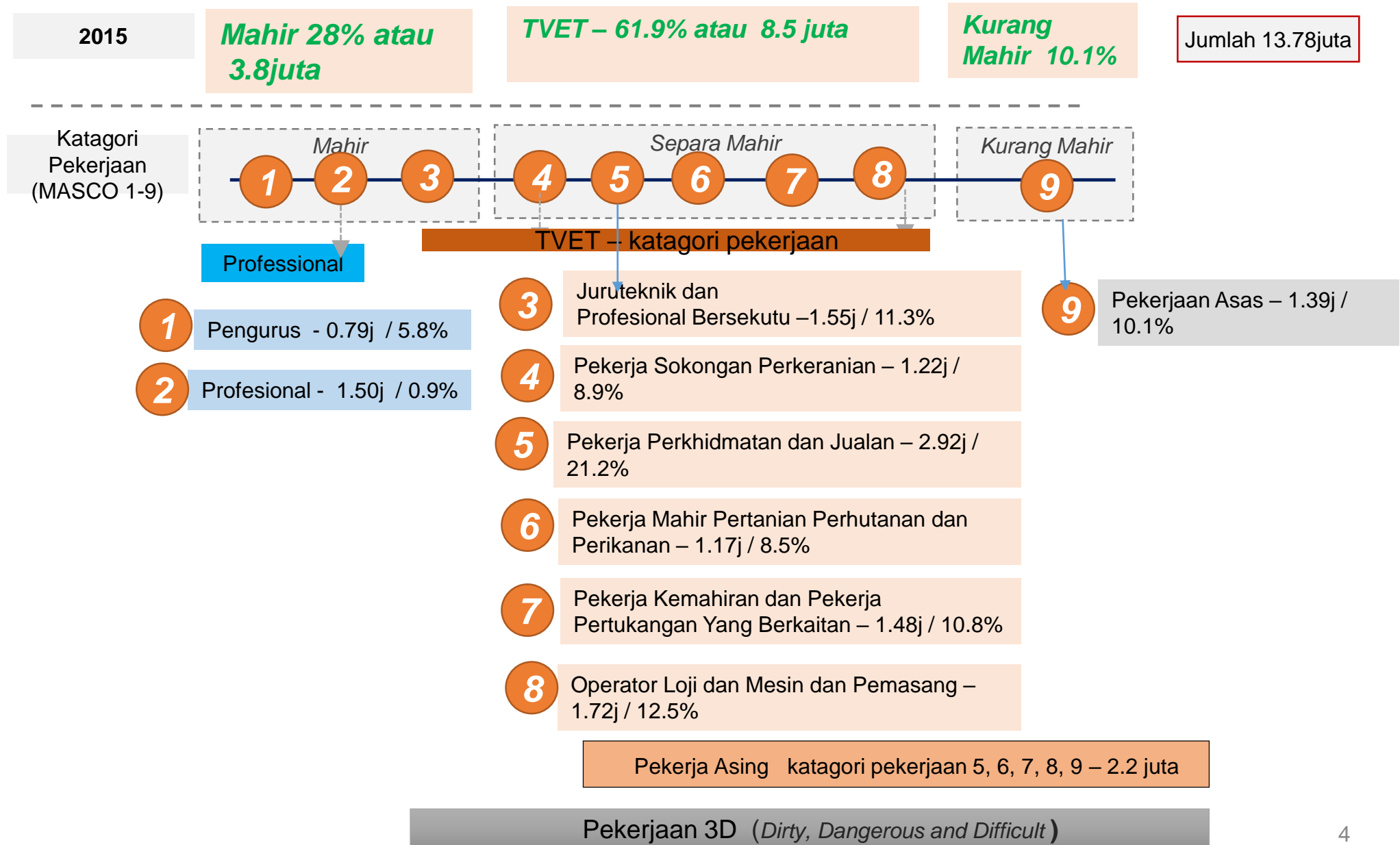
1. Snapshot Tenaga Buruh

Peningkatan 8.5% atau 1.2 juta jumlah penduduk bekerja menjelang tahun 2020

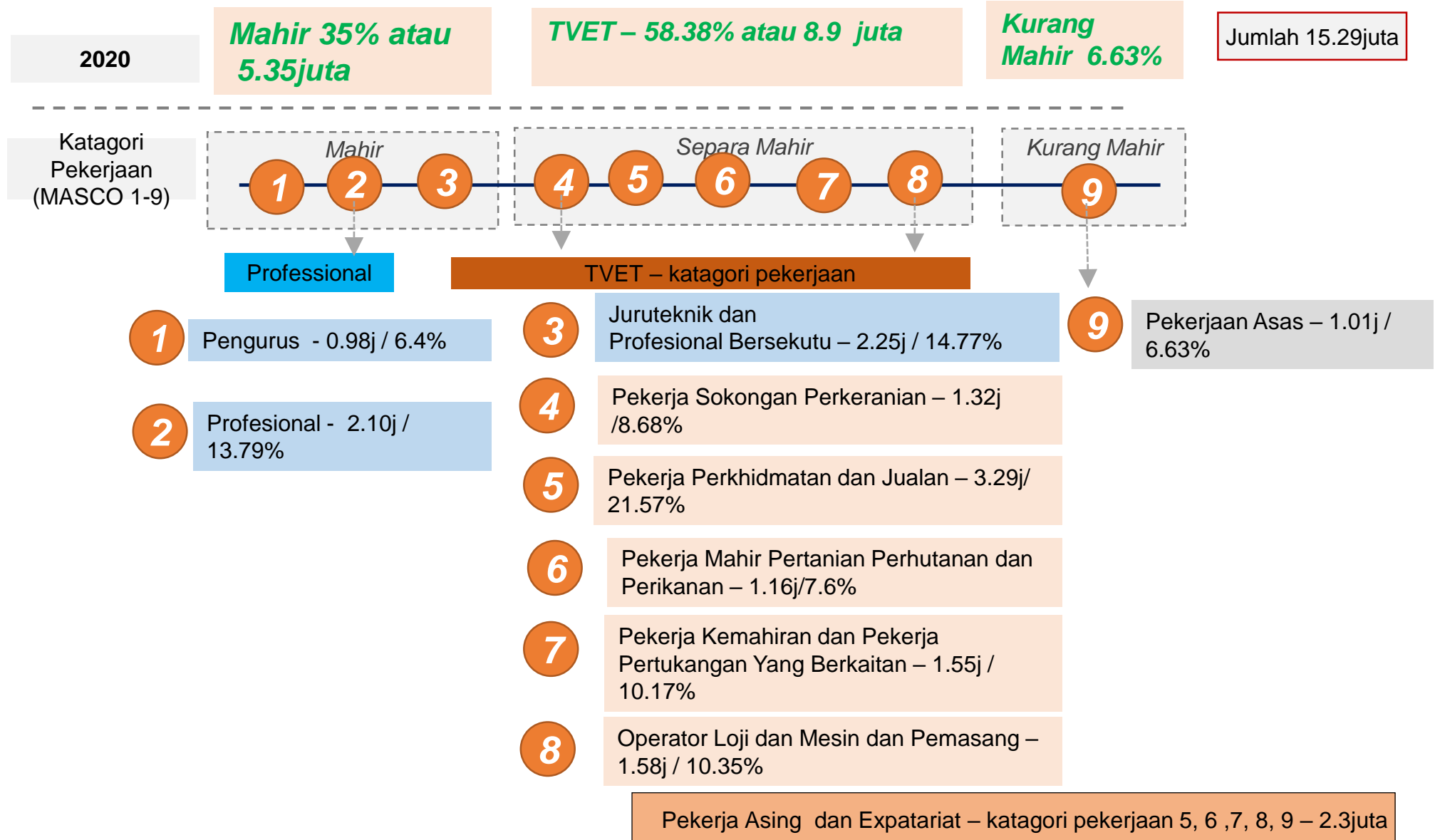


Sumber : RMKe-11/ LFS

2. Penduduk Bekerja 2015 - Katagori Pekerjaan Dan Kemahiran



3. Unjuran Penduduk Bekerja 2020 - Katagori Pekerjaan dan Kemahiran



4. JOB MALAYSIA Kekosongan Didaftarkan Dan Penempatan

Penempatan pekerja melalui JOB MALAYSIA bagi katagori pengurus, professional dan jururteknik pada tahun 2015 berjumlah 55,079 pekerja

KATEGORI PEKERJAAN (MASCO 2008)	TAHUN KEKOSONGAN DAFTAR		
	2013	2015	2016
Pengurusan	8,251	22,426	3,215
Profesional	32,999	28,570	19,669
Juruteknik dan Profesional Bersekutu	23,913	13,401	6,585
Perkeranian	18,965	17,271	8,183
Perkhidmatan dan Jualan	113,370	94,975	23,186
Pekerja Mahir Pertanian, Perhutanan dan Perikanan	23,503	9,705	3,532
Pekerja Pertukangan Dan Yang Berkaitan	42,677	26,863	5,874
Operator, loji, mesin dan pemasang	126,874	82,895	40,286
Pekerja Asas	1,023,558	629,112	158,921
Tentera	0	0	0
JUMLAH	1,414,110	925,218	269,451

KATEGORI PEKERJAAN (MASCO 2008)	TAHUN PENEMPATAN		
	2013	2015	2016
Pengurusan	10,229	7,321	3,036
Profesional	19,358	21,480	8,507
Juruteknik dan Profesional Bersekutu	28,690	26,278	15,296
Perkeranian	24,119	23,078	11,166
Perkhidmatan dan Jualan	59,788	53,370	21,263
Pekerja Mahir Pertanian, Perhutanan dan Perikanan	2,544	2,270	610
Pekerja Pertukangan Dan Yang Berkaitan	4,893	5,128	1,354
Operator, loji, mesin dan pemasang	41,766	46,745	21,946
Pekerja Asas	32,763	43,184	14,812
Tentera	8,610	4,110	280
JUMLAH	232,760	232,964	98,270

5. Senarai pekerjaan kritikal (Critical Occupation List- COL) terdiri dari 60 katagori pekerjaan, 21 daripadanya terdapat dalam 2 atau lebih sektor

No.	MASCO ¹	Critical Occupation
1	2120	Mathematicians, Actuaries and Statisticians
2	2411	Accountants
3	2413	Financial Analyst
4	2511	Systems Analysts
5	2514	Applications Programmers
6	1214	Business Services Manager
7	1330	ICT Services Managers
8	2522	IT System Administrators
9	2141	Industrial and Production Engineers
10	2144	Mechanical Engineers
11	2149	Engineering Professionals N.E.C.
12	2152	Electronic Engineers
13	2153	Telecommunications Engineers
14	2182	Manufacturing Professionals
15	2421	Management and Organization Analysts
16	2423	Personnel and Career Professionals
17	2433	Technical and Medical Sales Professionals
18	2512	Software Developers
19	2523	Computer Network Professionals
20	2529	Database and Network Professional N.E.C.

No.	MASCO ¹	Critical Occupation
21	3512	ICT User Support Technicians
22	1211	Finance Managers
23	1212	Human Resource Managers
24	1213	Policy and Planning Managers
25	1221	Sales and Marketing Managers
26	1321	Manufacturing Managers
27	1322	Mining Managers
28	1324	Supply, Distribution and Related Managers
29	1330	ICT Services Manager
30	1420	Retail and Wholesale Trade Managers
31	1511	ICT Manager
32	2114	Geologists and Geophysicists
33	2142	Civil Engineer
34	2145	Chemical Engineers
35	2146	Mining Eng., Metallurgists, Related Professions
36	2151	Electrical Engineers
37	2166	Graphic and Multimedia Designers
38	2263	Env. & Occ. Health and Hygiene Professionals
39	2412	Financial and Investment Advisers
40	2431	Advertising and Marketing Professionals

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
N.E.C.: Not Elsewhere Classified. Occupations highlighted in pink appear in two or more sectors.

Sambungan.....

No.	MASCO ¹	Critical Occupation
41	2432	Public Relations Professionals
42	2519	Softw. & App. Developers & Analyst NE.C.
43	2521	Database Designers and Administrators
44	2611	Lawyers
45	3114	Electronics Engineering Technicians
46	3115	Mechanical Engineering Technicians
47	3116	Env. & Occ. Health Inspectors and Associates
48	3312	Credit and Loans Officer
49	3313	Accounting Associate Professionals
50	N/A	Business developer
51	N/A	Claims management officer
52	N/A	Compliance officer
53	N/A	Marketing officer
54	N/A	Other Job titles not classified
55	N/A	Product developer and specialists
56	N/A	Relationship manager
57	N/A	Risk management officers
58	N/A	Shariah Professional
59	N/A	Traders and dealers
60	N/A	Underwriter

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
N.E.C.: Not Elsewhere Classified. Occupations highlighted in pink appear in two or more sectors.

6. Snapshot COL Mengikuti Sektor

* appendix / [Telco](#) / ICT / [Financial Services](#) / Accounting

Sector	MASCO	Selected Critical Occupations ¹	Examples of Job Titles within Critical Occupations ²
Oil & Gas <ul style="list-style-type: none"> • Exploration • Development • Production • Decommissioning • Products 	2114	Geologists and Geophysicists	Petroleum Engineer, Geoscientist; Mudlogger; Oceanographer; Reservoir Geologist; Subsurface Manager; Geomodeller; Petrophysicists; Physical Oceanographer; Seismic Interpreter; Mechanical Design Engineer; Reliability and Safety Engineer; Rotating Equipment Engineer; Platform Superintendent; Subsea Engineer; Drilling Engineer; Gas Processing Engineer; Inspection (QA/QC) Engineer; Pipeline Corrosion Engineer; Wellsite Corrosion Engineer; Material (and NDT) Engineer; Welding Engineer; Drainage Design Engineer
	2142	Civil Engineer	
	2144	Mechanical Engineers	
	2146	Mining Engineers, Metallurgists & Related Professions	
E&E <ul style="list-style-type: none"> • Electronic Components • Industrial Electronics • Semiconductor • LED • Solar 	2144	Mechanical Engineers	Industrial machinery and tools engineer; Industrial machinery and tools engineer; Process Engineers; Maintenance engineers; Test/measurement engineer; Photonic Engineer; Product Design R&D Engineer; Computer engineer; Electronics/ semiconductors engineer; RF engineer; Embedded System/Firmware Engineer; Hardware Design Engineer; User Experience Engineer; Semiconductor Packaging Engineers; IC Circuit Designer
	2149	Engineering Professionals N.E.C.	
	2151	Electrical Engineers	
	2152	Electronic Engineers	

¹ N.E.C.: Not Elsewhere Classified

² Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

7. Pekerjaan Kritikal Dan Jenis Pekerjaan Mengikut Sektor

(Lihat lampiran *slide* no.14 hingga 27)

[O&G -a -b-](#) / [E&E - a -b](#) / [Telco-a](#) / [ICT-a -b](#) / [Financial services- a -b](#) /

Penemuan Kajian Lepas

(Kajian yang di laksanakan oleh ILMIA. Maklumat lanjut seperti *slide* no. 28 hingga 36)

A Study on Manpower Requirements for East Coast Economic Region (ECER)

- [Ecotourism](#)
- [Culture and Heritage](#)
- [Coastal and Island](#)
- [Automotive Sector](#)

A Study on Human Capital Requirement for the Greater Kuala Lumpur

- [Transportation \(MRT and High Speed Rail\)](#)
- [Shared Services and Outsourcing \(Knowledge Process Outsourcing – Financial Services\)](#)
- [Oil and Gas \(upstream\)](#)

A Study on Human Capital Requirement for the Sarawak Corridor of Renewable Energy (SCORE)

- [Industry](#)
- [Jobs](#)

Thank You



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MINISTRY OF HUMAN RESOURCES

Snapshot of the COL by Sector

Sector	MASCO	Selected Critical Occupations ¹	Examples of Job Titles within Critical Occupations ²
Telco <ul style="list-style-type: none"> Infrastructure for wireless technology Infrastructure for fixed line technology Information and network security; Emerging technologies (cloud computing & big data analytics) 	1511	Information and Communications Technology Manager	Network Strategist; Technology Strategist; Infrastructure Specialist; Software Developer; Network Deployment Manager; Chief Information Security Officer; Information Systems Maintenance Engineer; Access Control Specialist; Network Security Software Developer; Data Architect; Wireless Network Engineer; Radio Optimisation & Capacity Engineer; Core Network Service Assurance Engineer; Site & Construction Engineer; Network Implementation & Construction Engineer; VAS Engineer; Transmission Network; IP Engineer;
	2521	Database Designers & Administrators	
	2153	Telecommunications Engineers	
ICT <ul style="list-style-type: none"> Creative multimedia System design & development Information technology Shares services & outsourcing 	2511	Systems Analysts	Business (IT) analyst; JDE Consultant; RPG Programmer; SAP Application Developer; SAP Consultants; SAP FICO/JVA Consultant; SAP Specialist; SAP BCS/FICO Consultant; Computer programmer; Communication programmer; Database programmer; Multimedia programmer;.NET programmer; Software QA engineer; Application Engineer; Software Engineer; Software Programmer; Game Engine Programmer, UI/GamePlay Coder; IT Network Systems Engineer, Network Analyst
	2512	Software Developers	
	2514	Applications Programmers	
	2523	Computer Network Professionals	

¹ N.E.C.: Not Elsewhere Classified

² Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

Snapshot of the COL by Sector

Sector	MASCO ¹	Selected Critical Occupations	Examples of Job Titles within Critical Occupations ²
Financial Services <ul style="list-style-type: none"> • Banking • Insurance • Wealth Management • Islamic Finance 	2412	Financial and Investment Advisers	Anti-Money Laundering Specialist; Financial Analyst; Research Analyst; Debt Analyst; Equity Analyst; Investment Analyst; Underwriters; Financial Officer; Shariah Officers; Islamic Business Head; Shariah Compliance Officer; Product Manager; Shariah Auditor; Compliance officer; Market risk officer; Credit risk officer; Operational risk officer; Risk manager; Risk analyst; Risk modeller
	2413	Financial Analysts	
	N/A	Shariah Professionals	
	N/A	Risk management officers	
Accounting	2411	Accountants	Auditor; Accountant; Fraud Specialist; Transfer Pricing; Fraud & Investigation Consultant
	2413	Financial Analyst	

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² Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

O&G: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

O&G Clusters: (1) Exploration; (2) Development; (3) Production; (4) Decommissioning; (5) Products

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
1	1214	Business Services Managers	Business Manager with Engineering Background
2	1321	Manufacturing Managers	QAQC Manager
3	1322	Mining Managers	Site Operation Director
4	1324	Supply, Distribution & Related Managers	Power Station Manager
5	2114	Geologists and Geophysicists	Petroleum Geoscientists; Geoscientist; Geologist; Mudlogger; Oceanographer; Well Site Geologist; Operation Geologist; Reservoir Geologist; Sedimentologist; Structural Geologist; Subsurface Manager; Geomodeller; Geophysicist; Petrophysicists; Physical Oceanographer; Seismic Interpreter; Geophysicists; Geological Specialist; Geophysical Specialist; Oceanographer; Reservoir Geologist; Custodian Geology
6	2141	Industrial and Production Engineers	Automation Design – Electrical Engineer; Reliability Engineer; Process Development Engineer (Moulding); Test/Measurement Engineer
7	2142	Civil Engineer	Structural Engineer; Civil/Structural/Structural Design Engineer; Drainage Design Engineer; Facilities Planning Specialist; Facilities (equipment design) Engineer; Facilities Project Manager; Foundation Engineer; Inspection (QA/QC) Engineer; Reliability and Safety Engineer; Construction Engineer

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²N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

O&G: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

O&G Clusters: (1) Exploration; (2) Development; (3) Production; (4) Decommissioning; (5) Products

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
8	2144	Mechanical Engineers	Mechanical Design Engineer; Facilities Engineer; Mechanical Maintenance Engineer; Project Engineer; Reliability and Safety Engineer; Rotating Equipment Engineer; Operations Manager; Operations Engineer; Platform Superintendent
9	2145	Chemical Engineers	Corrosion Engineer; Project Engineer/Manager; Product Quality Control/Assurance; Process Control Engineer; Terminal Manager
10	2146	Mining Engineers, Metallurgists, Related Professions	Marine Section Leader; Technical Section Leader; Subsurface – Petroleum; Subsea Engineer; Integrity Management; Petroleum Engineer; Drilling Engineer; Well Engineer; Completions Engineer; Gas Processing Engineer; Production Engineer; Recovery (EOR) Engineer; Reservoir Engineer; Wellsite (Planning) Engineer; Production Technologist; Petroleum Economist; Facilities (equipment design) Engineer; Inspection (QA/QC) Engineer; Loss Control Engineer; Pipeline Corrosion Engineer; Wellsite Corrosion Engineer; Material (and NDT) Engineer; Welding Engineer; Test/Measurement Engineer; Energy Engineer; Renewable Energy Engineer; Environment Engineer; Plan & Audit Engineering Design; Materials & Metallurgical Engineer; Pipeline / Piping Engineer; Gas Processing Engineer; Hydraulics Engineer; Chemical Engineer; Corrosion Engineer; Water Management Engineer; Product Design R&D Engineer

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O&G: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

O&G Clusters: (1) Exploration; (2) Development; (3) Production; (4) Decommissioning; (5) Products

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
11	2149	Engineering Professionals N.E.C.	Procurement Engineer; Pipe Stress Engineer; Commissioning Engineer; Research Engineer; Pipeline Corrosion Engineer; Pipeline Mechanical Engineer; Pipeline Project Engineer; Pipeline SCADA and Simulations Engineer;
12	3116	Environmental & Occupation Health Inspectors and Associates	Health and Safety Inspector; Industrial Safety Officer; Quality, Health and Safety Environmental Coordinator
13	2411	Accountants	Accountant; Operations Accountant; Production Accountant; Chief Accountant; Project Accountant; Drilling Accountant
14	2433	Technical and Medical Sales Professionals	Technical Sales Engineer
15	N/A	Other Job Titles N.E.C.	Wireline sales engineer, territory manager, Inspection Engineer, OR&A Lead; IPM Project Manager; MI Swaco Project Engineer; MRO Value Stream Manager; HSE Manager; Media Processing Engineer; Wafer Fabrication Engineer; Marine supervisor

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²N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

E&E: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

E&E Clusters: (1) Automation; (2) Industrial Electronics; (3) Semiconductor; (4) Electronic Manufacturing Services (EMS); (5) LED; (6) Solar

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
1	1213	Policy and Planning Managers	Mechanical engineer, Engineering technologist, Mechanical technologist, Operations engineer, Rotating equipment engineer, Mechanical design engineer, Facilities engineer
2	1330	ICT Services Managers (tbc)	Strategic Program Manager
3	2120	Math., Actuaries & Statisticians	Data Scientist; Data Analyst
4	2141	Industrial and Production Engineers	Process Engineering; Preventive Maintenance (Facility); Packaging Engineer; Facilities Competent Engineer; Industrial Engineer; Automation Engineer
5	2144	Mechanical Engineers	Mechanical engineer; Engineering technologist; Mechanical technologist; Industrial machinery and tools engineer; Heating, ventilation, air-conditioning and refrigeration engineer; Media process engineers; Industrial machinery and tools engineer; Process Engineers; Maintenance engineers; Product engineer; R&D engineer
6	2149	Engineering Professionals N.E.C.	Process engineer; Quality control engineer; Technical service adviser; Research engineer; Engineering executive (store); Test/measurement engineer; Material engineer; Photonic Engineer; R&D Engineer; UPD Engineer; Plasma Enhance Chemical Vapour Deposition Engineer; Sputter Process Engineer; Module Characterisation Engineer; Aerospace Engineer; Sputter Equipment Engineer

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E&E: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

E&E Clusters: (1) Automation; (2) Industrial Electronics; (3) Semiconductor; (4) Electronic Manufacturing Services (EMS); (5) LED; (6) Solar

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
7	2151	Electrical Engineers	Electrical engineer; Electrical illumination engineer; Electromechanical equipment engineer; Process Engineers; maintenance engineers; Product engineer; R&D engineer; IC Design Engineers; Embedded System/Firmware Engineer; RF Engineers; Media Process Engineer; Wafer Fabrication Process Engineer; Test/Measurement Engineer; Product Design R&D Engineer
8	2152	Electronic Engineers	Electronics engineer; Computer engineer; Audio and video equipment engineer; Electronics/ semiconductors engineer; Electronics/ instrumentation engineer; RF engineer; Embedded system/firmware engineer; Wafer fabrication engineer; Process Engineer; Maintenance engineer; Design Engineer; Product engineer; R&D engineer; Test Engineer; IC Design Engineers; Embedded System/Firmware Engineer; Media Process Engineer; Wafer Fabrication Process Engineer; Test/Measurement Engineer; Product Design R&D Engineer; Hardware Design Engineer; User Experience Engineer; Semiconductor Packaging Engineers; IC Circuit Designer; IC Package Assembly Process Engineer
9	2182	Manufacturing Professionals	Manufacturing Specialist; Manufacturing executive; Quality assurance executive; Production executive; Warehouse executive; Boiler superintendent; Health and safety executive & manager

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E&E: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

E&E Clusters: (1) Automation; (2) Industrial Electronics; (3) Semiconductor; (4) Electronic Manufacturing Services (EMS); (5) LED; (6) Solar

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
10	2263	Environment & Occupational Health and Hygiene Professionals	Scheduled Waste Management Professional; Safety Officer; Radiation Protection Officer
11	2433	Technical and Medical Sales Professionals	Sales Engineer; Marketing Engineer
12	2511	System Analysts	Systems analyst; Computer analyst; Business (information technology) analyst
13	2512	Software Developers	Computer programmer; Systems programmer; Programmer (analyst); Multimedia programmer; Information technology researcher; Software Engineer; Software Design Engineer; RCFA Engineer; SAP IT and Finance Applications Developer; Product Development Engineering
14	2514	Applications Programmers	CAD Engineer
15	3114	Electronics Engineering Technicians	Electronics engineering technician; Electronics engineering estimator; Wafer fabrication technical
16	3115	Mechanical Engineering Technicians	Engineering/ mechanical technician; Hydraulic hose technician; Wafer fabrication technical

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Telco: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

Telco Clusters: (1) Infrastructure for wireless technology; (2) Infrastructure for fixed line technology; (3) Information and network security; (4) Emerging technologies, namely cloud computing and big data analytics

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
1	1511	Information and Communications Technology Manager	Network Strategist; Technology Strategist; Enterprise Convergence Strategist; IT Project Manager; Infrastructure Specialist; Database Specialist; Software Developer; Network Performance Manager; Network Operations Manager; Network Deployment Manager; Chief Information Security Officer; Network Security; Information Systems Maintenance Engineer; Access Control Specialist; Network Security Software Developer; Data Architect; Business Data Analyst
2	2529	Database and Network Professionals N.E.C.	Security Technology Specialist; Security Architect; Chief Information Security Officer; Security Strategist; Network Penetration Tester; Network Security Engineer; Application Security Specialist; Access Control Specialist; Network Security Software Developer
3	2521	Database Designers & Admin.	Database Specialist; Data Architect/Scientist; Business Data Analyst
4	1214	Business Services Managers	Production & operation manager; Business servs./development manager
5	1221	Sales and Marketing Managers	Solutions Sales Manager
6	1330	ICT Services Managers	Production and operation/ communications manager; Information systems manager; Information technology manager; Computer services manager; Data processing manager
7	2120	Math., Actuaries & Statisticians	Data Scientist; Predictive Analyst; Data mining analyst

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
²N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

Telco: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

Telco Clusters: (1) Infrastructure for wireless technology; (2) Infrastructure for fixed line technology; (3) Information and network security; (4) Emerging technologies, namely cloud computing and big data analytics

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
8	2413	Financial Analysts	Pricing analyst; Strategy/Business analyst
9	2421	Mgmt. & Org. Analysts	Market research/ Business analyst
10	2431	Adv. & Marketing Professionals	Customer Care Administrators; Customer Experience Experts
11	2432	Public Relations Professionals	Campaign Management Leader
12	2511	Systems Analysts	Systems/computer analyst; Business (IT) analyst
13	2514	Applications Programmers	Software Developer; Systems Programmer
14	2522	Information Technology System Administrators	Systems Administrator; Information Systems Maintenance Engineer; VAS Engineer; Software Developer; Billing Specialist; IT Architect; Enterprise Applications Architect; Web and Mobility Developer; Cloud Computing Solution Architect; Cloud Technology Specialist; Cloud Planner
15	2523	Computer Network Prof.	Network Analyst
16	2153	Telecommunications Engineers	Network Architect / Designer / Planner / Tester; Wireless Network Engineer; Radio Optimisation & Capacity Engineer; Core Network Service Assurance Engineer; Data Network Engineer; Network Deployment Manager; Site & Construction Engineer; Network Implementation & Construction Engineer; Network Performance Manager; Network Quality Engineer; VAS Engineer; Transmission Network; IP Engineer; Network and System Engineer; Network Performance Engineer

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
²N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

ICT: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

ICT Clusters: (1) Creative multimedia; (2) System design & development; (3) Information technology; (4) Shares services & outsourcing

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
1	1330	ICT Services Managers	Production and operation/ communications manager; Information systems manager; Information technology manager; Computer services manager; Data processing manager
2	1420	Retail and Wholesale Trade Managers	Pre-Sales Manager
3	2120	Mathematicians, Actuaries and Statisticians	Data Scientists, Data Modellers, Data Analyst; Data Miners; Big Data and Analytics; Analytical Consultant
4	2153	Telecommunications Engineers	Indirect Procurement; Smartphone Designer
5	2182	Manufacturing Professionals	Supply Chain/ Procurement Specialist; Presales Storage Consultant; Product Planner
6	2411	Accountants	Accountant; Auditor; Tax consultant; Liquidator; Chartered accountant; Transaction Monitoring Manager; Account Receivable (AR) Executive; Account Payable (AP) Executive; Team Leader – Accounting
7	2413	Financial Analysts	Operational Risk Analyst; Financial Services Team Leader; Solutions Consultant
8	2511	Systems Analysts	Systems analyst; Computer analyst; Business (information technology) analyst; JDE Consultant; RPG Programmer

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

ICT: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

ICT Clusters: (1) Creative multimedia; (2) System design & development; (3) Information technology; (4) Shares services & outsourcing

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
9	2512	Software Developers	SAP Application Developer; SAP Consultants; SAP FICO/JVA Consultant; SAP Specialist; SAP BCS/FICO Consultant
10	2514	Applications Programmers	Computer programmer; Communication programmer; Database programmer; Systems programmer; Programmer (analyst); Multimedia programmer; Information technology researcher; .NET programmer; Software QA engineer; Application Developer; Application Engineer; Software Engineer; Software Programmer; Game Engine Programmer, UI/GamePlay Coder
11	3313	Accounting Associate Professionals	Assistant officer (account); Financial supervisor
12	3512	ICT User Support Technicians	Help desk technician; Computer/user services assistant; Technical Helpdesk Analyst; Technical Support;
13	2166	Graphic and Multimedia Designers	Web designer; Graphics and sound specialist; Computer specialist; Systems/computer designer; Graphic designer graphic; Digital Artist; Animator; 3D Modeller; Visual Effects Artist; 2D Animator, 3D Artist, Animation Director, Animation Producer, Animation Supervisor, Creative Artist; Layout artist; Lighting artist

¹N/A cells accommodate for job titles that were added by employers or regulators, but cannot be appropriately matched to existing MASCO occupations.
²N.E.C.: Not Elsewhere Classified ²Job titles are obtained from (i) regulator bodies' feedback; (ii) TalentCorp's administrative data; and (iii) Sectoral research conducted by regulator bodies, industry lead bodies or the Institution for Labour Market Information and Analysis (ILMIA)

ICT: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

ICT Clusters: (1) Creative multimedia; (2) System design & development; (3) Information technology; (4) Shares services & outsourcing

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
14	2152	Electronic Engineers	Electronics engineer; Computer engineer; Audio and video equipment engineer; Electronics/ semiconductors engineer; Electronics/ instrumentation engineer; RTL Designer; System Architect; Structural Designer; Pre-Silicon Validation Engineer; Physical Design Engineer; Physical Design Verification Engineer; Signal Integrity Engineer
15	2423	Personnel and Career Professionals	Human Resource Analyst, HR Assistant, HR Consultant, Talent Acquisition Consultant
16	2523	Computer Network Professionals	IT Network Systems Engineer, Network Analyst, Network Specialist, New Network Engineer, Network System Engineer; Systems Administrator
17	2519	Software & Application Developers & Analyst N.E.C.	Software QA Engineer, Product Assurance Engineer, QA Analyst, QA Executive, Quality Engineer, Release Manager, Software Tester, Test Engineer, Solution Architect, System Architect, Technical Architect, Application Consultant
18	2522	Information Technology System Administrators	Customer Support Engineer, Customer Support Officer, Product Support Engineer, Product Support Officer; System Administrator

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Financial Services: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

Financial Services Clusters: (1) Banking; (2) Insurance; (3) Wealth Management; (4) Islamic Finance

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
1	1211	Finance Managers	Financial Reporting Analyst; Tax Manager; Credit Risk Management
2	1212	Human Resource Managers	Human Capital/ Human Resource Manager
3	1214	Business Services Managers	Production and operation/business manager; Business services/development manager
4	2411	Accountants	Accountant/ Chartered Accountant; Auditor; Tax Consultant; Tax Manager
5	2412	Financial and Investment Advisers	Anti-Money Laundering Specialist
6	2413	Financial Analysts	Financial Analyst; Research Analyst; Debt Analyst; Equity Analyst; Investment Analyst; Underwriters; Financial Officer
7	2421	Management and Organization Analysts	Claims Executive
8	2423	Personnel and Career Professionals	Human Resource Professionals
9	2511	Systems Analysts	System Analyst

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Financial Services: Critical Occupations with Job Titles

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Financial Services Clusters: (1) Banking; (2) Insurance; (3) Wealth Management; (4) Islamic Finance

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
10	2514	Applications Programmers	Software Analyst
11	3312	Credit and Loans Officer	Loan Officer; Credit Analyst; Credit Officer; Credit Risk Officer
12	2611	Lawyers	Legal Managers
13	1330	Information and Communications Technology Services Manager	Software Analyst; Data Warehouse Specialist/ Modellers/ Scientists; Digital Banking/ Internet Technology Specialists; Integration Technology Specialists; IT security specialists; Big Data/ Hadoop Engineer; Cloud specialists; PMO Manager
14	N/A	Shariah Professionals	Shariah Officers; Islamic Business Head; Shariah Compliance Officer; Product Manager; Shariah Auditor
15	2120	Mathematicians, Actuaries and Statisticians	Appointed Actuary; Pricing Actuary; Valuation Actuary
16	N/A	Product developer and specialists	Trade product specialist; Product manager; Islamic product manager; Credit and lending product developers
17	N/A	Business developer	Project managers; Business analyst
18	N/A	Relationship manager	Sales manager; Sale analyst; Client relationship manager; Wealth managers; Financial planner; Corporate finance advisor; High-net-worth client advisor

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Financial Services: Critical Occupations with Job Titles

Based on Top-down and Bottom-up evidence

Financial Services Clusters: (1) Banking; (2) Insurance; (3) Wealth Management; (4) Islamic Finance

No.	MASCO ¹	Critical Occupations	Examples of Job Titles within Critical Occupations ²
19	N/A	Risk management officers	Compliance officer; Market risk officer; Credit risk officer; Operational risk officer; Risk manager; Risk analyst; Risk modeller
20	N/A	Traders and dealers	Forex traders; Fixed income traders; Treasury dealers; Treasury analyst
21	N/A	Compliance officer	Compliance officer; Shariah compliance officers; Compliance analyst
22	N/A	Claims management officer	Claims manager; Claims officer; Claims underwriter
23	N/A	Underwriter	Non-motor underwriters; General insurance underwriters
24	N/A	Marketing officer	Marketing communications specialist

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PAST RESEARCHES FINDINGS

A Study on Manpower Requirements for East Coast Economic Region (ECER)

Current and Future Talent needs in Ecotourism

State	Kelantan			Terengganu		
Highly Skilled & Skilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Managers	-Operation Manager			-Marketing Manager -HR Manager		
Professionals				-Accountant -IT Executive		
Technicians & associate professionals						
Semi-Skilled & Unskilled Worker						
Job Category		2015	2020	Job Type	2015	2020
Clerical support worker	-Receptionist			-Receptionist		
Service & sales worker	-Tourist guide			-Tourist Guide		
Semi-skilled agricultural				-Agricultural Workers		
Craft & related trades				-Craft Workers		
Plant and machine operators & assemblers						
Elementary occupations				-Cleaning Workers		

Highly skilled and Skilled

- The projection indicates slightly critical talent needs in 2015 & 2020 for job types i.e. operation manager.

Semi-Skilled & Unskilled

- The projection also indicates critical talent needs in 2020 for job type i.e. Craft Workers

Indicator			
Demand needs	Very critical	Critical	Slightly critical

PAST RESEARCHES FINDINGS (' cont.)

A Study on Manpower Requirements for East Coast Economic Region (ECER)

Current and Future Talent needs in Culture and Heritage

State	Kelantan			Terengganu		
Highly Skilled & Skilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Managers	-Operation Manager			-Marketing Manager		
Professionals				-Accountant		
Technicians & associate professionals				-Technician (maintenance)		
Semi-Skilled & Unskilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Clerical support worker	-Receptionist			-Receptionist		
Service & sales worker	-Tourist guide			-Tourist Guide		
Semi-skilled agricultural				-Agriculture Workers		
Craft & related trades				-Textile Craft Worker		
Plant and machine operators & assemblers				-Machine Operator		
Elementary occupations				-Cleaning Worker		

Highly skilled and Skilled

- The projection indicates more slightly critical talent needs in 2015 & 2020 for job types i.e. Accountant & Managers.

Semi-Skilled & Unskilled

- The projection also indicates more critical talent needs in 2020 for job type i.e. Machine Operators, Cleaning Workers

Indicator			
Demand needs	Very critical	Critical	Slightly critical

PAST RESEARCHES FINDINGS (' cont.)

A Study on Manpower Requirements for East Coast Economic Region (ECER)

State	Kelantan			Terengganu		
Highly Skilled & Skilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Managers	-Resort manager			-Marketing Manager		
Professionals	-Chef -Accountant -Diver			-SPA Therapist -Chef -Accountant -Diver		
Technicians & associate professionals	-Technician (Maintenance)			-Technician (maintenance)		
Semi-Skilled & Unskilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Clerical support worker	-Receptionist			-Receptionist		
Service & sales worker	-Tourist Guide			-F&B Staff -Tourist Guide		
Elementary occupations	-Housekeeping -Security Guard -Driver			-Cleaner -Boatman -Gardeners		
State	Pahang			Mersing (Johor)		
Highly Skilled & Skilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Managers	-Marketing Manager -Resort Manager					
Professionals	-Diving Instructor			-Chef		
Semi-Skilled & Unskilled Worker						
Job Category	Job Type	2015	2020	Job Type	2015	2020
Clerical support worker	-Receptionist					
Service & sales worker	-F&B Staff					

Current and Future Talent needs in Coastal and Island

Highly skilled and Skilled

- The projection indicates more critical talent needs in 2015 & 2020 for job types i.e. Resort Manager, Marketing Manager.

Semi-Skilled & Unskilled

- The projection also indicates more of very critical talent needs in 2015 & 2020 for job type i.e. Receptionist, Tourist Guide.

Highly skilled and Skilled

- The projection indicates more of slightly critical talent needs in 2015 & 2020 for job types of Marketing Manager, Driving Instructor, etc.















Semi-Skilled & Unskilled

- The projection also indicates more of slightly critical talent needs in 2015 & 2020 for job type of Receptionist and F&B Staff

PAST RESEARCHES FINDINGS (' cont.)

A Study on Manpower Requirements for East Coast Economic Region (ECER)

Current and Future Talent needs in Automotive Sector




State	Pahang		
Highly Skilled & Skilled Worker			
Job Category	Job Type	2015	2020
Managers	-Legal Manager -Operations And Production Manager -Quality Controller Manager		
Professionals	-Body Shop Engineer -Paint Shop Engineer -Logistic Engineer -Mechanical Engineer -Production Engineer -QC/QA Engineer		
Technicians & associate professionals	-Technical Assistant -Welders -Human Capital Officer -Procurement Officer		
Semi-Skilled & Unskilled Worker			
Job Category	Job Type	2015	2020
Clerical support worker	-Clerical Worker		
Service & sales worker	-Sales Worker		
Plant and machine operators & assemblers	-Sprayer -Machine Operators		
Elementary occupations	-Cleaners		
Related trades			

Highly skilled and Skilled

- The projection indicates more of very critical talent needs in 2015 & 2020 for job types i.e. Legal, Operation, Quality Control Managers etc.

Semi-Skilled & Unskilled

- The projection also indicates more of very critical talent needs in 2015 & 2020 for job type i.e. Clerical, Sales Worker, Sprayer Workers etc.

Indicator			
Demand needs	Very critical	Critical	Slightly critical

A Study on Human Capital Requirement for the Greater Kuala Lumpur

Talent Supply-Demand Assessment by Industries

i. Transportation (MRT and High Speed Rail)

- The rail industry in Malaysia is growing and in need of talent, especially those with technical skills that are directly related to the industry. **Technical manpower needs in this industry is expected to triple from approximately 5,500 currently to 16,000 people.** The overall workforce in Malaysia's rail industry in 2014 consists of approximately 13,000 employees.
- Approximately 40% (5,500) are within the technical segment, in which about 90% (4,950) are based in GKL/KV. In terms of level of experience, approximately 85% of this technical workforce are experienced hire while 15% are fresh graduates. Meanwhile, majority of them are semi-skilled workers with only about 10% skilled.

Some of the key challenges faced by industry players in talent attraction and development are:

- Lack of skilled and experienced workers with knowledge in operations, signalling and maintenance
- Specialists are mostly foreigners. The industry as a whole is still in the state of transfer-of-knowledge, especially in areas of testing and commissioning in systems testing, integration and commissioning
- Industry talents who have experience are poached by competitors or they leave to work in other countries that can offer them higher pay or expatriate package (e.g. Singapore, Middle East)
- Lack of dedicated rail courses in the local universities (both private and government institutions)

2. A Study on Human Capital Requirement for the Greater Kuala Lumpur

Talent Supply-Demand Assessment by Industries

ii. Shared Services and Outsourcing (Knowledge Process Outsourcing – Financial Services)

The KPO industry in Malaysia currently employs about 4,300 people, in which more than 80% (~3,400) are based in GKL/KV. Approximately 90% are experienced talent while the remaining 10% are fresh graduates. As financial services contribute more than 50% to Malaysia's SSO industry, assessment of the future talent supply and demand requirements for the KPO industry are focused on the financial services sub-segment

Currently, employment by the KPO industry makes up about 7% of the total SSO industry, with a target to significantly increase this proportion by 2020 via various initiatives. Thus, supply-demand assessment in the second scenario is based on the assumption that employment by the KPO industry will make up ~15% of the total employment in the SSO industry in 2020. Given that SSO is projected to grow at 12% CAGR moving forward, KPO is expected to grow at a higher CAGR of 27% from 2014-2020 to achieve a 15% proportion of total SSO employment by 2020.

Supply of financial graduates will still be sufficient to meet the increase in demand by the KPO financial services industry with a surplus of more than 7,000 graduates in 2020. The surplus however is based on the demand by financial services companies in the KPO industry and does not include the demand by companies in other industries for the same pool of graduates.

PAST RESEARCHES FINDINGS ('cont.)

2. A Study on Human Capital Requirement for the Greater Kuala Lumpur

Talent Supply-Demand Assessment by Industries

iii. Oil and Gas (upstream)

There are approximately 20,000 people who are employed in the oil and gas upstream industry in Malaysia currently, in which close to 90% or approximately 17,500 are based in GKL/KV. Out of this, a majority (80%) are skilled workers while semi-skilled workers represent about 12% of the total workforce. Entry level talent constitutes about 20% of the workforce.

The supply of graduates is expected to be sufficient in meeting the entry-level skilled talent demand of the upstream industry up to 2020 (based on demand from upstream oil & gas companies but excluding demand from companies in other industries for the same pool of graduates). The estimation factors in graduates with engineering or geosciences background who have the skills to be employed in the oil and gas upstream industry.

Overall, the quantity of graduates is sufficient to meet the entry-level talent demand of companies in this industry. However, industry players still find it difficult to hire skilled talent for specific technical positions such as structural engineers and geoscientists. Industry players have indicated that while many fresh graduates have good academic results, some lack hands-on experience and have difficulty applying what they have learned.

Employers sometimes find it challenging to hire graduates who understand engineering terminologies/concepts, able to interpret engineering designs, prepare and read machine drawings, as well as have knowledge of codes, standards and robotics (for drilling machines). Talent with relevant experiences and strong technical skills are in demand.
















There is also a lack of awareness on the demands of the upstream industry among some fresh graduates. This leads to some of them quitting the industry halfway because they are unable to endure the working conditions.

PAST RESEARCHES FINDINGS


3. A Study on Human Capital Requirement for the Sarawak Corridor of Renewable Energy (SCORE)

Fresh Graduate Talent Supply-Demand by Selected Critical Job Titles

Bars indicate tight/shortage of fresh graduate labour supply pool

Job Title	Industry	2016	2018	2020
Welders	Steel, Aluminium, Shipbuilding, Oil & Gas, Construction			
CNC Machinists	Steel, Aluminium, Shipbuilding, Construction			
Tour Guides	Tourism			
Mechanics (Heavy Vehicles)	Logistics			
Mechanical Engineers	Steel, Aluminium, Shipbuilding, Oil & Gas, Construction			

Legend:

-  Shortages
-  Tight supply pool
-  Adequate supply

Note: Critical job titles are defined as jobs that are critical to the industry's growth presently or jobs that are of concern to industry players due to qualitative factors, and not necessarily jobs that are facing shortages.

PAST RESEARCHES FINDINGS (cont.)

3. A Study on Human Capital Requirement for the Sarawak Corridor of Renewable Energy (SCORE)

Summary of Talent Demand

The findings so far show that the most in-demand jobs are for the semi-skilled/trade workers

Skill Level	Jobs	Level of Demand
Semi-Skilled	Electrician	High
Semi-Skilled	Tour Guide	High
Semi-Skilled	Technician: QC, Process, Instruments	High
Semi-Skilled	Mechanics: Machine	High
Semi-Skilled	Mechanics: Heavy Vehicles	High
Semi-Skilled	Crane Operator: Logistics & Construction	High
Semi-Skilled	Machinists: Lathe and CNC	High
Semi-Skilled	Motor Grader Operator	Medium
Semi-Skilled	Welders/Fitters/Markers	Medium

Skilled	Mechanical Engineer	High
Skilled	Electrical Engineer	High
Skilled	Health & Safety Officer	High
Skilled	Quantity Surveyor	Medium
Skilled	Tour Operator	Medium