OCCUPATIONAL FRAMEWORK
SECTION C: MANUFACTURING
DIVISION 26: MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS

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ABSTRACT

An Occupational Framework (OF) is the outcome of the analysis conducted in identifying the work scope of the occupational areas in terms of competencies. It is used to analyse skilled manpower competency requirements for the industry. The OF aims to provide an overall view of the industry's OS and identify skills gaps, critical job titles and Occupational Descriptions that would assist in further understanding the job requirements of the various occupations in the industry. Jabatan Pembangunan Kemahiran (JPK) or in English, the Department of Skills Development (DSD) is the custodian of this document, where via the OF will identify suitable occupational areas which will either require development of skills training programmes or the review and enhancement of existing skills training programmes. Research findings have shown that there are 2 main sub-sectors of the Electronics Manufacturing industry, which are Electronics Components Manufacturing (MSIC Group 261) and Electronics Products Manufacturing (MSIC Group 262-268). However, the Occupational Structure is similar for Groups 262 until Group 268, where only the type of Electronic Product is different. There is an overall total of 318 job titles. The majority of job titles are at level 5, 6 and 7 as the industry requires workers with the capability to perform complex problem solving, analysis and planning. A total of 104 critical job titles have been identified in the job areas of Manufacturing and Engineering. Critical jobs are defined as jobs where there are either insufficient workers and require skills training to train more workers or jobs where there are existing workers but require training to bridge the skills gaps. There are 72 jobs relevant to Industry 4.0 mostly under the Manufacturing job area ranging from Operator to Engineer level. Based on focus group discussions and survey responses, the Skills In Demand that have been identified are technical skills (programming, technical drawing, product understanding), communication skills, trouble shooting skills, problem solving skills, skills to escalate issues to superior and basic computer knowledge using office productivity software. Emerging skills which are mainly related to Industry 4.0 (optimisation and utilisation of automation systems) and innovation for continuous improvement are also seen to be in demand by the industry in the near future and should be embedded in the National Occupational Skills Standard (NOSS). In terms of NOSS to be developed, it is recommended that the existing NOSS be reviewed as to fit the MSIC 2008 segmentation with most NOSS to be reviewed at Level 1-3.

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LIST OF ABBREVIATIONS

CBT	Competency Based Training
DESCUM	Development of Standard and Curriculum
ILB	Industry Lead Body
E&E	Electrical & Electronics
ISIC	International Standard Industrial Classification
JPK	*Jabatan Pembangunan Kemahiran* (Department of Skills Development)
MIDA	Malaysian Investment Development Authority
MOSQF	Malaysian Occupational Skills Qualification Framework
MQA	Malaysian Qualification Agency
MQF	Malaysian Qualifications Framework
MSC	Malaysian Skills Certificate
MSIC	Malaysia Standard Industrial Classification
NCS	National Competency Standards
NKEA	National Key Economic Areas
NOSS	National Occupational Skills Standard
OF	Occupational Framework
OD	Occupational Description
OS	Occupational Structure

CHAPTER 1: INTRODUCTION

1.1 Chapter Introduction

This chapter will explain the objectives, scope and justification for the development of the Occupational Framework for the Manufacture of Computer, Electronic and Optical Products. The concept of the Occupational Framework and its function in skills training and curriculum development is also elaborated in this chapter.

1.1.1 Research Background

The Department of Skills Development (DSD) has conducted previous research on the Electronics Industry where the first project was the Occupational Job Structures for the Electronics Industry Sector in the year 2009. This was followed by the review of the industry which then combined both of the Electrical and Electronics Industry into one document, resulting in the Occupational Analysis on the Electrical and Electronics Industry in the year 2015.

However, there has not been specific research on the Occupational Structure of the industry based on the Malaysian Standard Industry Classification (MSIC) definition of the industry which is the Manufacture of Computer, Electronic and Optical Products. It is defined in the MSIC under Section C, which is manufacturing and Division 26 which is Manufacture of Computer, Electronic and Optical Products. In order to ensure the development of the Occupational Framework is in line with the development of the NOSS based on MSIC sections and divisions, therefore this research aims to define the industry as specified in the MSIC based on qualitative research on its Occupational Structure, Critical Jobs and Skills in Demand.

1.1.2 National Skills Development Act, 2006 (Act 652)

The National Skills Development Act, 2006 (Act 652) came into effect on 1st September 2006 after it was officially gazetted on 29th June 2006, with the mandate of promoting, through skills training, the development and improvement of a person's abilities, which are needed for vocation, and to provide for other matters connected therewith. The Act 652 is significant because for the first time in the history of skills training in Malaysia, a national legislation has been enacted

solely and exclusively for skills training and development. In addition, the meaning and scope of skills training have been clarified and given a statutory interpretation that can be used to distinguish it from other components of the country's national education and training system. The Act 652 also provides for the implementation of a Malaysian Skills Certification System, leading to the award of five (5) levels of national skills qualification, namely Malaysian Skills Certificate Level 1, 2 and 3; Malaysian Skills Diploma; and Malaysian Skills Advanced Diploma.

1.1.3 Malaysian Qualification Act, 2007 (Act 679)

The Malaysian Qualification Act 2007 (Act 679) which was adopted on the 29th August 2007, Establishes the Malaysian Qualifications Agency, sets out its composition, functions and responsibilities. This act repeals the *Lembaga Akreditasi Negara Act* 1996 [Act 556] and dissolves *the Lembaga Akreditasi Negara.* The Malaysia Qualification Framework (MQF) refers to the policy framework that satisfies both the national and international recognised qualifications. It consists of titles and guidelines, together with principles and protocols covering articulation and issuance of qualifications and statements of attainment. Elements of the qualifications framework indicate the achievement for each qualification title. It will also provide progression routes for all the graduates in the respective occupational fields. The MQF has eight levels of qualifications in three sectors and it is supported by lifelong education pathways as shown in Figure 1.1. JPK governs the skills sector, in which there are five (5) levels of skills qualification. The definition for each level of skills qualification is specified in the Malaysian Occupational Skills Qualification Framework (MOSQF).

	Sectors	

<table>
<tr><th>MQF Levels</th><th>Skills</th><th>Vocational and Technical</th><th>Higher Education</th><th>Lifelong Learning</th></tr>
<tr><td>8</td><td rowspan="3"></td><td rowspan="3"></td><td>Doctoral Degree</td><td rowspan="8">Accreditation of Prior Experiential Learning (APEL)</td></tr>
<tr><td>7</td><td>Master Degree</td></tr>
<tr><td>6</td><td>Bachelor Degree</td></tr>
<tr><td>5</td><td>Malaysian Advanced Skills Diploma</td><td>Advanced Diploma</td><td>Advanced Diploma</td></tr>
<tr><td>4</td><td>Malaysian Skills Diploma</td><td>Diploma</td><td>Diploma</td></tr>
<tr><td>3</td><td>Malaysian Skills Certificate 3</td><td rowspan="3">Vocational and Technical Certificate</td><td>Certificate</td></tr>
<tr><td>2</td><td>Malaysian Skills Certificate 2</td><td rowspan="2"></td></tr>
<tr><td>1</td><td>Malaysian Skills Certificate 1</td></tr>
</table>

Figure 1.1: Malaysian Qualifications Framework (MQF) Chart

(Source: Malaysian Qualifications Agency (MQA).2013)

1.1.4 National Occupational Skills Standard (NOSS)

The National Occupational Skills Standard (NOSS) is defined as a specification of the competencies expected of a skilled worker who is gainfully employed in Malaysia for an occupational area, level and pathway to achieve the competencies and is gazetted in Part IV of the National Skills Development Act, 2006 (Act 652). NOSS is developed by industry experts based on the needs of the industry and is utilised as the main tool in the implementation of Malaysian Skills Certification System in which the performance of existing industry workers and trainees are assessed based on the NOSS to award the Malaysian Skills Certificate.

1.1.5 Competency Based Training (CBT)

Competency Based Training (CBT) is an approach to vocational training which emphasises what a person can do in a work place as a result of education and training obtained. CBT is based on performance standards which are set by the industry with main focus on measuring the performance while taking into account knowledge and attitude rather than the duration taken to complete the course. CBT is a learner-centric, outcome-based approach to training which allows each

individual to develop skills at their own pace for a similar outcome. Thus, training practices can be customised for each individual to achieve a similar outcome. CBT concept is the basis of Malaysian Skills Certification system which is coordinated by JPK.

1.1.6 Occupational Framework (OF)

The Occupational Framework (OF) is described as the outcome of the occupational analysis process to identify the occupational structure of an industry. The OF which was previously known as Occupational Analysis (OA) consists of Occupational Structure (OS), Occupation Description (OD) and Skills in Demand.

The development of the OF is a preliminary process in developing relevant NOSS. Once developed, the NOSS can be used as the basis to conduct skills training and skills certification of competent personnel.

1.1.7 Malaysian Standard Industrial Classification (MSIC)

The MSIC is intended to be a standard classification of productive economic activities. Its main purpose is to provide a set of activity categories that can be utilised for the collection and presentation of statistics according to such activities. Therefore MSIC aims to present these set of activity categories in such a way that entities can be classified according to the economic activity that they carry out. For purposes of international comparability, the MSIC 2008 Version 1.0 conforms closely to the International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4, published by the United Nations Statistics Division, with some modifications to suit national requirements. The objective of an industrial classification system is to classify data in respect of the economy according to categories of activities and the characteristics of which will be similar. The MSIC is a classification of all types of economic activities and is not a classification of goods & services nor is it a classification of occupations.[1]

1.2 Objectives Of Study

[1] MSIC 2008, Department of Statistics Malaysia.

The objectives of the study conducted on the Electronic Products Manufacturing industry are as below and can be referred in Figure 1.2:

a. To produce the OS for the Electronic Products Manufacturing industry from data analysis, interviews and focus group;
b. To produce Occupational Descriptions (OD) of job titles in the aforesaid OS;
c. To identify the Skills in Demand in the Electronic Components and Products Manufacturing industry; and
d. To identify the Critical Jobs in the Electronic Components and Products Manufacturing industry.

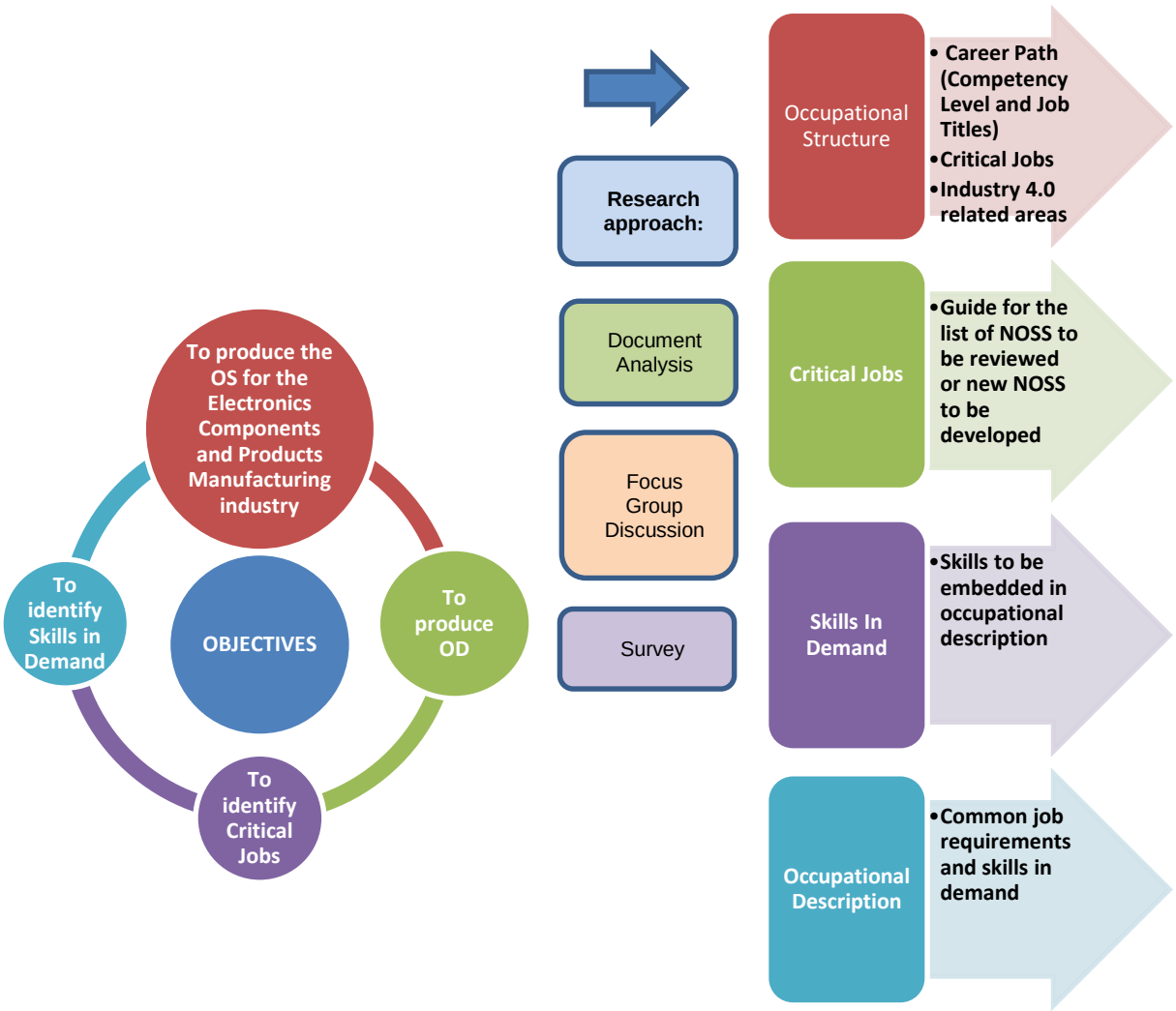


Figure 1.2: Objectives, Data Collection and Occupational Framework Outcomes

1.3 Scope of Study

The scope of work for the study conducted on the Electronic Components and Products Manufacturing industry are as listed below:

a. The scope of this research is only on jobs under MSIC Section C, Division 26, which involves the manufacturing of electronic components and products and does not include the retail and after sales services such as repair and maintenance of the electronic products;
b. To conduct literature review on the Electronic Components and Products Manufacturing industry;
c. To consult with Electronic Products Manufacturing industry representatives to obtain expert input from industry;
d. The expected outcome of the research will be the OS, OD, Jobs in demand and Skills in demand;
e. To develop and disseminate the survey, then to subsequently analyse survey responses from Electronic Products Manufacturing industry representatives; and
f. To perform focus group discussion with the industry representatives, interviews, site visits and/or any other methods in order to achieve the study outcome.

1.4 Justification for MSIC Section Selection

The justification for the selection of MSIC's Section C, Manufacturing and Division 26 for this particular Occupational Framework is as follows:

a. The scope of the Electronics Products Manufacturing industry matches that of Division 26 under Section C: Manufacturing after analysing the scope of work and list of electronics products and components under the Groups of Division 26.(Please refer Table 1.1)
b. Division 26 does not include retail or after sales repair and maintenance jobs which is in line with the scope of the research that only focuses on the jobs involved in the overall manufacturing process.
c. The current NOSS registry (May 2018) has stated that the NOSS relevant to the industry are under Section C, Division 26.

In order to understand the co-relation between the scope of the MSIC groups in this particular research and industry definition provided by various resources, Table 1.1 can be referred. The table below shows the mapping between sub-sectors of the industry and the Groups under Section C's Division 26.

Table 1.1: Mapping between MSIC Group and Industry Definition

MSIC GROUP	MSIC Group Description	MSIC Group Scope	Industry Definition
261	Manufacture of electronic components and boards	This group includes the manufacture of semiconductors and other components for electronic applications.	Semiconductors, passive components, printed circuit boards, metal stamped parts and precision plastic parts. (Refer MIDA definition for Components Electronics)
262	Manufacture of computers and peripheral equipment	This group includes the manufacture and/or assembly of electronic computers, such as mainframes, desktop computers, laptops and computer servers; and computer peripheral equipment, such as storage devices and input/output devices (printers, monitors, keyboards)	Multimedia and information technology products such as computers and computer peripherals, telecommunications equipment and office equipment. (Refer MIDA definition for industrial electronics)
263	Manufacture of communication equipment	This group includes the manufacture of telephone and data communications equipment used to move signals electronically over wires or through the air such as radio and television broadcast and wireless	

MSIC GROUP	MSIC Group Description	MSIC Group Scope	Industry Definition
		communications equipment.	
264	Manufacture of consumer electronics	This group includes the manufacture of electronic audio and video equipment for home entertainment, motor vehicle, public address systems and musical instrument amplification.	Audio visual products such as television receivers, portable multimedia players (PMP), speakers, cameras and electronic games. (Refer MIDA definition for Consumer Electronics)
265	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	This group includes the manufacture of measuring, testing, navigating and control equipment for various industrial and non-industrial purposes, including time-based measuring devices such as watches and clocks and related devices.	Avionic systems include communications, navigation, display, and management of multiple systems, and the hundreds of systems that are fitted to aircraft to perform individual functions. (Researcher's summary of avionics definition) Other items under this MSIC group are similar to the MSIC scope and do not have a specific definition such as aviation electronics as they are not highly regulated.
266	Manufacture of irradiation, electro medical and		The definition of a medical device is in accordance with the global harmonized (GHTF)

MSIC GROUP	MSIC Group Description	MSIC Group Scope	Industry Definition
	electrotherapeutic equipment		definition which covers any products used in healthcare for the diagnosis, prevention, monitoring or treatment of illness or handicap but excludes drugs (Medical Device Authority. Ministry of Health Malaysia.) (Referred from the Medical Devices Authority's definition)
267	Manufacture of optical instruments and photographic equipment	This group includes the manufacture of optical instruments and lenses, such as binoculars, microscopes (except electron, proton), telescopes, prisms and lenses (except ophthalmic); the coating or polishing of lenses (except ophthalmic); the mounting of lenses (except ophthalmic) and the manufacture of photographic equipment such as cameras and light meters.	There is no specific industry definition for products under this group therefore the scope is similar to the MSIC scope provided.
268	Manufacture of magnetic and optical media	This group includes the manufacture of magnetic and optical recording media.	There is no specific industry definition for products under this group therefore the scope is

MSIC GROUP	MSIC Group Description	MSIC Group Scope	Industry Definition
			similar to the MSIC scope provided. Based on the technology available in the year 2018 and depending on the size of the magnetic and optical media, the items listed under this group are considered as consumer electronics (for smaller sized storage) whereas for larger sized storage are considered as industrial electronics.

1.5 Chapter Conclusion

This chapter sets out the research background comprising of the legislations that are pertinent to this document (i.e. National Skills Development Act 2006 (Act 652) and Malaysian Qualification Act 2007 (Act 679)), the Malaysian Qualifications Framework (MQF), definitions of the NOSS, OF and Competency Based Training. All of which are important elements of skills training in Malaysia that should be understood by the reader beforehand.

The objectives, scope and justification of this research have also been explained in this chapter. This research aims to define the industry based on qualitative research on its Occupational Structure, Jobs in Demand and Skills in Demand.

The occupational structure or career path will be determined in the research via focus group discussions and industry surveys, where these findings will be presented and discussed in Chapter 4 of this report. However through preliminary information, it can be seen that the norm based on the qualification levels of the workers, the starting level for non-certificate and certificate holders is as operators or technicians then with diploma level qualifications they may progress as senior operators or senior technicians. With advanced

diploma or degree level qualifications the entry level may be as engineers, where at the higher management levels based on experience and performance in the company, these employees will be competent to accept the responsibility as Staff Engineers or Managers (depending on the job area) and then as Senior Managers or Senior Staff Engineers.

Skills in demand have been determined and confirmed through the industry survey responses and presented in Chapter 4, however through earlier discussions with members of the industry, the common skills in demand are such as:

a. Communication skills;
b. Technical skills in engineering and manufacturing (i.e. programming, technical drawing and product understanding);
c. Troubleshooting and problem solving skills; and
d. Escalation of issues to superior.

Emerging skills identified are such as Industry 4.0 related skills (i.e. automation and ability to utilise, maintain and optimise systems related to Industry 4.0) and innovation for continuous improvement (i.e. Kaizen skills).

With the Occupational Structure and Skills in Demand identified, the job scopes of the different professions involved in this industry will be clearer and therefore the development and management of human resources will be more in tune to the demands of the overall Electronics Manufacturing Industry. Thus, development of this OF will enable the relevant stakeholders to take necessary strategic actions to meet the industry's human capital requirements.

This document is divided into several chapters, the following chapter, Chapter 2 includes the industry overview highlighting the definition and scope of the industry, stakeholders, legislation, initiatives and industry & market intelligence of the industry. The third chapter will explain the methodology used in the OF development such as qualitative analysis through Focus group discussions and industry surveys. Chapter 4 will discuss the findings of the focus groups and surveys conducted that will be translated into the Occupational Structure, Occupational Description, Jobs in Demand, Skills in Demand and Emerging Skills. Ultimately, Chapter 5 will recommend the NOSS or NCS that should be developed based on the critical jobs identified in this OF and the skills in demand plus emerging skills that should be included in the NOSS and skills training curriculum under JPK.

CHAPTER 2: LITERATURE REVIEW

2.1 Chapter Introduction

This chapter provides a brief overview of the Electronics Components and Products Manufacturing Industry in Malaysia and its stakeholders, related legislations, key government initiatives & policies and industry intelligence.

Findings in this chapter were obtained primarily through literature review/document analysis and subsequently confirmed by the development panel members in focus group discussions and industry surveys.

2.2 Definition Of Research Area

In order to ensure that the scope of the industry is comprehensively covered in this Occupational Framework research, the definition of industry has to be spelt out clearly.

The definitions specified by the MSIC and industry definition by the Malaysian Investment Development Authority (MIDA) are as follows:

2.2.1 MSIC 2008 Definition of Electronics Manufacturing

Under MSIC 2008, the area being researched falls under the Sections and Divisions listed in the following Table 2.1.

Table 2.1: MSIC Definition of Electronics Manufacturing

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**261**	Manufacture of electronic components and boards
	262	Manufacture of computers and peripheral equipment
	263	Manufacture of communication equipment
	264	Manufacture of consumer electronics
	265	Manufacture of measuring, testing, navigating and control equipment; watches and clocks
	266	Manufacture of irradiation, electro medical and electrotherapeutic equipment
	267	Manufacture of optical instruments and photographic equipment
	268	Manufacture of magnetic and optical media

Division 26 includes the manufacture of computers, computer peripherals, communications equipment, and similar electronic products, as well as the manufacture of components for such products. Production processes of this division are characterized by the design and use of integrated circuits and the application of highly specialized miniaturization technologies. The division also contains the manufacture of consumer electronics, measuring, testing, navigating, and control equipment, irradiation, electro medical and electrotherapeutic equipment, optical instruments and equipment, and the manufacture of magnetic and optical media.[2]

2.2.2 Industry Definition of Electronics Manufacturing

Based on the industry definition by the MIDA, the Electronics sub-sector in the Electrical & Electronics (E&E) industry in Malaysia can be categorised as shown in Table 2.1. However, more specific definitions of the sub-sectors can be referred in Table 1.1 of this report.

[2] MSIC 2008, Department of Statistics Malaysia.

Table 2.2 MIDA Industry Definition

Sectors	Sub-Sectors	Products
Electronics	Components	Semiconductors, passive components, printed circuit boards, metal stamped parts and precision plastic parts
	Consumer	Audio visual products such as television receivers, Portable Multimedia Players (PMP), speakers, cameras and electronic games
	Industrial	Multimedia and information technology products such as computers and computer peripherals, telecommunications equipment and office equipment.

(Source: Malaysian Investment Development Authority (MIDA). 2018)

2.3 Scope Of Occupational Framework Based On MSIC 2008

To further understand the scope of this particular Occupational Framework based on MSIC 2008, the following Table 2.3 through Table 2.14 can be referred.

Table 2.3: MSIC Section, Division and Group

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**261**	**Manufacture of electronic components and boards**
	262	**Manufacture of computers and peripheral equipment**
	263	**Manufacture of communication equipment**
	264	**Manufacture of consumer electronics**
	265	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**
	266	**Manufacture of irradiation, electro medical and electrotherapeutic equipment**
	267	**Manufacture of optical instruments and photographic equipment**
	268	**Manufacture of magnetic and optical media**

Table 2.4: MSIC Group 261 (Class 2610, Item 26101-26102)

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**261**	**Manufacture of electronic components and boards**
MSIC CLASS	**2610(1)**	**Manufacture of electronic components and boards**
MSIC ITEM	**26101(2)**	**Manufacture of diodes, transistors and similar semiconductor devices**
	26102(3)	**Manufacture electronic integrated circuits micro assemblies**

(1) Excludes:

(a) printing of smart cards, see 1811

(b) manufacture of modems (carrier equipment), see 2630

(c) manufacture of computer, see 26201 and television displays, see 26400

(d) manufacture of X-ray tubes and similar irradiation devices, see 26600

(e) manufacture of optical equipment and instruments, see 2670

(f) manufacture of similar devices for electrical applications, see division 27

(g) manufacture of lighting ballasts, see 27101

(h) manufacture of electrical relays, see 27102

(i) manufacturing of electrical wiring devices, see 2733

(j) manufacture of complete equipment is classified elsewhere based on complete equipment classification

(2) Includes:

(a) manufacture of diodes, transistors, and related discrete devices

(b) manufacture of dice or wafers, semiconductor, finished or semi-finished

(c) manufacture of light emitting diodes (LED)

(3) Includes:

(a) manufacture of microprocessors

(b) manufacture of integrated circuit (analogue, digital or hybrid) (c) manufacture of optical cable sets or assemblies

26103 Manufacture of electrical capacitors and resistors(1) 32102p

26104 Manufacture of printed circuit boards(2) 32102p

26105 Manufacture of display components(3) 32102p

26109 Manufacture of other components for electronic applications(4) 32109

Table 2.5: MSIC Group 261 (Class 2610, Item 26103-26109)

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**261**	**Manufacture of electronic components and boards**
MSIC CLASS	**2610**	**Manufacture of electronic components and boards**
MSIC ITEM	**26103**	**Manufacture of electrical capacitors and resistors(1)**
	26104	**Manufacture of printed circuit boards(2)**
	26105	**Manufacture of display components(3)**
	26109	**Manufacture of other components for electronic applications(4)**

(1) Includes:

(a) manufacture of capacitors, electronic

(b) manufacture of resistors, electronic

(2) Includes:

(a) manufacture of bare printed circuit boards

(b) loading of components onto printed circuit boards

(c) printed circuit boards assemblies

(3) Includes:

(a) manufacture of electron tubes

(b) manufacture of display components (plasma, polymer, LCD)

(4) Includes:

(a) manufacture of solenoids, switches and transducers for electronic applications

(b) manufacture of interface cards (e.g. sound, video, controllers, network)

(c) manufacture of printer cables, monitor cables, USB cables, connectors, etc.

(d) manufacture of internal/external computer modems

(e) manufacture of electronic component-type connectors, sockets, and switches

(f) manufacture of inductors (e.g. chokes, coils, transformers), electronic component type

(g) manufacture of electronic crystals and crystal assemblies

(h) manufacture of other components for electronic applications n.e.c.

Table 2.6: MSIC Group 262 (Class 2620, Item 26201-26602)

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**262**	**Manufacture of computers and peripheral equipment**
MSIC CLASS	**2620(1)**	**Manufacture of computers and peripheral equipment**
MSIC ITEM	**26201**	**Manufacture of computers(2)**
	26202	**Manufacture of peripheral equipment(3)**

(1) Excludes:

(a) reproduction of recorded media (e.g. computer media, sound, video, etc.) see 1820

(b) manufacture of electronic components and electronic assemblies used in computers and peripherals, see 26102

(c) manufacture of internal/external computer modems, see 26109

(d) manufacture of interface cards, modules and assemblies, see 26109

(e) manufacture of modems, carrier equipment, see 2630

(f) manufacture of digital communication switches, data communications equipment (e.g. bridges, routers, gateways), see 2630

(g) manufacture of consumer electronic devices (e.g. CD players and DVD players), see 2640

(h) manufacture of television monitors and displays, see 2640

(i) manufacture of video game consoles, see 2640

(j) manufacture of blank optical and magnetic media for use with computers or other devices, see 2680

(2) Includes:

(a) manufacture of desktop computers

(b) manufacture of laptop computers

(c) manufacture of main frame computers

(d) manufacture of hand-held computers (e.g. PDA)

(3) Includes:

(a) manufacture of magnetic disk drives, flash drives and other storage devices

(b) manufacture of optical CD-RW, CD-ROM, DVD-ROM, DVD-RW, disk drives

(c) manufacture of printers

(d) manufacture of monitors

(e) manufacture of keyboards

(f) manufacture of all types of mice, joysticks and trackball accessories

(g) manufacture of dedicated computer terminal (e.g. automatic teller machines, point-of-sale terminal, etc.)

(h) manufacture of computer servers

(i) manufacture of other peripheral equipment n.e.c. (e.g. scanners, including bar code scanners, smart card readers)

Table 2.7: Group 263 (Class 2630, Item 26300)

MSIC SECTION	**C**	**MANUFACTURING**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**263**	**Manufacture of communication equipment**
MSIC CLASS	**2630(1)**	**Manufacture of communication equipment**
MSIC ITEM	**26300**	**Manufacture of communication equipment**

(1) Includes:

(a) manufacture of central office switching equipment

(b) manufacture of cordless telephones

(c) manufacture of private branch exchange (PBX) equipment

(d) manufacture of telephone and facsimile equipment, including telephone answering machines

(e) manufacture of data communications equipment (e.g. bridges, routers and gateways)

(f) manufacture of transmitting and receiving antenna

(g) manufacture of cable television equipment

(h) manufacture of pagers

(i) manufacture of cellular phones

(j) manufacture of mobile communication equipment

(k) manufacture of radio and television studio and broadcasting equipment, including television cameras

(l) manufacture of local area network and wide area network communication equipment (e.g. bridges, routers, gateways, etc.)

(m) manufacture of modems, carrier equipment

(n) manufacture of burglar and fire alarm systems, sending signals to a control station

(o) manufacture of radio and television transmitters

(p) manufacture of infrared devices (e.g. remote controls)

(q) manufacture of telecommunication equipment for satellites

Excludes:

(a) manufacture of computer and computer peripheral equipment, see 2620

(b) manufacture of consumer audio and video equipment, see 2640

(c) manufacture of electronic components and subassemblies used in communications equipment, see 26102

(d) manufacture of internal/external computer modems (PC-type), see 26109

(e) manufacture of electronic scoreboards, see 27900 (f) manufacture of traffic lights, see 27900

Table 2.8: MSIC Group 264 (Class 2640, Item 26400)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**264**	**Manufacture of consumer electronics**
MSIC CLASS	**2640[(1)]**	**Manufacture of consumer electronics**
MSIC ITEM	**26400**	**Manufacture of consumer electronics**

(1) Includes:

(a) manufacture of video cassette recorders and duplicating equipment

(b) manufacture of televisions

(c) manufacture of television monitors and displays

(d) manufacture of audio recording and duplicating systems

(e) manufacture of stereo equipment

(f) manufacture of radio receivers

(g) manufacture of speaker systems

(h) manufacture of household-type video cameras

(i) manufacture of jukeboxes

(j) manufacture of amplifiers for musical instruments and public address systems

(k) manufacture of microphones

(l) manufacture of CD and DVD players

(m) manufacture of karaoke machines

(n) manufacture of headphones (e.g. radio, stereo, computer)

(o) manufacture of video game consoles

(p) manufacture of other consumer electronics equipment n.e.c.

Excludes:

(a) reproduction of recorded media (computer media, sound, video, etc.), see 1820

(b) manufacture of computer peripheral devices and computer monitors, see 2620
manufacture of telephone answering machines, see 2630

(c) manufacture of paging equipment, see 2630

(d) manufacture of remote control devices (radio and infrared), see 2630

(e) manufacture of broadcast studio equipment such as reproduction equipment, transmitting and receiving antennas, commercial video cameras, see 2630 (f) manufacture of electronic games with fixed (non-replaceable) software, see 3240

Table 2.9: MSIC Group 265 (Class 26510-26511)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**265**	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**
MSIC CLASS	**2651(1)**	**Manufacture of measuring, testing, navigating and control equipment**
MSIC ITEM	**26511**	**Manufacture of measuring, testing, navigating and control equipment(1)**
(1) Includes: manufacture of GPS devices Excludes: (a) manufacture of telephone answering machines, see 2630 (b) manufacture of irradiation equipment, see 2660 (c) manufacture of optical measuring and checking devices and instruments (e.g. fire control equipment, photographic light meters, range finders, etc.), see 26701 (d) manufacture of optical positioning equipment, see 26701 (e) manufacture of dictating machines, see 2817 (f) manufacture of simple mechanical measuring tools (e.g. measuring tapes, callipers, see manufacturing class according to main material used) (g) manufacturing of medical thermometers, see 3250 (h) installation of industrial process control equipment, see 3320		

Table 2.10: MSIC Group 265 (Class 2651, Item 26511-26512)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**265**	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**
MSIC CLASS	**2651**	**Manufacture of measuring, testing, navigating and control equipment(1)**
MSIC ITEM	**26511**	**Manufacture of measuring, testing, navigating and control equipment(2)**
	26512	**Manufacture of industrial process control equipment(3)**

(1) Includes: manufacture of GPS devices

Excludes:

(a) manufacture of telephone answering machines, see 2630

(b) manufacture of irradiation equipment, see 2660

(c) manufacture of optical measuring and checking devices and instruments (e.g. fire control equipment, photographic light meters, range finders, etc.), see 26701

(d) manufacture of optical positioning equipment, see 26701

(e) manufacture of dictating machines, see 2817

(f) manufacture of simple mechanical measuring tools (e.g. measuring tapes, callipers, see manufacturing class according to main material used)

(g) manufacturing of medical thermometers, see 3250

(h) installation of industrial process control equipment, see 3320

(2) Includes:

(a) manufacture of aircraft engine instruments

(b) manufacture of automotive emissions testing equipment

(c) manufacture of meteorological instrument

(d) manufacture of physical properties testing and inspection equipment

(e) manufacture of polygraph machines

(f) manufacture of instruments for measuring and testing electricity and electrical signals (including for telecommunications)

(g) manufacture of radiation detection and monitoring instruments

(h) manufacture of surveying instruments

(i) manufacture of thermometers liquid-in-glass and bimetal types (except medical)

(j) manufacture of humidistat

(k) manufacture of hydronic limit controls

(l) manufacture of flame and burner controls

(m) manufacture of spectrometers

(n) manufacture of pneumatics gauges

(o) manufacture of consumption meters (e.g. water, gas)

(p) manufacture of flow meters and counting devices

(q) manufacture of tally counters

(r) manufacture of mine detectors, pulse (signal) generators; metal detectors

(s) manufacture of search, detection, navigation, aeronautical and nautical equipment, including sonobuoys

(t) manufacture of environmental controls and automatic controls for appliances

(3) Includes:

(a) manufacture of measuring and recording equipment (e.g. flight recorders)

(b) manufacture of motion detectors

(c) manufacture of laboratory analytical instruments (e.g. blood analysis equipment)

(d) manufacture of laboratory type distilling apparatus, laboratory centrifuges, laboratory ultrasonic cleaning machinery

(e) manufacture of laboratory scales, balances, incubators and miscellaneous laboratory apparatus for measuring, testing, etc.

(f) manufacture of other measuring and controlling devices, such as radiation detection equipment, polygraph machines, thermometers (except bimetal medical type), meteorological instruments

Table 2.11: MSIC Group 265 (Class 2652, Item 26520)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**265**	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**
MSIC CLASS	**2652(1)**	**Manufacture of watches and clocks**
MSIC ITEM	**26520**	**Manufacture of watches and clocks and parts**

(1) Includes:

(a) manufacture of watches and clocks of all kinds, including instrument panel clocks

(b) manufacture of watches and clock cases, including cases of precious metals

(c) manufacture of components for clocks and watches

(d) manufacture of time-recording equipment and equipment for measuring, recording and otherwise displaying intervals of time with a watch or clock movement or with synchronous motor, such as parking meters, time clocks, time/date stamps, process timers

(e) manufacture of time switches and other releases with a watch or clock movement or with synchronous motor such as manufacture of time locks, etc.

Excludes:

(a) manufacture of non-metal watch bands (textile, leather, plastic), see 1512

(b) manufacture of watch bands of precious metal, see 3211

(c) manufacture of watch bands of non-precious metal, see 3212

Table 2.12: MSIC Group 266 (Class 2660, Item 26600)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**266**	**Manufacture of irradiation, electro medical and electrotherapeutic equipment**
MSIC CLASS	**2660[(1)]**	**Manufacture of irradiation, electro medical and electrotherapeutic equipment**
MSIC ITEM	**26600**	**Manufacture of irradiation, electro medical and electrotherapeutic equipment[(2)]**

(1) Excludes:

(a) manufacture of laboratory analytical instruments (e.g. blood analysis equipment), see 26512

(b) manufacture of tanning beds, see 27900

(2) Includes:

(a) manufacture of irradiation apparatus and tubes

(b) manufacture of X-ray equipment

(c) manufacture of CT scanner

(d) manufacture of PET scanner

(e) manufacture of MRI equipment

(f) manufacture of medical laser equipment

(g) manufacture of medical endoscopic equipment

(h) manufacture of food and milk irradiation equipment

(i) manufacture of medical ultrasound equipment

(j) manufacture of electrocardiographs

(k) manufacture of pacemakers

(l) manufacture of hearing aids

(m) manufacture of other irradiation equipment, electro medical and electrotherapeutic equipment n.e.c.

Table 2.13: MSIC Group 267 (Class 2670, Item 26701-26702)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**267**	**Manufacture of optical instruments and photographic equipment**
MSIC CLASS	**2670(1)**	**Manufacture of optical instruments and photographic equipment**
MSIC ITEM	**26701**	**Manufacture of optical instruments and equipment(2)**
	26702	**Manufacture of photographic equipment(3)**

(1) Excludes:

(a) manufacture of computer projectors, see 2620

(b) manufacture of commercial TV and video cameras, see 2630

(c) manufacture of household-type video cameras, see 2640

(d) manufacture of complete equipment using laser components, see manufacturing class by type of machinery (e.g. medical laser equipment), see 2660

(e) manufacture of photocopy machinery, see 2817

(f) manufacture of ophthalmic goods, see 3250

(2) Includes:

(a) manufacture of optical machinist's precision tools

(b) manufacture of optical mirrors

(c) manufacture of optical gun sighting, optical positioning equipment

(d) manufacture of magnifying instruments, optical comparators

(e) manufacture of optical measuring and checking devices and instrument: fire control equipment, photographic light meters

(f) manufacture of laser assemblies

(g) manufacture of lenses, optical microscopes, binoculars and telescopes

(h) manufacture of other optical instruments and equipments n.e.c.

(3) Includes:

(a) manufacture of film cameras and digital cameras

(b) manufacture of motion picture and slides projectors

(c) manufacture of overhead transparency projectors

(d) manufacture of other photographic equipment n.e.c.

Table 2.14: MSIC Group 268 (Class 2680, Item 26800)

MSIC SECTION	**C**	**Manufacturing**
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**
MSIC GROUP	**268**	**Manufacture of magnetic and optical media**
MSIC CLASS	**2680(1)**	**Manufacture of magnetic and optical media**
MSIC ITEM	**26800**	**Manufacture of magnetic and optical recording media**

(1) Includes:

(a) manufacture of blank magnetic audio and video tapes and cassettes

(b) manufacture of blank diskettes

(c) manufacture of blank optical discs

(d) manufacture of hard drive media

(e) manufacture of other magnetic and optical recording media n.e.c.

(f) manufacture of storage units for use with computer or other devices including memory cards, thumb drives/pen drives, etc.

Excludes: reproduction of recorded media: computer media, sound, video, etc., see 1820

2.4 Key Stakeholders

The stakeholders for the Electronics Components and Products Manufacturing Industry in Malaysia comprises of government agencies, regulatory bodies, industry associations professional bodies of Computer, Electronic And Optical Products' manufacturers.

2.4.1 Regulatory Bodies And Relevant Government Agencies

The regulatory bodies and relevant government agencies for the Electronics Manufacturing industry can be referred in Table 2.15 below:

Table 2.15: List of Government Agencies/Regulatory Agencies/Licensing Bodies

No	Government Agency/Regulatory Agency/Licensing Body	Relevance to Electronics Products Manufacturing Industry
1.	Malaysian Investment Development Authority (MIDA) (Website: http://www.mida.gov.my)	MIDA is the government's principal agency to oversee and drive investment into the manufacturing sectors in Malaysia. In terms of the Electronics Products manufacturing industry, MIDA's role is to promote foreign and local investments, planning for industrial development, to recommend policies and strategies on industrial promotion and development, to evaluate applications for manufacturing licenses, and expatriate posts; tax incentives for manufacturing activities, and duty exemption on raw materials, components and machinery. MIDA also assists companies in the implementation and operation of their projects, and offers assistance through direct consultation and co-operation with the relevant authorities at both the federal and state levels.

No	Government Agency/Regulatory Agency/Licensing Body	Relevance to Electronics Products Manufacturing Industry
2.	Atom Energy Licensing Board (AELB) (Website: http://portal.aelb.gov.my)	AELB is responsible for the licensing of the Radiation Protection Officer and licensing of the activities pertaining to the Import and Export or transportation of radioactive material and the import/export of radioactive equipment. The Electronics Manufacturing industry will refer the AELB when obtaining approval for products or parts that have been imported or will be exported in order to fulfil safety requirements.
3.	Malaysian Communications and Multimedia Commission (MCMC) (Website: https://www.skmm.gov.my)	Specifically for the electronics products manufacturing industry, MCMC is referred to in terms of licensing of the products as stipulated in the Communications and Multimedia (Technical Standards) Regulations 2000, Regulation 14 - "All communications equipment which are required to be certified under these Regulations shall be so certified." MCMC's Scope of Certifications include: • Communication Equipment; • Electricity Safety • Electromagnetic Immunity & Compatibility • Network Interoperability • Wireless • Light Wave Apparatus • Cabling Facilities and Systems
4.	Department of Occupational Safety and Health (DOSH) (Website: http://www.dosh.gov.my)	The Department of Occupational Safety and Health (DOSH) is responsible for ensuring the safety, health and welfare of people at work as well as protecting other people from the safety and health hazards. (DOSH will ensure that the safety and health regulations are adhered to by

No	Government Agency/Regulatory Agency/Licensing Body	Relevance to Electronics Products Manufacturing Industry
		companies in the Electronics Products Manufacturing industry. DOSH is also responsible to carry out promotional and publicity programs to employers, workers and the general public to foster and increase the awareness of occupational safety and health.
5.	Department of Environment (DOE) (Website: https://www.doe.gov.my)	The main function of the DOE is to prevent, eliminate, control pollution and improve the environment, consistent with the Environmental Quality Act 1974 and regulations under DOE[3].. The main functions of DOE are to monitor and regulate air pollution, water and groundwater pollution, regulate the treatment and disposal license wastes, carry out investigation into alleged environmental contamination and processing of Environmental Impact Assessment (EIA). The Electronics Products Manufacturing industry is under the monitoring and enforcement of DOE in terms of environmental quality.

[3]Department of Environment. https://www.doe.gov.my/portalv1/en/tentang-jas/pengenalan/perkhidmatan-teras

No	Government Agency/Regulatory Agency/Licensing Body	Relevance to Electronics Products Manufacturing Industry
6.	Medical Device Authority (Medical Device Bureau) (Website: https://www.mdb.gov.my)	The MDA ensures that medical devices in Malaysia are of high quality, effective and safe. The Medical Devices Bureau (MDB) was established to develop and implement the medical devices regulatory program in Malaysia. Companies in the electronics industry that manufacture medical devices will be under the purview of relevant Medical Devices legislations and will refer relevant Medical Devices standards and guidance documents. The Medical Device Bureau is responsible for the regulation of medical devices on the Malaysian market, registering medical devices for all classes, and issuing of licences to manufacturers, distributors, importers and exporters.
7.	Civil Aviation Authority of Malaysia (CAAM) formerly known as the Department of Civil Aviation (DCA) (Website: http://www.dca.gov.my)	CAAM's role is to regulate aviation activities in Malaysia to be in compliance to standards and recommended practices of the International Civil Aviation Organization (ICAO). The Airworthiness division under CAAM carries out regulating activities relevant to the electronics products manufacturing industry such as certification of aeronautical products, issue of Airworthiness Directives, approval of Modification and Repair and approval of Design Organisations and Production Organisation.

No	Government Agency/Regulatory Agency/Licensing Body	Relevance to Electronics Products Manufacturing Industry
8.	Malaysian Aviation Commission (MAVCOM) (Website: http://www.mavcom.my)	The Malaysian Aviation Commission (MAVCOM) was formally established as an independent entity to regulate economic and commercial matters related to civil aviation in Malaysia. MAVCOM's functions, in relation to the electronics products manufacturing industry include the regulating of economic matters relating to the civil aviation industry, and to provide a mechanism for dispute resolution between aviation industry players.
9.	SIRIM Berhad (Website: http:www.sirim.my)	SIRIM plays an active role in local industry and international standards development. It is also responsible in the testing and validation of products from the electronics products manufacturing industry and that they meet the particular requirements to be certified.
10.	SIRIM QAS International Sdn. Bhd. (Website**:** http://www.sirim-qas.com.my)	SIRIM QAS International is an accredited certification, inspection and testing services provider under numerous bodies, including the National Accreditation Body, the Department of Standards Malaysia (STANDARDS MALAYSIA) and the United Kingdom Accreditation Service (UKAS) among others[4].
11.	Bureau Veritas (Website**:** http://www.bureauveritas.com)	Bureau Veritas is responsible for activities in Testing, Inspection and Certification (TIC). Its services related to the Electronics and Electrical Manufacturing industry include: • Certification of Management systems and second party audit services • Testing, inspection and certification of consumer goods in the Electrical & Electronics industry

[4] http://www.sirim-qas.com.my/about-us/overview

2.4.2 Professional Bodies And Industry Associations

The following Table 2.16, list of industry associations serve their respective categories of organisations by promoting their interests and facilitate close collaboration between their member organisations towards strengthening the industry.

Table 2.16 List of Industry Associations

No	Industry Association	Relevance to Electronics Products Manufacturing Industry
1.	Institute of Electronics and Electrical Engineers (IEEE) (Website: https://ieeemy.org)	The IEEE is responsible for research publication, technical standards and guidelines, technical conferences, various magazines and publications. Featuring many societies and chapters, the IEEE has a very broad range of coverage[5].
2.	Federation of Malaysian Manufacturers (FMM) (Website: http://www.fmm.org.my)	The Federation of Malaysian Manufacturers (FMM) is Malaysia's premier economic organisation. It now represents over 3,000 manufacturing and industrial service companies of varying sizes, the FMM is the officially recognised and acknowledged voice of the industry[6].
3.	The Electrical and Electronics Association of Malaysia (TEEAM) (Website: http://www.teeam.org.my)	The association one of the representative bodies of the electrical and electronic industry in Malaysia. It works closely with government departments, statutory bodies and the private sector to ensure and encourage the growth of the electrical and electronic industry.
4.	International Electrotechnical Commission (IEC) (Website: http://www.iec.ch/about/activities/	The International Electrotechnical Commission publishes consensus-based International Standards and manages conformity assessment systems for electric

[5] https://ieeemy.org/students/

[6] http://www.fmm.org.my/About_FMM-@-About_FMM.aspx

No	Industry Association	Relevance to Electronics Products Manufacturing Industry
	?ref=menu)	and electronic products, systems and services, collectively known as electrotechnology. IEC publications serve as a basis for national standardization and as references when drafting international tenders and contracts.

2.5 Government Legislation, Policy And Initiatives

2.5.1 Legislations

The following Table 2.17 indicates the relevant legislations to the overall manufacturing industry which includes the manufacturing of computer, electronics and optical products.

Table 2.17: List of Relevant legislations

No	Areas acts are related to	Name of Act	Function and relevance of act
1.	Acts related to manufacturing (In general)	Occupational Safety and Health Act 1994 (Act 514)	This Act is for securing the safety, health and welfare of persons at work, for protecting others against risks to safety or health in connection with the activities of persons at work. The regulatory body for this Act is Department of Occupational Safety and Health (DOSH). [7]
		Environmental Quality Act 1974 (Act 127)	An Act relating to the prevention, abatement, control of pollution and

[7] Legislation. http://www.dosh.gov.my/index.php/en/legislatioNot Availablects. Date accessed: 15th April 2017

No	Areas acts are related to	Name of Act	Function and relevance of act
		Environmental Quality (Amendment) Act 2012 (Act A1441)	enhancement of the environment, and for purposes connected therewith.[8]
		Factories and Machinery Act 1967 [Act 319] / Factories and Machinery Act (Amendment) 2006	An Act to provide for the control of factories with respect to matters relating to the safety, health and welfare of person therein, the registration and inspection of machinery and for matters connected therewith.[9]
2.	Acts related to tax incentives	• Investment Incentives Act 1968 (Repealed by Act 327) • Promotion of Investments Act 1986, • Income Tax Act 1967 • Customs Act 1967 • Sales Tax Act 1972 • Excise Act 1976 • Free Zones Act 1990.	These Acts cover investments in the manufacturing sectors to further promote R&D, training and environmental protection activities.[10]

[8] Ecolex. https://www.ecolex.org/details/legislation/environmental-quality-act-1974-no-127-of-1974-lex-faoc013278/. Date accessed: 15th April 2017
[9] Legisation.http://www.dosh.gov.my/index.php/en/legislation/acts. Date accessed: 15th April 2017.
[10] MIDA. Incentives in Manufacturing. http://www.mida.gov.my/home/incentives-in-manufacturing-sector/posts/

No	Areas acts are related to	Name of Act	Function and relevance of act
3.	Acts related to Medical Devices	• Medical Device Act 2012 Act 737 • Medical Device Authority Act 2012 Act 738	These acts are related to the manufacturing of medical devices under Group 266.
4.	Acts related to radioactive equipment	• Atomic Energy Licensing Act 1984 (Act 304) • *Akta Zon Ekonomi Ekslusif 1984: Perintah Zon Ekonomi Ekslusif (Pemakaian Akta Perlesenan Tenaga Atom) 1990 - (Malay Version)*	These acts are related to the licensing of materials or equipment by the electronic products manufacturing industry that may consist of radioactive substances or either emit radioactive waves. These licenses are also used to allow these items that are either imported or exported.
5.	Acts related to the manufacturing of Aerospace/Aviation electronics	• Civil Aviation Act 1969 (Act 3) • Carriage by Air Act1974 (Act 148) • Aviation Offences Act1984 (Act 307) • Malaysian Aviation Commission Act 2015 (MACA)	These acts are enforced by the CAAM when regulating the airworthiness of aviation electronics manufactured by the industry.
6.	Acts related to electronic products	• Communications and Multimedia	These acts are relevant to the regulation of manufactured communications equipment.

No	Areas acts are related to	Name of Act	Function and relevance of act
	used in communications	Act 1998 (Act 588) • Malaysian Communications and Multimedia Commission Act 1998 (Act 589)	

2.5.2 Government Policies And Initiatives

The current economic plans (Third Industrial Master Plan (IMP3) and Rancangan Malaysia Ke-11 (RMK11)) are still relevant and remain as Malaysia's mid-term policy guide until 2020. RMK11(2016-2020) has identified the three (3) catalytic (E&E, M&E and Chemical) plus two (2) new growth (Aerospace and Medical Devices) sectors as game changers for the manufacturing sector. These sectors will continue as the focus sector together with other sectors such as automotive, petrochemicals, textiles and services.

For Malaysia to remain a competitive investment destination in the region and to attract a new breed of quality investments, competitive incentive offerings will continue to be used as a strategic planning tool to achieve the national investment agenda. These incentives, especially for high impact and strategic businesses, are aimed to encourage and support industries to move up the value chain. As the number of high-quality investments rise and new growth areas spring up, so too will the demand for highly skilled workers, thereby raising the nation's income levels.[11]

Malaysia has a wide variety of incentives covering the major industry sectors. Tax incentives can be granted through income exemption or by way of allowances. The major tax incentives for companies investing in the manufacturing sector are the Pioneer Status and the Investment Tax Allowance. Eligibility for Pioneer Status and

[11] MIDA, 2017

Investment Tax Allowance is based on certain priorities, including the level of value-added, technology used and industrial linkages.

There are various types of incentives available in Malaysia for areas of Research & Development (R&D), Automation and Green Technology. These incentives are important to further encourage these activities to be conducted by industry players. For companies that provide or conduct R & D in manufacturing they will be eligible for tax exemption and Investment Tax Allowance (ITA).[12]

There are also incentives for manufacturing companies with increased use of automation where they have incurred expenditure in automation equipment used directly in the manufacturing activities and resulting in reduced man hours and increased productivity (PWC, 2018). Manufacturing companies that have been in operation for at least 36 months are eligible for automation capital allowance.

For companies that purchase green technology assets listed on the 'MyHijau' directory, they will be eligible for an ITA.[13]

2.6 Industry And Market Intelligence

This section provides an overview of the relevant factors which have substantial impact on the industry. Such information may be used to forecast the future manpower needs of the industry and to influence the necessary manpower planning.

2.6.1 Industry Economic Growth

The E&E sector plays a crucial role in driving the Malaysian economy and has become a main contributor to Malaysia's Gross Domestic Product (GDP) in recent years has created more than 780,000 jobs for Malaysians. The E&E Multinational Companies in Malaysia have been identified as a catalyst to develop local SMEs into high-value corporations. The Malaysian National Export Council (NEC) has identified Electrical & Electronics (E&E) as the key sector to promote the inclusion of Malaysian companies in the global supply chain, given its significance in developing new industries that are driven by knowledge, high-technology and

[12] PWC. Tax Credits and Incentives. http://taxsummaries.pwc.com/ID/Malaysia-Corporate-Tax-credits-and-incentives
[13] PWC, 2018

added-value. The NEC agreed that by boosting the performance of the E&E sector more market leaders from Malaysia will be developed, hence increasing the participation of Malaysian companies in the global supply chain, particularly in emerging segments. Among these segments are System Integration, Cloud Computing, Advanced Energy Storage, Wireless Electronics, Electric Vehicle, Internet of Things, Augmented Reality and Big Data.[14] Figure 2.1 below is a summary of recent statistics obtained from MIDA's 2017 Investment Performance Report regarding the E&E industry's performance in the year 2017[15]:

a. Attracted RM8.2 billion, or 84.5% of all investments in the industry, mostly from Singapore, the Netherlands, Japan, and Germany
b. Brought in the second-greatest amount of total investments which was RM9.7 billion across 109 projects compared to 107 projects amounting to RM9.2 billion in investments in the year 2017. Out of the 109 projects approved, 20 new projects brought in investments of RM1.4 billion, while 89 expansion/diversification projects had investments worth RM 8.3 billion.
c. The sixth-largest receiver of domestic funds (RM1.5 billion).
d. The country's largest export earner in 2017, totalling RM343 billion and accounting for 36.7 per cent of the total value of exports.

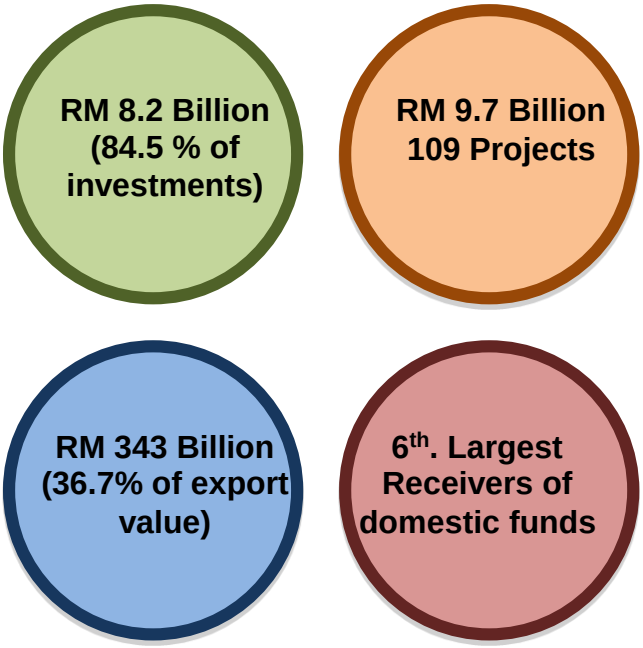


Figure 2.1: MIDA's 2017 Investment Performance Report

[14] MITI, 2018
[15] MIDA, 2017

(Source: MIDA 2017 Investment Performance Report.2017)

Based on data from the Department of Statistics Malaysia (DOSM), Malaysia's economy grew by 4.5 per cent in the second quarter of 2018, slower than 5.4 per cent recorded in the previous quarter. The favourable performance by Services and Manufacturing sectors spearheaded the production side[16]. As shown in the Figure 2.2 below, the Manufacturing sector elevated further by 4.9 per cent to 23.6 per cent growth in the second quarter of 2018.

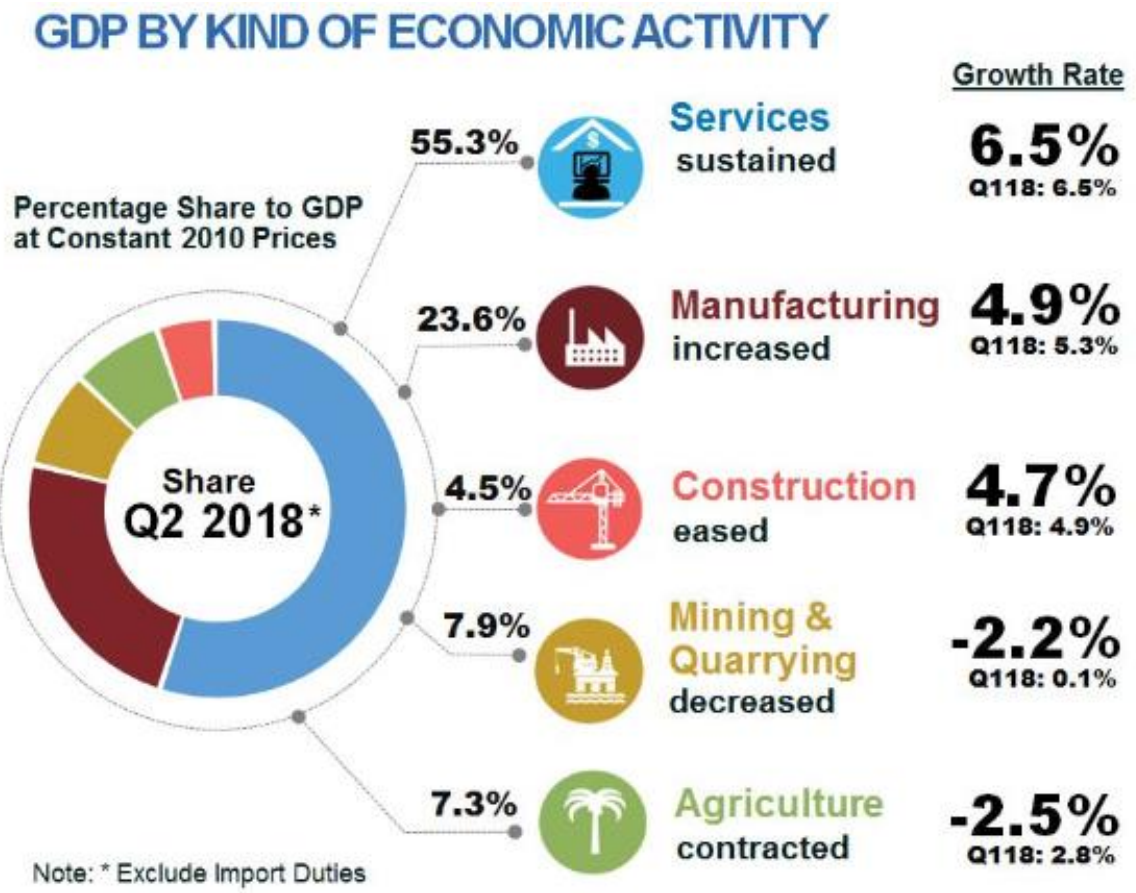


Figure 2.2: GDP By Kind of Economic Activity

(Source: Department of Statistics Malaysia.2018)

[16] Department of Statistics, Malaysia. September 2018. **h**ttps://Www.Dosm.Gov.My/V1/Index.Php?R=Column/Cthemebycat&Cat=100&Bul_Id=M3zgdxnnyta4sexgwehvb2f4t3zeqt09&Menu_Id=Te5cruzcblh4ztzmodzibmk2awrrqt09

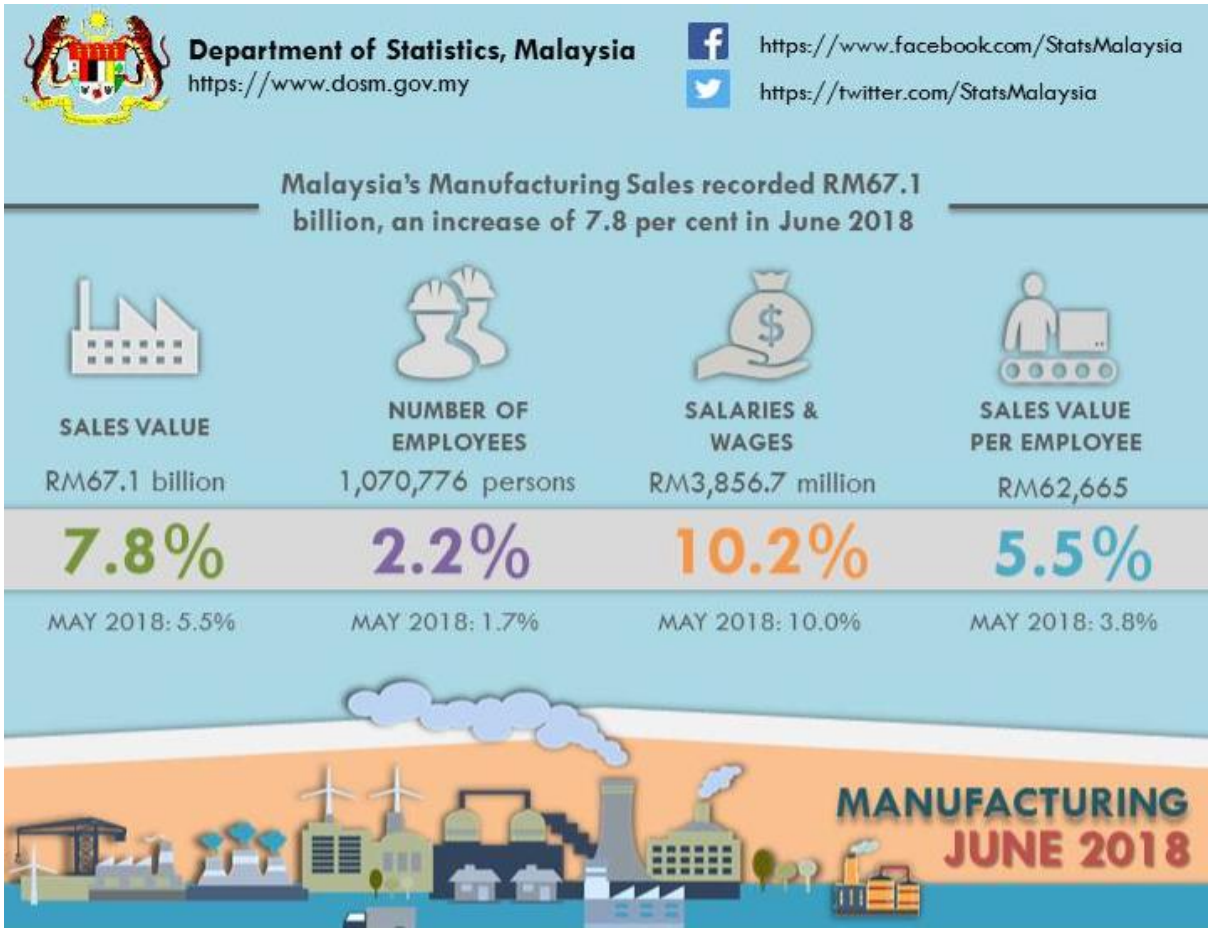
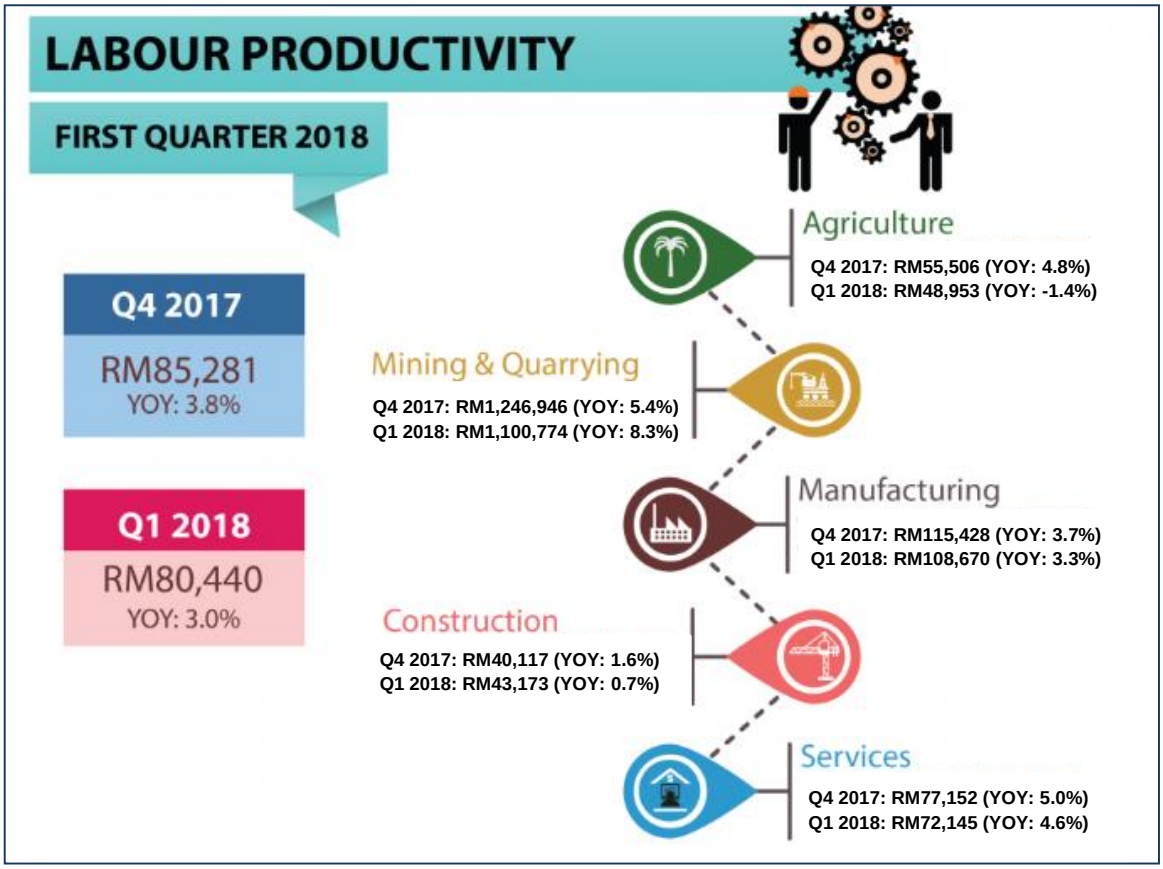


Figure 2.3: Manufacturing Industry Statistics for Number of Employees and Salaries and Wages

(Source: Department of Statistics Malaysia.2018)

Data from the Department of Statistics Malaysia (DOSM) was referred to gauge the employment statistics in the year 2018. Figure 2.3 shows that the Manufacturing sector recorded RM 3,856.7 million (10.2% of all industries) of salaries & wages in June 2018. It also shows that there was an employment of 1,070, 776 persons (2.2%). Based on the Manufacturing Industry's sales value recorded an increase to 7.8% which was RM67.1 billion. There has been an increase compared to data recorded in May 2018 where we can see that with the increase of sales value, the number of employment and salaries have increased to support the demand and business ramp up.



Note:

YOY: Year –on-Year

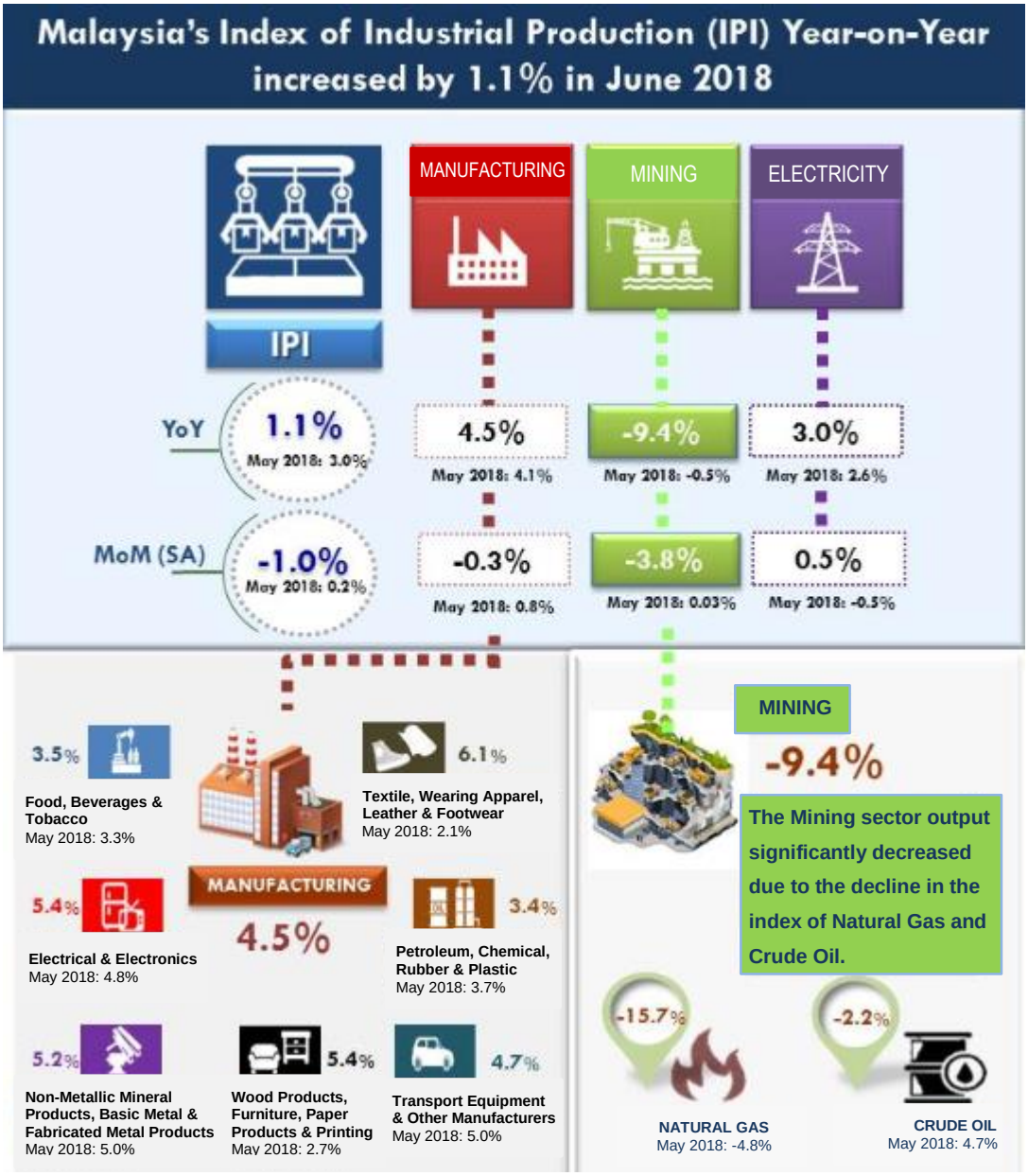
Q1,Q2,Q3,Q4: Quarter 1, Quarter 2, Quarter 3, Quarter 4

Figure 2.4: Malaysia's Labour Productivity Statistics for 1st Quarter 2018

(Source: Department of Statistics Malaysia. 2018)

Labour productivity in the Manufacturing sector rose 3.3 per cent (Q4 2017: 3.7%) at RM108,670. During this quarter, value added grew 5.3 per cent (Q4 2017: 5.4%) while employment increased 2.0 per cent (Q4 2017: 1.7%).[17] This can be seen in the Figure 2.4 above obtained from the DOSM website.

[17] Department of Statistics Malaysia. Labour productivity of First Quarter 2018https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=438&bul_id=TUM0R0pHRTd4ZkVSMEZQWklRbFYxQT09&menu_id=Tm8zcnRjdVRNWWlpWjRlbmtlaDk1UT09



Note:

Percentage Shown refers to:

YoY : Year-on-Year

MoM (SA) : Month-on-Month (Seasonally Adjusted)

Figure 2.5: Malaysia's Industrial Productivity Statistics for 2018

(Source: Department of Statistics Malaysia. 2018)

The Industrial Production Index (IPI) increased marginally by 1.1% in June 2018 as compared with the same month of the previous year. The growth in June 2018

was supported by an increase in the index of Manufacturing (4.5**%**) and the index of Electricity (3.0%). Meanwhile, the index of Mining recorded a decline of 9.4% (May 2018: -0.5%). On yearly basis, Manufacturing output increased by 4.5% in June 2018 after recording a growth of 4.1% in May 2018. The major sub-sectors which recorded an increase in June 2018 were: Electrical and Electronic Equipment Products (5.4%), Petroleum, Chemical, Rubber and Plastic Products (3.4**%**) and Non-Metallic Mineral Products, Basic Metals and Fabricated Metal Products (5.2%).[18]

Overall the statistics shown in this section provide information that the manufacturing industry as a whole has positive growth in terms of sales, employment and industrial productivity. Therefore the future economic outlook for the manufacturing industry and its sub-sectors is promising.

2.6.2 The E & E industry and the 4th Industrial Revolution (Industry 4.0)

a. Industry 4.0 Definition

Coined by German economist Klaus Schwab in 2015, the Fourth Industrial Revolution is used to describe the emergence of the Digital Economy and use of automation and data exchange in industrial technologies. Commonly referred to with the catchphrase Industry 4.0 it also included the Internet of Things and collaboration between networked machines and human beings in decision-making. Technology experts are already speaking about the coming industrial revolution as one that has the potential to disrupt every industry in every country due to the exponential pace that is the nature of digital revolution which is at the heart of Industry 4.0. This is already happening in businesses and industries as robotics and artificial intelligence can take over jobs traditionally manned by human labour, in particular technical processes that can easily be computerised[19]. Figure 2.6 below depicts the progression of the industry revolutions:

[18] Department of Statistics Malaysia. Industrial Production Index. June 2018. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=91&bul_id=Vm52ZWg1OGd3TTJBbDJHbzNtbURkUT09&menu_id=SjgwNXdiM0JlT3Q2TDBlWXdKdUVldz09

[19] October 16, 2017.How Do We Equip Malaysia's Workforce For Industry 4.0.. http://malaysiandigest.com/frontpage/282-main-tile/702866-how-do-we-equip-malaysia-s-workforce-for-industry-4-0.html

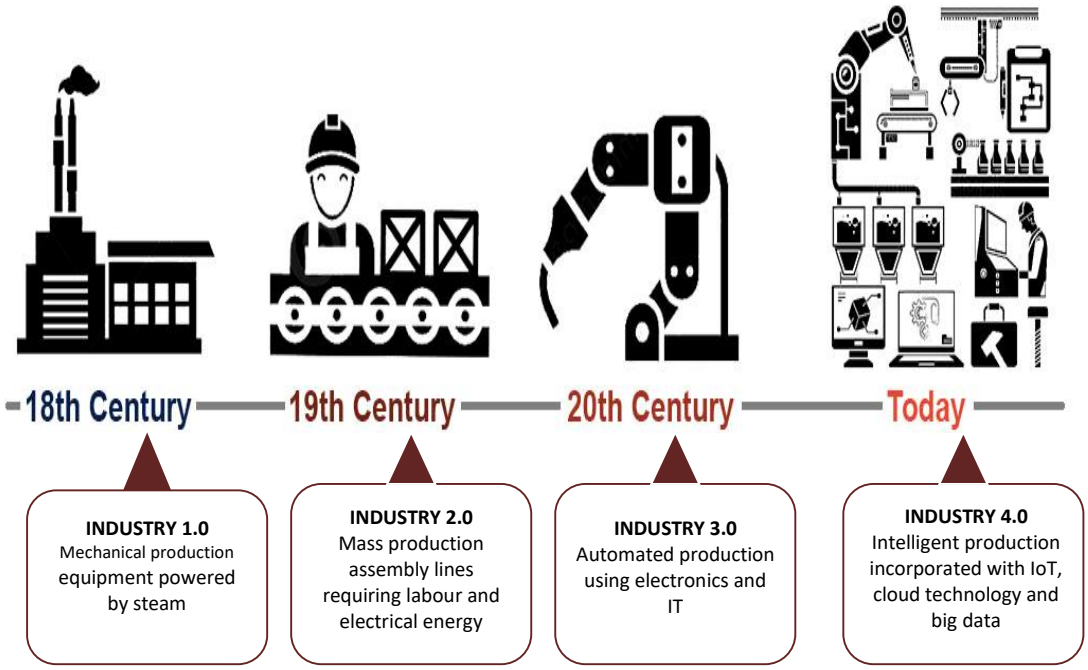


Figure 2.6: Industry Revolution Progression

(Source: Malaysian Digest.2016)

Industry 4.0 is a technological revolution, which starts from the First Industrial Revolution to the Third Industrial Revolution. Briefly, the First Industrial Revolution used water and steam power to mechanise production. The Second revolution used electric power to create mass production. The Third used electronics and information technology to automate production. The Fourth

Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterised by a fusion and convergence of technologies that cut across the physical, digital, and biological spheres.

According to the Malaysian Ministry of International Trade and Industry (MITI), the main pillars of Industry 4.0 which actually reflect more on the different technologies used in an Industry 4.0 environment, are as follows:

i. Autonomous Robots;
ii. Big Data Analytics;
iii. Cloud Computing;
iv. Internet of Things(IOT);
v. Additive Manufacturing (3D printing);
vi. System Integration;
vii. Cyber-security;
viii. Augmented Reality; and
ix. Simulation.

Below is a visual representation of the 9 pillars of Industry 4.0.

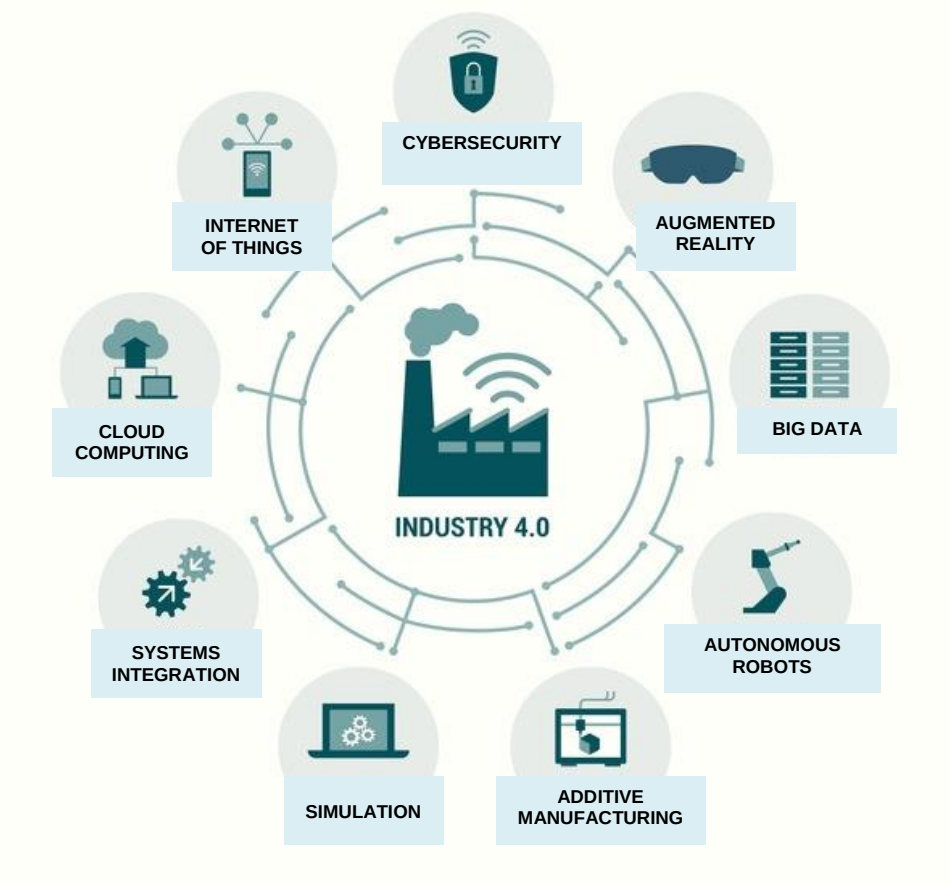


Figure 2.7: Main Pillars of Industry 4.0 implementation

(Source: www.eknowledge.com.my.2018)

b. Industry 4.0 in the Manufacturing Industry

Malaysia's manufacturing sector as a whole varies in terms of where they are currently ranging between 2.0 (mass production) and 3.0 (automation). However, there are industry leads already in the process of moving towards Industry 4.0 or becoming Industry 4.0 compliant on their own. The E&E, aerospace and the automotive sectors are more advanced in terms of Industry 4.0 adoption. The success stories by industry captains will be showcased as Industry 4.0 examples that can be emulated going forward[20].

The Government is committed to move away from low-skilled/foreign workers dependency particularly for the manufacturing sector. Adopting new technology to ensure companies be more efficient and productive will be in tandem with global trends. Cheap labour is unsustainable in the long run and prone to

[20] MITI. Industry 4.0. FAQ. www.miti.gov.my

human errors thus reducing the quality of products produced. A prime example is China that is moving towards digitalization on a large scale despite the abundance of cheap labour in the country. The adoption of Industry 4.0 in this type of organisation will increase efficiency and promote zero-defect outputs. A study by The Boston Consulting Group has stated that rapid adoption of Industry 4.0 could boost labour productivity by as much as 30 % by 2024.[21]

c. Industry 4.0 in Electronics Manufacturing

Throughout the research, input on Industry 4.0 specifically in the Electronics Industry will be obtained from the industry survey respondents and will be presented in Chapter 4 of this report. Therefore, in this section of the report, chapter 2, the available information of examples and efforts of Industry 4.0 implementation in the Electronics Industry are as listed below:

i. Use of automation in electronics manufacturing

SONY Malaysia, a consumer electronics manufacturer company, implements Industry 4.0 with the use of robot arms in the TV assembly line. At MIMOS Malaysia, an Applied Research and Development centre in Industrial Electronics Technology, applies Big Data Analysis for data mining and analysis whereas Computer Vision is used in image recognition and analysis.

One of the advancements that can be seen with automation is in the semiconductor industry, where previously the work of inspecting each component for defects was done by an operator, but with an automated machine, the vision is incorporated into the machine to check 100% the dimension and finishing of the components.[22]

ii. Establishing synergies between manufacturers in automation and supply chains

[2121] MITI, 2017.

[22] Sangeetha Amarthalingam. (October 12, 2017) The Edge Malaysia. Special Report: Penang manufacturing ready for Industry 4.0? Retrieved from http://www.theedgemarkets.com/article/special-report-penang-manufacturing-ready-industry-40 on 2nd June 2018.

The Penang Automation Cluster is the first SME precision metal fabrication or automation cluster in Malaysia that will support and enhance the development of the existing supply chain ecosystem of industries and services in Penang. These are primarily those in the semiconductor, E&E, medical device, light-emitting diode and avionic segments. For automation, local companies also require a strong supply chain which is crucial for them to grow quickly and support Industry 4.0. In the Malaysian context, it is about shifting from labour-intensive to automation by replacing operators with machines in the area of quality control[23].

The Industry 4.0 advancements and usage will continue to be developed by the German companies OSRAM, Bosch and B'Braun. These companies have been in the Penang state for more than 40 years. [24]These companies are interested to assist in implementing Industry 4.0 where through procurement processes there can be knowledge transfer from these companies to local companies. Front-end manufacturing, such as wafer fabrication and IC design, needs more capital, higher level engineering education and talent, in which Malaysia would have to catch up.[25]

iii. Training provision for manufacturers to be Industry 4.0 ready

Currently there is an existing training provider for Industry 4.0 which is the company, Knowledge.com. This company has partnered with seven states with the support of the Federal government to open the Centre of Excellence Training (CoET). Through this collaboration, the company is planning to train and certify 3,300 of Industry 4.0 certificated workers across Malaysia under the CoET program National Empowerment in Certification and Training for Next Generation Workers (NECT-GEN – Industry 4.0). Content of the training includes implementation of a Data Warehouse, Big Data, Cloud Computing, Implementing Infrastructure Solutions, Managing

[23] Sangeetha Amarthalingam. (October 12, 2017) The Edge Malaysia. Special Report: Penang manufacturing ready for Industry 4.0? Retrieved from http://www.theedgemarkets.com/article/special-report-penang-manufacturing-ready-industry-40 on 2nd June 2018.

[24] Sangeetha Amarthalingam. (October 12, 2017) The Edge Malaysia. Special Report: Penang manufacturing ready for Industry 4.0? Retrieved from http://www.theedgemarkets.com/article/special-report-penang-manufacturing-ready-industry-40 on 2nd June 2018.

[25] Sangeetha Amarthalingam. (October 12, 2017) The Edge Malaysia. Special Report: Penang manufacturing ready for Industry 4.0? Retrieved from http://www.theedgemarkets.com/article/special-report-penang-manufacturing-ready-industry-40 on 2nd June 2018.

Industrial Networks and Android Application Development. In terms of cyber-security, the training teaches threat detection and response[26].

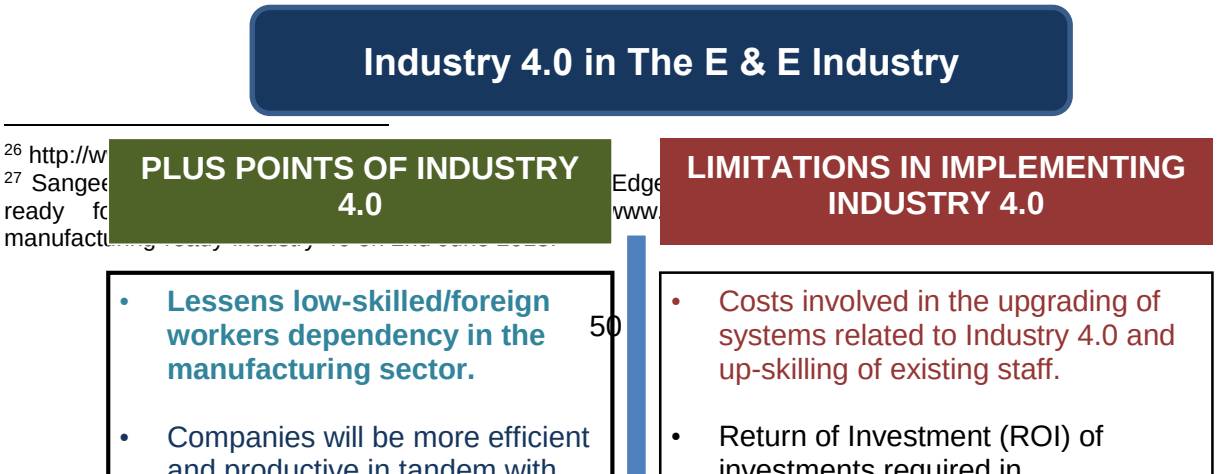
iv. Limitations in implementing Industry 4.0 in the Electronics Manufacturing Industry

There are various limitations faced in implementing Industry 4.0 especially by local SMEs, which include:

- Costs involved in the upgrading of systems related to Industry 4.0 and up-skilling of existing staff
- Return of Investment (ROI) of investments required in implementing Industry 4.0 technologies
- The upgrading of the company's manpower where they will be required to have a shift of skills set and will also be required to be multi-skilled
- These limitations require the synergy of the industry and government agencies in order to facilitate the implementation of Industry 4.0 in the near future and in the long run.

SME Association of Malaysia views that SMEs must first come together to form a cluster, however most SMEs have not yet have adopted software integration due to mindset and fundraising challenges however the younger generation of SME companies are more information technology savvy and are willing to move but need help in the form of incentives. The incentives should be focused on target areas such as enterprise resource planning systems because innovation is not purely research and development but also a change in operation. The E&E sector has grown as a result of relationship with MNCs that push them to improve their performance.[27]

Figure 2.8 below shows the plus points and limitations that impede the implementation of Industry 4.0 in the Electronics Manufacturing Industry.



[26] http://w
[27] Sangee
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Figure 2.8: Plus Points and Limitations of Industry 4.0 Implementation in the Electronics Manufacturing Industry

2.6.3 Investment in the Malaysian E&E Industry

The Cushman & Wakefield 'Manufacturing Risk Index 2017' report published at the beginning of 2017 had ranked Malaysia as the most attractive market for locating manufacturing facilities, with a relatively high level of productivity and quality of infrastructure. The report, which ranks 30 of the largest countries by manufacturing output, also observed that given its trade and transport infrastructure quality, Malaysia had a higher rank than many other middle-income countries in terms of overall logistics performance. Strategically, the nation's manufacturing sector is

shifting up the value chain; from producing raw materials and commodities, it is now moving to higher value-added activities.[28]

Figure 2.9 shows the total of approved investments for the E & E industry in 2017 was RM 9.7 Billion with the highest total of investments was for Electronic Components (43.7%) and Industrial Electronics (43.7%).[29]

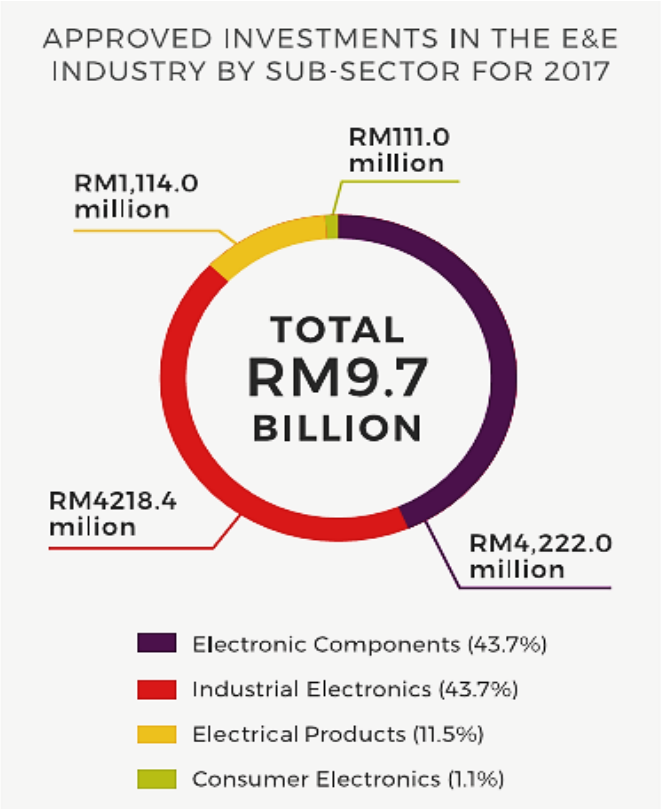

Figure 2.9: Approved Investments in the E&E Industry by Sub-Sector For 2017

(Source: MIDA Investment Performance Report, 2017)

The Consumer Electronics and Electronic Components sub-sector is mainly dominated by the semiconductor players especially MNCs, mainly undertaking the assembly and test activities. However, the development of the semiconductor cluster has shown a gradual increase over the years. More companies are expanding the research, design and development activities in their operations with less emphasis in the manufacturing of low end products. The increase in demand for the miniaturisation and high performance devices for mobile, automotive and

[28] MIDA. MIDA Malaysia Investment Performance Report 2017. Page 33-34
[29] MIDA. MIDA Malaysia Investment Performance Report 2017. Page 33-34

green applications has further stimulated the growth of outsourcing activity in the semiconductor industry.[30]

The Electronic Manufacturing Services (EMS) Industry has shown a significant growth not only in investment but also extensive development in technology where most of the operations has now shifted from the board level operation (components) to providing full range of services including contract design, prototyping, final assembly, configuration, repair and after sales services. With additional high capital investment and by diversifying into major R&D activities, some of the companies have geared up with the technology by producing more high mix low volume products for the medical, aerospace and instrumentation applications.

2.6.4 Issues & Challenges

There are several issues and challenges faced by the electronics manufacturing industry that may impede its growth and competitiveness in the region.

The issues highlighted by panel members are listed below:

a. Manpower skills gap in electronics manufacturing
b. User Preference on electronic products in the market
c. Regional Competition in terms of market price, quality and innovations
d. Communications Capacity such as access to the Internet to enable lot and global accessibility of electronic manufacturers to be part of the global business community
e. Lack of R&D investment by electronic products manufacturers due to high capital and limitations in securing R&D investment grants

The issues were obtained via discussions with focus group members and confirmed with available literature on the areas highlighted as depicted in Figure 2.10 below:

Issues and Challenges of the Electronics Products Manufacturing

[30] John Bunyan.**http**://www.themalaymailonline.com/malaysia/article/trade-ministry-to-set-up-large-scale-electronics-electrical-industry-in-per Saturday February 10, 2018

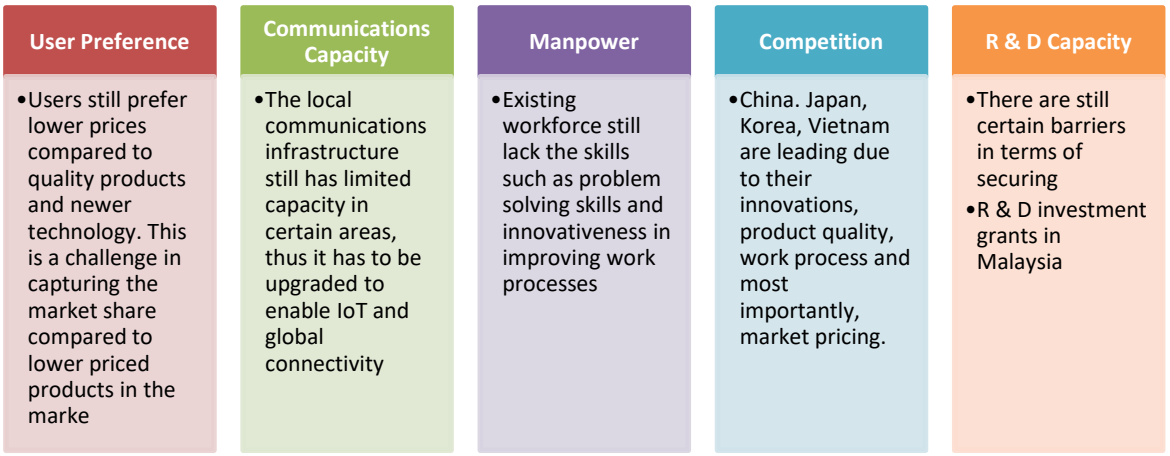

Figure 2.10: Issues and Challenges of the Electronics Products Manufacturing Industry

2.7 List of National Occupational Skills Standards (NOSS) Relevant To The MSIC Section C And Group 26

Currently there are 46 National Occupational Skills Standards (NOSS) developed by Jabatan Pembangunan Kemahiran (JPK) that are relevant to the sub-sectors and areas in the Manufacture of Computer, Electronic and Optical Products.

The details of the existing NOSS relevant to the Manufacture of Computer, Electronic and Optical Products are in the following tables.

Table 2.18: Manufacture of Computer, Electronic and Optical Products related NOSS

MSIC Group	Corresponding NOSS/ Level
261 Manufacture of electronic components and boards	1. EE-020-5:2013 Semiconductor Manufacturing Management (Back End Process) L5 2. EE-020-4:2013 Semiconductor Manufacturing Technical Supervision (Back End Process) L4 3. EE-020-3:2013 Semiconductor Assembly Production L3
	4. EE-021-5:2012 Electronic Product Design & Management L5 5. EE-021-4:2012 Electronic Product Development L4 6. EE-021-3:2012 Troubleshooting, Electronic Equipment Troubleshooting, Repair & Maintenance L3 7. EE-021-2:2012 Troubleshooting Electronic Equipment and Appliance Installation & Troubleshooting L2
	8. EE-022-5:2012 Front End Wafer Fabrication Process Operation L5 9. EE-022-4:2012 Front End Wafer Fabrication Operation L4
	10. EE-024-5:2014 Front End Wafer Fabrication Equipment Troubleshooting & Repair L5 11. EE-024-4:2014 Front End Wafer Fabrication Equipment Maintenance L4
	12. EE-120-5 Consumer Electronic Design Specialist

MSIC Group	Corresponding NOSS/ Level
	13. EE-120-4 Consumer Electronic Design Assistant Specialist L4
	14. EE-050-3 Buffer Storage Senior Technician 15. EE-050-2 Buffer Storage Technician
	16. EE-060-3 Embedded System Senior Technician (Design) 17. EE-060-2 Embedded System Technician
	18. EE-070-3 Optical Electronic Display Senior Technician (Design) 19. EE-070-2 Optical Electronic Display Technician (Design)
	20. EE-080-3 Electromagnetic Interference / Electromagnetic Compatibility (EMI/EMC) Senior Technician (Design) 21. EE-080-2 Electromagnetic Interference / Electromagnetic Compatibility (EMI/EMC) Technician (Design)
	22. EE-100-3 Consumer Electronic Power Management Senior Technician (Design) 23. EE-100-2 Consumer Electronic Power Management Technician (Design)
	24. EE-113-5 Integrated Circuit Design Senior Specialist L5 25. EE-113-4 Integrated Circuit Design Specialist L4 26. EE-112-5 Electronics System Design Senior Specialist 27. EE-112-4 Electronics System Design Specialist 28. EE-102-3 Technology Senior Technician L3 29. EE-103-3 Program Logic Senior Technician 30. EE-101-2 Consumer Electronics Design Technician L2
263 Manufacture of communication equipment	31. EE-104-3 Digital Signal Processing Senior Technician (Design) 32. EE-104-2 Digital Signal Processing Technician (Design) L2 33. EE-105-3 Network Senior Technician (Design) 34. EE-105-2 Network Technician (Design)

MSIC Group	Corresponding NOSS/ Level
264 Manufacture of consumer electronics	35. EE-010-5 Electronic Audio Visual Technology Senior Executive 36. EE-010-4 Electronic Audio Visual Technology Executive L4 37. EE-021-3:2012 Troubleshooting, Electronic Equipment Troubleshooting, Repair & Maintenance L3 38. EE-021-2:2012 Electronic Equipment and Appliance Installation & Troubleshooting L2
	39. EE-120-5 Consumer Electronic Design Specialist 40. EE-120-4 Consumer Electronic Design Assistant Specialist L4 41. EE-090- 3 Interface Senior Technician L3 42. EE-090-2 Interface Technician L2 43. EE-110-3 Security Senior Technician (Design) 44. EE-110-2 Security Technician (Design)
265 Manufacture of measuring, testing, navigating and control equipment; watches and clocks	45. MC-011-3 Watch Maker 46. MC-011-2 Watch Technician L2

(Source: NOSS Registry May 2018 Jabatan Pembangunan Kemahiran (JPK).2018)

2.8 Chapter Conclusion

Based on the literature review findings, the area of Computer, Electronic and Optical Products manufacturing is seen as one of the main contributors to the economic performance and foreign investment.

Currently there are several stakeholders in the industry comprising of government agencies (i.e. MIDA, AELB, DOE, DOSH, CAAM, MDB, MDA, MAVCOM etc.) involved in the development and monitoring of the industry in terms of compliance to the relevant acts and regulations. The main industry associations are the FMM, TEAMM, IEC and IEEE. The manufacturing of electronic products include products regulated by CAAM and the Medical Devices Authority as these type of products are highly regulated due to the affect they may have on the safety of its users and may be hazardous in certain instances.

In general, the electronic products are regulated to meet safety requirements for users in Malaysia and also for Import/Export purposes. Therefore in this report, the Acts highlighted are those related to manufacturing in general and also acts related specifically to the type of electronic products, either for general consumers, communications, computers, aviation or medical purposes.

There have been 46 NOSS developed for the industry, however, due to the fast-moving advancement of technologies in the industry and in order to increase employment mobility for the workforce, it is imperative that the occupational areas are redefined in the Occupational Structure. This is to allow scalability of skills and to accommodate the emerging skills required in the current Industrial Revolution, which is the 4th Industrial Revolution. Segmentation of the industry based on the Malaysian Standard Industrial Classification (MSIC) is also taken into consideration in order to be in sync with data from the Department of Statistics on labour demographics. This industry in particular falls under Section C: Manufacturing, Division 26: Manufacture of Computer, Electronic ad Optical Products under MSIC. In order to identify the above, structured research approaches must be applied. The research methodology used for this study is elaborated in Chapter 3.

CHAPTER 3: METHODOLOGY

3.1 Chapter Introduction

Chapter 3 will elaborate on the methodology used throughout the research which includes the research methodologies, data collection strategies, outcomes and data analysis.

3.2 Overall Approach

Qualitative analysis has been applied as the main method of analysing the necessary input obtained throughout the research done on the Electronics Products Manufacturing industry's Occupational Framework. Qualitative analysis was selected as the method of research because it investigates not only the what, where and when, but also the why and how of the decision making process; it requires smaller but more focused samples; and focuses on unique themes that illustrate the range of the meanings of the subject matter rather than the statistical significance of the occurrence. Inductive reasoning is applied in this research where the themes and categories are based on the data through examination and constant comparison.

This study uses a combination of the following methods to gather information:

a. Document analysis;
b. Focus Group Discussion (FGD) workshops; and
c. Surveys.

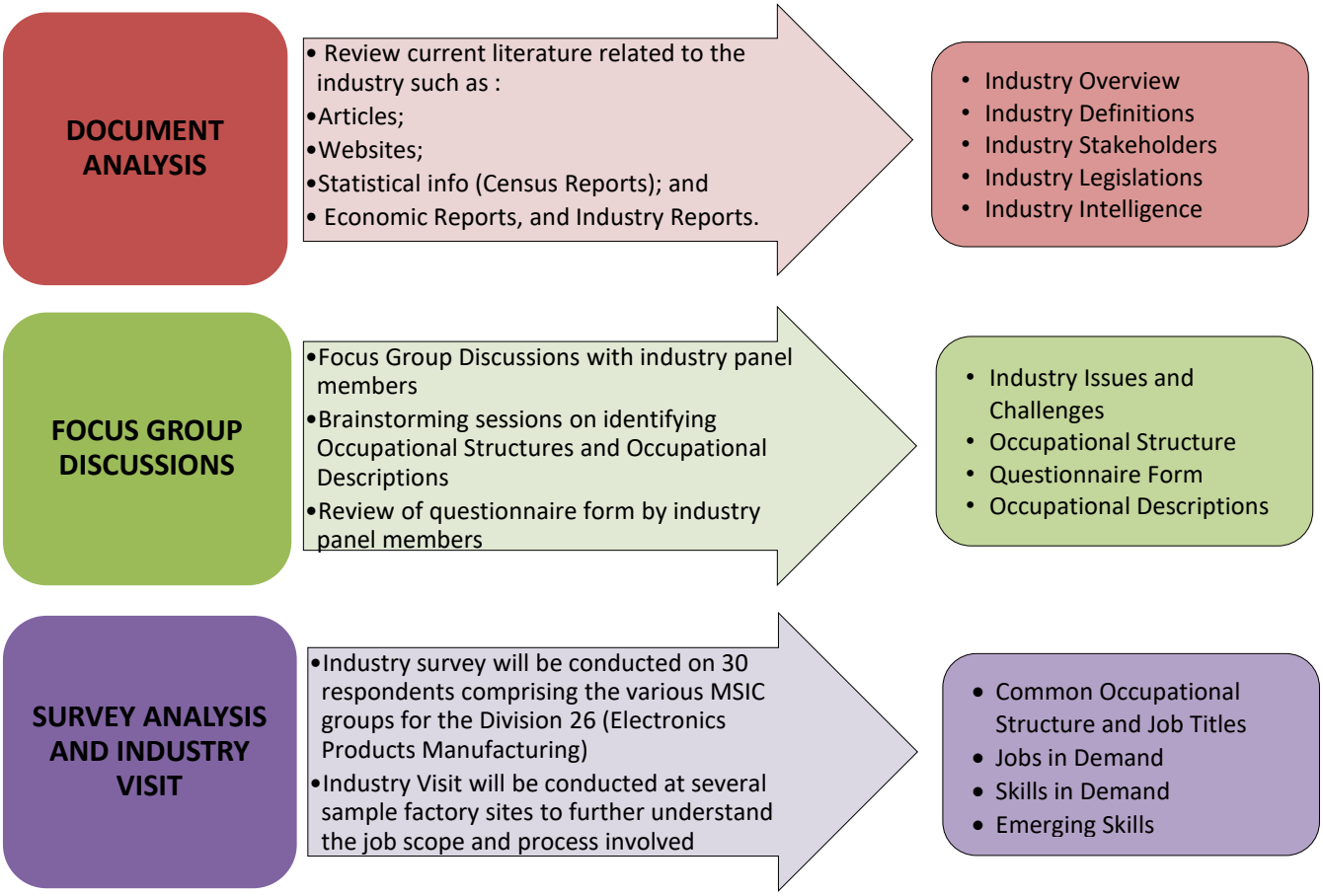

Figure 3.1: Operational Framework of Research

Below are the elaborations of each method used to gather and analyse the information used in the research.

3.2.1 Document Analysis

a. Data Collection Strategies

Document analysis or literature review was done to obtain an overview of the Electronics Components and Products Manufacturing Industry. The document analysis was done to identify the Industry Definition, Stakeholders, Acts and Industry Intelligence. Sources of information were such as those published by the government, regulatory and professional bodies, news agencies, research agencies and any other sources relevant to the background information of the

industry. Most information obtained was mainly on the larger industry, which was either the Manufacturing Industry or the Electronics and Electrical (E&E) Industry. Details of the sources for the documents reviewed can be referred in the Reference section of this report.

The documents referred during the document analysis phase were as follows:

i. Department of Statistics Census Report
ii. Department of Statistics data on Employment and Industry Productivity
iii. MIDA Investment Performance 2017 Report
iv. MITI Frequently Asked Questions (FAQ) on Industry 4.0
v. NOSS Registry May 2018
vi. Malaysian Standard Industrial Classification (MSIC) 2008
vii. Online newspaper/magazine articles
viii. Official websites of industry stakeholders and legislations

b. Analyses

Document Analysis was done on the documents relevant to the required information in this research such as industry overview, stakeholders, legislations, Industry 4.0, government policies and industry intelligence. The relevance of the documents and reliability were based on the source of information and organisation of that aforesaid document. The documents were also selected based on how widely they were cited by other researchers.

c. Outcome

The outcome of this process is an overall view of the industry as described in Chapter 2 which includes the list of stakeholders (i.e. Regulatory bodies, related government agencies, certification organisations, industry associations), legislations, policies and initiatives, industry and market intelligence, MSIC scope of section and groups, plus the list of developed NOSS relevant to the Electronics Components and Products Manufacturing industry.

3.2.2 Focus group discussions (FGD)

a. Data Collection Strategies

Facts obtained during the literature review/document analysis were discussed and presented to the Development Panel members, comprising representatives from various sectors of the industry in focus group workshop sessions for their review and confirmation.

The data collection strategy most applied throughout research was the Focus Group Discussions. The Focus Group Discussion (FGD) meeting with the development panel members managed to accomplish the confirmation of document analysis such as industry intelligence information pertaining to issues and challenges and Industry 4.0 in the industry. This is because there is certain information for the industry intelligence section that is not available in the form of available literature. Below is the list of FGD panel members.

Table 3.1: List of Focus Group Discussion Panel Members

NO	NAME	POSITION	ORGANISATION	MSIC GROUP
1.	Noorhisyam Bin Abdul Hamid	Quality Engineering Manager	ON Semiconductor (Malaysia) Sdn. Bhd.	261
2.	Ismayazzir Bin ismail	Equipment Manager	Nexperia Semiconductors Sdn. Bhd.	261
3.	Mohd Nahrulhisham Bin Mahamud	Assistant Manager	SONY EMCS (Malaysia) Sdn. Bhd.	264
4.	Abd Rahim Bin Mansor	Manager	Asteria Electronics MFG Sdn. Bhd.	264
5.	Dr. Roslee Bin Mohd Sabri	Staff Engineer	Mimos Semiconductor (M) Sdn. Bhd.	262,264

NO	NAME	POSITION	ORGANISATION	MSIC GROUP
6.	Shahrol Hisham Bin Baharom	Staff Engineer	Mimos Semiconductor (M) Sdn. Bhd.	262,264
7.	Muhammad Helmi Bin Hussain	Product Support Engineer	Ericsson Resource & Competence Center Sdn. Bhd.	263
8.	Muhd Ridth'wan Bin Md Asror	Engineer	Ericsson Resource & Competence Center Sdn. Bhd.	263
9.	Aida Syukrena Binti Mohd. Idris	Senior Principal Assistant Director	Sectoral Policy, Ministry of International Trade and Industry (MITI)	261-267
10.	Norhizam Bin Ibrahim	Senior Deputy Director	Electrical & Electronics Division, Malaysian Investment Development Authority (MIDA)	261-267

Sessions with MIDA and MITI were also conducted to further confirm if the findings are in line with government policies and initiatives. Other than confirming the document analysis findings with the development panel, initial information was also obtained from the Focus group discussions such as the Occupational Structures, Skills in Demand and Emerging Skills. The scope of the analysis was centred on the following key areas:

i. Industry background;
ii. Occupational structure; and
iii. Skills in demand.

Input from the FGD was also used to review the draft questionnaire form to anticipate the response of the industry. The questionnaire can be referred in Annex 3 of this report. The questionnaire seeks to elicit information on the key

areas from the industry representatives. The dates, venue and activities of the industry engagement sessions involving industry players, government agencies and subject matter experts are as below:

Table 3.2: List of Industry Engagement Sessions

No.	Date	Venue	Outcome
1.	21st – 22nd April 2018	Palace of the Golden Horses, Seri Kembangan	**Chapter 2:** 1. Industry Stakeholders 2. Relevant Legislations and Government Policies 3. Industry Definition and MSIC Scope 4. Relevant NOSS 5. Industry Intelligence
2.	3rd May 2018	Malaysian Investment Development Authority (MIDA) Headquarters, Kuala Lumpur Sentral	
3.	8th May 2018	Malaysian International Trade and Industry (MITI) office	
4.	9th – 10th June 2018	Palace of the Golden Horses, Seri Kembangan	**Chapter 4:** 1. Occupational Structure 2. Occupational Descriptions 3. Skills in Demand 4. Jobs in Demand 5. Emerging Skills **Chapter 5:** 1. Recommendations 2. List of Critical Jobs

b. Analyses

The information collected regarding organisation structures were analysed during the focus group discussion when determining the Occupational Structure, whereas, the Occupational Descriptions were analysed together with the panel members.

This section explains the methodology used to develop the Occupational Structure of the industry. It must be highlighted that the OS and OD development technique described in this document is based on the facilitator's approach, where other facilitators may have their own methods and techniques in developing the OS and OD.

i. Occupational Structure (OS) Development

The first draft OS for the Electronics Components and Products Manufacturing industry was developed by the facilitator and focus group by referring process driven segmentation in electronics manufacturing/production according to the respective MSIC Groups. This OS was included in the questionnaire to be reviewed by the survey respondents. The figure below depicts the overall OS development.

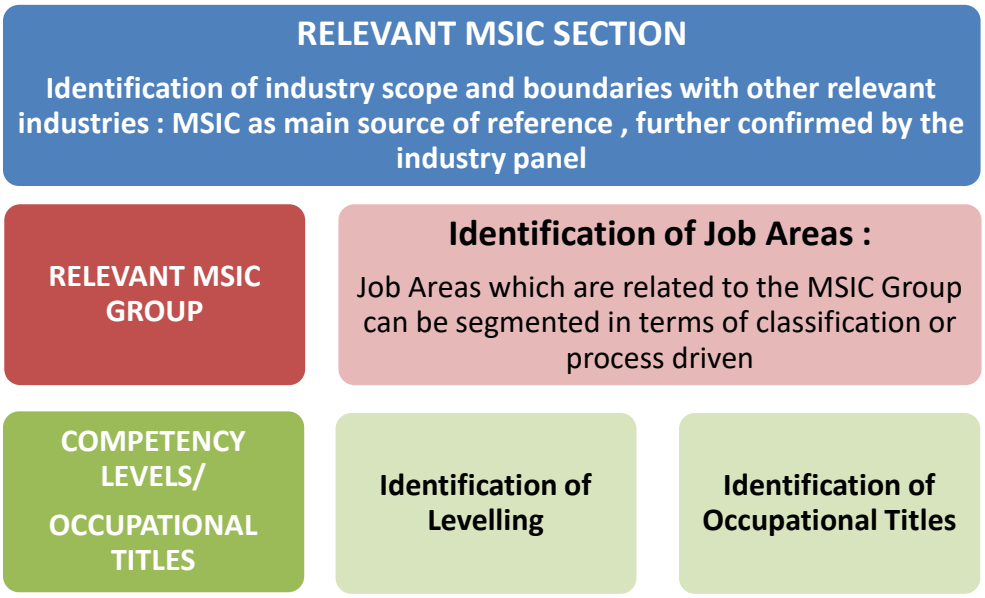

Figure 3.2: Overall Occupational Structure (OS) Development Process

The OS was developed based on identification of the industry's scope and segmentation as specified in MSIC. Grouping and segmentation based on

similar skill sets in terms of technical abilities that are unique to the particular industry is a determining factor.

Job areas which are related to the respective MSIC Groups under Division 26 were identified based on the different job areas in the overall electronics production process and also whether it was the manufacturing of components or products. This is important because the production approach is different in terms of the production line, Quality Control and production planning. These job areas were also segmented based on the common job areas in various types of companies.

Subsequently, occupational titles were determined based on common usage of job titles in the industry for all types of organisations (i.e. SME, MNC, GLC, Government). The facilitator and focus group also had to be careful that the occupational/job titles were in line with the common and accepted entry level jobs in the industry and tiers of operation. This is important as certain companies have their own policies on the entry levels and levels for designation progression in the company. In order to confirm occupational titles, it was important to obtain consensus from expert panel members that the occupational title was easily accepted by practitioners in the industry. Next these job titles were matched to the relevant competency levels as described in DSD's Malaysian Occupational Skills Qualification Framework which can be referred in Annex 1 of this report.

ii. Occupational Description (OD) Development

In the development of OD, Facilitators have the flexibility in choosing which techniques or methods to be used. The OD is the general description of the main job scope of a particular job. The OD is developed using a combination of brainstorming sessions with panel members and then the OD would be compared to other available descriptions of the same job.

Below are the main steps in producing an OD for the respective occupation titles:

- Determine the main areas and sub-areas in the sub-sector;
- Identify the occupational titles; and
- Identify the job scope.

c. Outcome

The outcome from the FGD and Industry Engagement Sessions are presented in Chapter 2 (Literature Review), Chapter 4 (Findings) and Chapter 5 (Discussions, Recommendations and Conclusions).

3.2.3 Industry Survey and Questionnaire

a. Data Collection Strategies

Research questions were developed in order to guide the research to arrive at a certain hypotheses. These questions are important to ensure that the research is focused where they have been formulated to be used as a guide throughout the industry survey and interviews:

- What is the Occupational Structure applied in various types of organisations in the industry?
- List and justify the Critical Jobs in various types of organisations (i.e. SME, MNC) in the industry.
- List and justify the Skills in Demand in various types of organisations (i.e. SME, MNC) in the industry.
- Identify and describe the job scope of the occupational areas highlighted for this particular industry.

It In order to develop the questionnaire, a draft of the Occupational Structures, Skills in Demand and Emerging Skills were identified and developed together with the development panel. The questionnaire consists of 4 sections to solicit information from industry practitioners regarding the topics below:

1. Occupational Structure sample and comments on sample OS developed in FGD
2. Jobs in Demand and justification
3. Skills in Demand and justification

4. Emerging Skills and Justification

Table 3.3: Number of Targeted Respondents According to MSIC Group

MSIC SECTION	C	MANUFACTURING	NUMBER OF TARGETED RESPONDENTS	ACTUAL NUMBER OF RESPONDENTS
MSIC DIVISION	**26**	**MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**		
MSIC GROUP	**261**	**Manufacture of electronic components and boards**	**7**	**6**
	262	**Manufacture of computers and peripheral equipment**	**5**	**2**
	263	**Manufacture of communication equipment**	**5**	**3**
	264	**Manufacture of consumer electronics**	**5**	**5**
	265	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**	**2**	**1**
	266	**Manufacture of irradiation, electro medical and electrotherapeutic equipment**	**2**	**1**
	267	**Manufacture of optical instruments and photographic equipment**	**2**	**-**
	268	**Manufacture of magnetic and optical media**	**2**	**2**
		Total Number of Respondents	**30**	**20**

The target group for the survey was the organisation's Human Resource or higher management representatives. The targeted number of industry survey respondents was 30 companies. As depicted in the Table 3.3, the actual number was 20 because of low participation from survey respondents.

b. Outcome

A sample of the questionnaire can be referred in Annex 3: Questionnaire, of this report. The surveys were conducted to obtain the views of a wider group of industry representatives. However, there were limitations in carrying out the survey as not many of the respondents responded to the survey in a timely manner. Therefore, the number of targeted respondents could not be met. In order to overcome this limitation, the research team had to combine the data from available survey responses to document analysis available on the internet. The survey was distributed online via email and followed up through phone calls to the respective Human Resource Department of the companies. The list of survey respondents were provided by MIDA and panel member's recommendations.

3.2.4 Validation of Research Findings by Review Committee

The research findings and final draft of the OF Document were presented to the Review Panel in the Occupational Framework Technical Evaluation Committee meetings for their comments, validation and approval. The details for these sessions can be referred in Table 3.4. After obtaining approval from JPK, the document is handed over to industry stakeholders. The review and final handover session aims to finalise the OF research project by having the final meeting with industry stakeholder representatives to be briefed on the contents and findings of the research.

Table 3.4: List of Evaluation Sessions

No.	Date	Venue	Activity
1.	7th May 2018	NOSS Division, Level 3, JPK Cyberjaya	• Pre JTPOF Evaluation meeting with JPK officers to review formatting and standard content
2.	16th May 2018	Palace of the Golden Horses, Seri Kembangan	• 1st JTPOF Technical Evaluation Meeting
3.	23rd May 2018	NOSS Division, Level 3, JPK Cyberjaya	• Pre PEMANDU meeting with JPK officers to review report content
4.	30th May 2018	NOSS Division, Level 3, JPK Cyberjaya	• Steering Committee (PEMANDU) meeting
5.	12th June 2018	NOSS Division, Level 3, JPK Cyberjaya	• Steering Committee (PEMANDU) meeting
6.	9th August 2018	Palace of the Golden Horses, Seri Kembangan	• 2nd JTPOF Technical Evaluation Meeting
7.	6th September 2018	NOSS Division, Level 3, JPK Cyberjaya	• Steering Committee (PEMANDU) meeting
8.	18th September 2018	Palace of the Golden Horses, Seri Kembangan	• Hand Over to Stakeholders Meeting

3.3 Chapter Conclusion

This chapter elaborates the research methodology used throughout the analysis on the industry's occupational framework for Electronic Manufacturing Industry. The methodology used in this analysis includes the project approach, Occupational Structure development, Occupational Description development and list of industry engagements throughout the project.

This project applies Qualitative Analysis methods to accomplish the research objectives, therefore industry engagements and interviews with industry representatives is one of the mostly used data collection method. Basically, qualitative analysis is applied to recognise the area of research, whereby qualitative analysis aim to represent a given reality in terms

of a numerical value. Qualitative analysis requires a holistic view and a fact-based predominant explanation. The research questions facilitated the process of obtaining responses in a clear and structured manner. The survey questionnaire can be referred in Annex 3: Questionnaire.

Thematic reasoning was used when analysing the data based on the main objectives of research and guided by the research scope. The findings are presented in Chapter 4 of this report as the Electronics Components & Product Manufacturing Industry Occupational Structure, Skills in Demand, Jobs in Demand and Emerging Skills. The Occupational Descriptions are presented in Annex 4 of this report.

CHAPTER 4: FINDINGS

4.1 Chapter Introduction

Based on the discussions with panel members during the development workshops, evaluation meetings and survey findings, the Electronics Components & Products Manufacturing Industry in Malaysia is categorised into 2 sub-sectors, which are actually based on the MSIC Groups but the OS are clustered together due to the same production and manufacturing process of the MSIC Groups:

- Electronic Components Manufacturing (MSIC Group 261)
- Electronic Products Manufacturing (Cluster of MSIC 262-268)

The scope of the analysis is based on 3 key areas, i.e. (a) the Occupational Structure (OS), (b) jobs and skills in demand, and (c) the Occupational Description (OD). This chapter therefore highlights the findings gathered on these key areas.

4.2 Comparative Study Analysis

This section presents the comparative analysis of the Electronics Manufacturing Industry according to each job area as identified in this OF analysis. Each area is compared in terms of market definition, major companies, top countries, economic landscape and job responsibilities.

Table 4.1 compares between the MSIC Groups under Division 26 where it is clearer for the reader to see the difference between the market definition, industry players (company and country) and the respective economic landscapes for each MSIC Group.

Based on the comparative analysis in terms of economic landscape, Asia, with China as the main leading country is one of the main contributors to the manufacturing of Electronic Components & Semiconductors, Computers and Peripheral Equipment and Navigational Equipment. The reason may be due to the cost effective and conducive environment for manufacturing. Whereas, in the following section, the job responsibilities between the different jobs in a particular job area under the same MSIC Division and MSIC group are compared side by side.

Table 4.1: Comparative Analysis between Electronics Components and Products Manufacturing Industry MSIC Groups

MSIC Group	Market Definition	Major Companies	Top Countries	Economic Landscape of MSIC Group
261 – Manufacture of Electronic Components and Semiconductors	Companies in this industry make semiconductors (computer chips) and other components used in electronic devices	Major companies include Intel,Samsung Electronics, Qualcomm, Texas Instruments, NXP and ON Semiconductor.	The Asia/Pacific region accounts for about 60% of semiconductor sales, followed by the Americas (20%), Japan (10%), and Europe (10%).[31]	Global semiconductor sales exceed $400 billion a year, according to World Semiconductor Trade Statistics[32]. The industry depends highly on demand from the computer industry and makers of telecommunications products such as mobile phones, which can vary sharply from year to year. Companies can be successful producing standard parts at low cost or by producing highly specialized components. Small companies can compete effectively with large ones by producing specialized products or developing new applications. Technological expertise is extremely important.

[31] Dun & Bradstreet. First Research. http://www.firstresearch.com/Industry-Research/Semiconductor-and-Other-Electronic-Component-Manufacturing.html

[32] Dylan McGrath .6 February 2018. EE Times. Semiconductor Industry Exceeded USD 500 Billion in 2017. https://www.eetindia.co.in/news/article/18020604-semiconductor-industry-exceeded-400-billion-in-2017

262 – Manufacture of computers and peripheral equipment	Companies in this industry manufacture computer mainframes, servers, personal computers (PCs), workstations, and mobile PCs (laptops, netbooks, and tablets), monitors, keyboards, mice, and webcams, as well as ATMs, self-service kiosks, point-of-sale terminals, and biometric readers.as well as computer peripheral equipment, including storage devices, terminals, and input/output devices	Major companies include Canon, Epson, and Brother, all based in Japan; Diebold, NCR, and HP, all based in the US; and Logitech, based in Switzerland. Major companies include US-based Apple, Dell, HP, and IBM; Foxconn and Quanta (both of Taiwan); Hitachi and Toshiba (Japan); and Lenovo (China).	The global computer peripheral manufacturing industry is concentrated in Asia. Companies in Japan have traditionally dominated the computer printer market, and China, Singapore, and Taiwan host large numbers of both computer peripheral OEMs and contract manufacturers that serve the industry.[33]	The industry's three major product categories are computers (PCs, servers, mainframes), storage devices (optical and hard disk drives, tape storage), and peripheral equipment (ATMs, PC peripherals, point-of-sale devices). Worldwide PC shipments totalled 67.2 million units in the third quarter of 2018, a 0.1 per cent increase from the third quarter of 2017, according to preliminary results by Gartner, Inc. The global market has shown modest stability for two consecutive quarters.[34]

[33] Dun & Bradstreet. First Research. http://www.firstresearch.com/Industry-Research/Semiconductor-and-Other-Electronic-Component-Manufacturing.html
[34] Gartner Inc. Stamford. Conn. 10th October 2018. https://www.gartner.com/en/newsroom/press-releases/2018-10-10-gartner-says-worldwide-pc-shipments-experienced-flat-growth-in-the-third-quarter-of-2018

	such as printers, monitors, printers and keyboards.			
263 – Manufacture of communication equipment	Companies in this industry make equipment used in telephone, data, radio and TV broadcast, and wireless communications networks.	Major companies include Apple, Cisco Systems, and QUALCOMM (all based in the US), as well as Ericsson (Sweden), Huawei (China), Nokia (Finland), Samsung (South Korea), and ZTE Corporation (China).	Regions with the highest percentages of voice and data network users are North America, Western and Northern Europe, and East Asia.[35]	The industry depends on purchases from businesses, telephone companies, cable companies, data communications providers, and TV and radio broadcasters. Profitability for individual companies is linked to technical innovation and the ability to secure high-volume contracts from large customers. Small companies can be successful if they make highly specialized products. There are large economies of scale in manufacturing standard products, but many products are specialized and produced in small manufacturing plants. Worldwide communications equipment demand is driven by expanding mobile broadband service, evolving computer

[35] Dun & Bradstreet. First Research. http://www.firstresearch.com/Industry-Research

				technologies, and increasingly complex software applications.
265 – Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Companies in this industry manufacture aircraft engines and engine parts, as well as fuselage, propeller and rotor, landing gear, electric and hydraulic control, and avionics systems.	Major companies include GE Aviation and Pratt & Whitney (US); Kawasaki Heavy Industries (Japan); Rolls-Royce (UK); SAFRAN, Thales and Zodiac (France), Boeing, General Dynamics, Airbus Group (the Netherlands), BAE Systems (the UK), Bharat Electronics (India), China Aerospace Times Electronics (China), Furuno Electric (Japan).	Top countries for the manufacture of search, detection, navigation, and guidance systems include China, France, the UK, and the US.[36]	Global aerospace and defence revenue, a key demand driver for search, detection, navigation, and guidance systems, is forecast to rise in 2018. The recovery of global gross domestic product (GDP), stable commodity prices, and heightened passenger travel demand are likely to ramp up growth in the commercial aircraft sector in 2018 [37]

[36] Dun & Bradstreet. First Research. 2018. http://www.firstresearch.com/Industry-Research
[37] Deloitte. Global Aerospace and Defense Outlook. 2018.https://www2.deloitte.com/global/en/pages/manufacturing/articles/global-a-and-d-outlook.html

4.3 Survey & Questionnaire Analysis

Below are findings based on the tabulation of survey responses obtained from a number of 20 respondents from various areas companies specialising in Electronics Components and Equipment Manufacturing:

4.3.1 Jobs in Demand

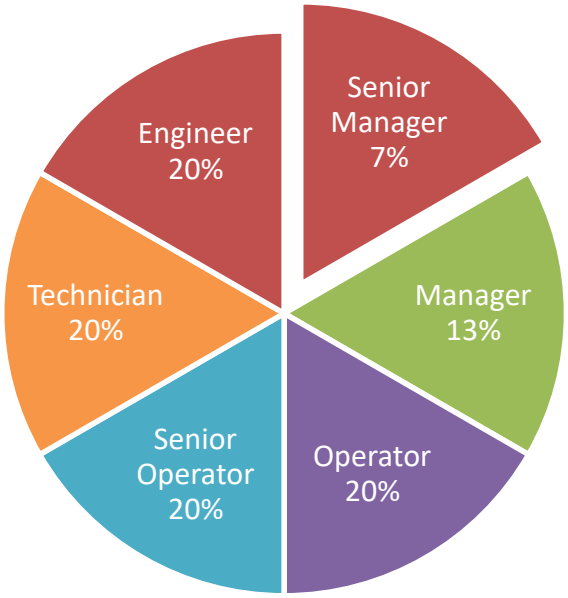

Figure 4.1: Jobs in Demand Pie Chart

The pie chart above shows that the majority of jobs in demand are at the operator, senior operator, technician and engineer level. The reason may be due to the critical process and engineering work required in the production of Electronic Components and Products Manufacturing. The least in demand was the Senior Manager job title with 7% ,this is because the number of Senior Managers are already sufficient in the industry and those in this position demonstrate that they possess the skills that are required.

4.3.2 Skills in Demand

The following Figure 4.2 shows the Skills in Demand response form the survey which shows that the majority of responses require the workers at Operator till

Engineer level to possess Product Understanding, Communication Skills and Ability to Escalate Issues to Superior. At higher levels, the requirements are more on technical skills in manufacturing and engineering.

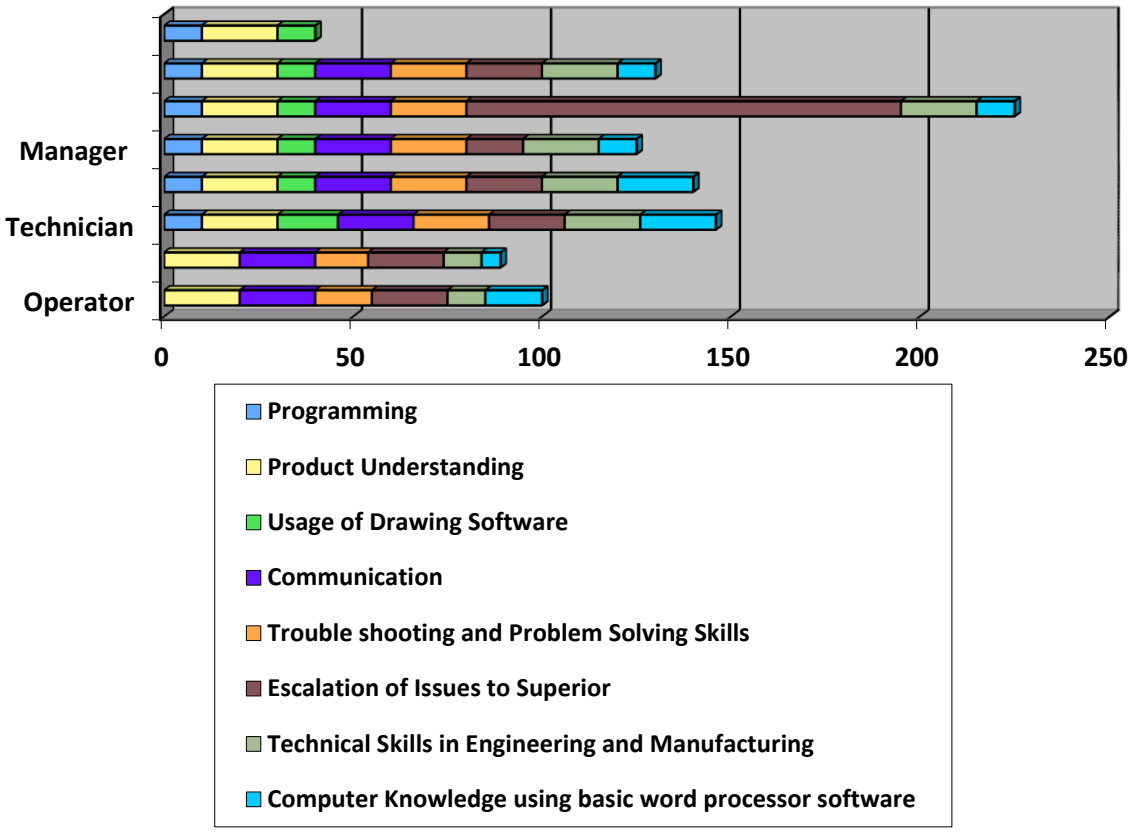

Figure 4.2: Skills in Demand Bar Chart

4.4 Occupational Structure (OS)

The OS depicts the various job areas of the industry arranged based on the common competencies. Occupational and functional areas which require similar competencies regardless of industries, e.g. human resources, accounts & finance and information technology are not included. Only jobs and functional areas which are specific and unique to the Electronics Manufacturing Industry are included in the OS. Therefore, the OS should not be confused with an organisational chart.

4.4.1 Electronics Components & Products Manufacturing Industry OS Sub-sectors

The Electronics Components & Products Manufacturing Industry sub-sectors are segregated according to job scope and common knowledge and skills required for the respective personnel under the specified sub-sector. These sub-sectors are also put under the categorisation as stated in the Malaysian Standard Industrial Classification (MSIC) which comprise of Section C: Manufacturing and . Please refer Chapter 2 for details of these MSIC sections. The sub-sectors identified will be a point of reference in identifying the job areas that are included and which will require human capital development. Please refer to tables included in this section for details of the OS sub-sectors, job areas, levels of competency and common job titles. The elaborations for the main sub-sectors are as follows:

a. Division 26: Manufacture Of Computer, Electronic And Optical Products (MSIC Group 261: Manufacture Of Electronic Components And Boards)

The job areas under this sub-sector are as follows:

i. Engineering

The Engineering job area consists of personnel whom will be involved closely with the engineering aspects involved in the manufacturing of electronics components such as semiconductors and boards.

It is further divided into the following sub-areas:

- Material

  This sub-area's personnel is responsible for ensuring and monitoring the usage of the material used in the manufacturing process for electronic components and boards. The entry level starts at a higher level compared to the other sub-areas under the Engineering job area, which is at Level 5, as an Engineer. This is because this sub-area focuses on the in-depth understanding of materials used in Electronic Components. The engineers may progress as Staff Engineers or Managers (job titles used in different companies) at Level 6 and then as Senior Staff Engineers or Senior Managers at Level 7.
- Process / New Product Introduction

This sub-area focuses on the engineering aspects of the processes involved in manufacturing electronic components and boards. The entry level is at Level 2 as a Junior technician or as an Assistant Technician. They may progress as Technicians at Level 3 and Senior Technicians at Level 4. Although to become an Engineer may require certain criteria to be fulfilled, those at Level 5 should be competent to fulfil the responsibilities as an Engineer. At level 6 the engineers are responsible as Staff Engineers and at Level 7 as Senior Staff Engineers. These personnel are also responsible for the introduction of new products into the production line.

- Equipment Engineering

  The personnel under this sub-area are responsible for the equipment used in the manufacturing process. The entry level is at level 2 as Junior Technicians or Assistant technicians, then at Level 3 as technicians and level 4 as Senior technicians. To become Engineers at level 5require certain competencies and when they have met them will be competent as Engineers and with further experience and improved work performance will be able to progress with the competencies as Staff Engineer and till the highest level of competency for this job area which is as a Senior Staff Engineer.

ii. Manufacturing

The entry level is at Level 1 as Operators, then they may progress as Senior Operators or in certain companies are known as Quality Inspectors. The main competency required at this level is to ensure the electronic component meets production specifications. At Level 3 the line leader will be responsible for ensuring the production line is running smoothly according to production schedule.

The scope of work for the Assistant manufacturing Executive at level 4 is to oversee the production floor and report issues to the Manufacturing Executives at Level 5 where the Manufacturing Manager at Level 6 will ensure that any issues met will be mitigated or resolved. The Senior Manufacturing Manager at Level 7 will plan and set the policies to ensure

the manufacturing process can be carried out smoothly according to production requirements and production schedule.

iii. Quality Assurance (QA)

Quality Assurance personnel are responsible to ensure and maintain quality specifications are as per requirements, conduct quality testing activities and to ensure every step of the production process meets quality standards.

The entry level is at level 2 as a QA Operator, then as a QA Technician at level 3, QA Senior Technician at level 4, QA Engineer at level 5, QA Manager at level 6 and at level 7 as a Senior QA Engineer.

iv. Document Control

Personnel under the document control job area are responsible for ensuring all relevant documentation used in the plant are registered in the document database, maintaining all necessary documents (hardcopy/softcopy), updating of version numbers, syncing the intranet and local database plus disseminating copies of documents to the relevant departments.

The entry level is at level 3 as Document Controllers, then as Assistant Document Control Executives at level 4, as Document Control Executives at level 5 and Document Control Manager at level 6, and the highest competency is as the Senior Document Control Manager who will be responsible to oversee the documentation control system is functioning according to standards and quality requirements.

b. Division 26: Manufacture Of Computer, Electronic And Optical Products (MSIC Group 262 - 268: Manufacture Of Electronic Products And Equipment)

The job areas under this sub-sector are as follows:

i. Production Engineering

The Production Engineering job area consists of personnel responsible on ensuring the engineering aspects and requirements are met throughout the production manufacturing of electronics products. It is further divided into the following sub-areas:

- Process Engineering
- Manufacturing Engineering

ii. Production Operation

This job area is further divided into the sub-areas below:

- Production
- Quality Control
- Planning

iii. Quality Assurance (QA)

Quality Assurance personnel for the MSIC Groups 262-268 have similar responsibilities as those under MSIC Group 261, which is to ensure and maintain quality specifications are as per quality standards via quality testing activities and audits. The entry level is at level 2 as a QA Operator, then as a QA Technician at level 3, QA Senior Technician at level 4, QA Engineer at level 5, QA Manager at level 6 and at level 7 as a Senior QA Engineer.

iv. Document Control

Similar to the other MSIC Groups, personnel under the document control job area are responsible for ensuring registration of all relevant documentation used in the plant, maintenance of database, all documents (hardcopy/softcopy), updating of version numbers, syncing the intranet and local database plus disseminating copies of documents to the relevant departments.

The entry level is at level 3 as Document Controllers, then as Assistant Officers or Document Control Executives at level 4, as Document Control Officers at level 5 and Document Control Manager at level 6, and the highest competency is as the Senior Document Control Manager who will be responsible to oversee the documentation control system is functioning according to standards and quality requirements.

Table 4.2: Occupational Structure for Sections C, Division 26, Group 261

MSIC Section	C – MANUFACTURING						
MSIC Division	26 – MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	261 - Manufacture of electronic components and boards						
Area	**Engineering (Material)**	**Engineering (Process)**	**Engineering (New Product Introduction)**	**Engineering (Equipment)**	**Production**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A		N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*	Senior Production Manager**	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager*	Staff Engineer/ Manager*	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager* **	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Engineer*	Engineer*	Production Executive* **	QA Engineer	Document Control Executive
4	Not Available	Senior Technician*	Senior Technician*	Senior Technician*	Assistant Production Executive* **	QA Senior Technician	Assistant Document Control Executive
3	No Level	Technician* **	Technician*	Technician* **	Line Leader* **	QA Technician	Document Controller
2	No Level	Junior Technician /Assistant Technician*	Junior Technician /Assistant Technician*	Junior Technician /Assistant Technician*	Senior Operator/ Quality Inspector* **	QA Operator	No Level
1	No Level	No Level	No Level	No Level	Operator* **	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.3: Occupational Structure Sections C, Division 26, Group 262

MSIC Section	**C – MANUFACTURING**						
MSIC Division	**26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**						
MSIC Group	**262 - Manufacture of computers and peripheral equipment**						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.4: Occupational Structure Sections C, Division 26, Group 263

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	263- Manufacture of communication equipment						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.5: Occupational Structure Sections C, Division 26, Group 264

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	264- Manufacture of consumer electronics						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.6: Occupational Structure Sections C, Division 26, Group 265

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	265 - Manufacture of measuring, testing, navigating and control equipment; watches and clocks						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.7: Occupational Structure Sections C, Division 26, Group 266

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	266 - Manufacture of irradiation, electro medical and electrotherapeutic equipment						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.8: Occupational Structure Sections C, Division 26, Group 267

MSIC Section	**C – MANUFACTURING**						
MSIC Division	**26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**						
MSIC Group	**267- Manufacture of optical instruments and photographic equipment**						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

Table 4.9: Occupational Structure Sections C, Division 26, Group 268

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	268- Manufacture of magnetic and optical media						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

Note: *Critical Job Titles

**Jobs relevant to Industry 4.0

4.4.2 Electronics Components and Products Manufacturing Summary of Job Titles

With reference to the Table 4.10, there are 318 job titles under the Electronics Components and Products Manufacturing Industry, which covers both of the sub-sectors from Level 1 to Level 8. The majority of job titles are at level 5, 6 and 7 as the industry requires workers with the capability to perform complex problem solving, analysis and planning. There are 72 jobs relevant to Industry 4.0 which are mostly under the production and manufacturing job areas ranging from Operator level to Engineer level.

Table 4.10: Summary of Job Titles

No	Sub-sector	Job/Sub-Area		Level								Number Of Job Titles Identified
				1	2	3	4	5	6	7	8	
1	**Electronic Components Manufacturing (MSIC Group 261)**	Engineering	Material	NIL	NIL	NIL	NIL	1	1	1	NIL	3
			Process/ New product	NIL	2	2	2	2	2	2	NIL	12
			Equipment Engineering	NIL	NIL	1	1	1	1	1	NIL	5
		Production		1	1	1	1	1	1	1	NIL	7
		Quality Assurance		NIL	1	1	1	1	1	1	NIL	6
		Document Control		NIL	NIL	1	1	1	1	1	NIL	5
2	**Electronic Products Manufacturing (MSIC Group 262-268)**	Production Engineering	Process Engineering	NIL	7	7	7	7	7	7	NIL	42
			Manufacturing Engineering	NIL	7	7	7	7	7	7	NIL	42
		Production Operation	Production	7	7	7	7	7	7	7	NIL	49
			Quality Control	NIL	7	7	7	7	7	7	NIL	42
			Planning	NIL	NIL	NIL	7	7	7	7	NIL	28
		Quality Assurance		NIL	7	7	7	7	7	7	NIL	42
		Document Control		NIL	NIL	7	7	7	7	7	NIL	35
	TOTAL NO. OF JOB TITLES IDENTIFIED			**8**	**39**	**48**	**55**	**56**	**56**	**56**	**0**	**318**

Note: NIL = No Level

4.5 Job Responsibilities versus NOSS Level (Job Area Description)

MSIC Division: 26 - Manufacture of Computer, Electronic and Optical Products
MSIC Group: 261 - Manufacture of Electronic Components and Boards

Table 4.11: Job Responsibilities versus NOSS Level (Job Area Description – Engineering)

AREA	**ENGINEERING (PROCESS/NEW PRODUCT INTRODUCTION)** Responsibilities May Include	**ENGINEERING (PROCESS)** Responsibilities May Include	**ENGINEERING (EQUIPMENT)** Responsibilities May Include
Level 8	Not Available	Not Available	Not Available
Level 7	Not Available	Not Available	Not Available
Level 6	Not Available	Not Available	Not Available
Level 5	**New Product Introduction (NPI) Engineer (Engineering)** 1. Involved in new product introduction (NPI) through developing process steps, cost monitoring and process improvement. 2. Coordinate the release of new product release per time line committed.	**Process Engineer (Engineering)** 1. Develop and implement engineering solutions that will improve product line yield, process improvement and operation efficiency. 2. Perform failure and root cause analysis for the rejects and quality issues seen on manufacturing processes. 3. Generate manufacturing process documentation including PFMEA, Control Plan, work instruction and visual aids for direct labour (DL) training and ensure standard work compliance and effectiveness. 4. Generate and implement Engineering changes, process qualification or optimization and validation activities. 5. Monitor the SPC (Statistical Process Control) performance.	**Engineer (Equipment)** 1. To provide technical expertise in maximizing overall equipment effectiveness 2. Working with production and process team to drive for equipment and operations improvement 3. Interpret equipment performance and reliability to improve equipment design 4. Establish programs and solutions for increasing uptime and for equipment problems that affect the manufacturing process. 5. Provide technical support to the process development, process engineering and manufacturing equipment maintenance. 6. Plans and execute training programs for equipment technicians 7. Prepare yearly equipment budget

AREA	**ENGINEERING (PROCESS/NEW PRODUCT INTRODUCTION)** Responsibilities May Include	**ENGINEERING (PROCESS)** Responsibilities May Include	**ENGINEERING (EQUIPMENT)** Responsibilities May Include
Level 4	**Senior New Product Introduction (NPI) Technician (Engineering)** 1. Assist/work with engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement. 2. Coordinate and plan for golden lot to be run and provide full report on its status to supervisor. 3. Initiate the new BOM registration inside systems (if any) 4. Provide the first level analysis on failures observed while running the golden lot. 5. Able to utilise word processing and spreadsheet application software	**Senior Process Technician (Engineering)** 1. Ability to support Process Engineering with process and equipment qualifications, process evaluation or simulations and process improvement. 2. Ability to support production in the resolution of process issues. 3. Capable and has authority to make decision plus take proper action in support of production process quality and yield. 4. Compiles and analyses statistical data for critical processes. 5. Liaise with relevant personnel from related departments for matters affecting process performance. 6. Maintain and summarize production data (yield, output, machine stoppages) and regularly report status to supervisor. 7. Carry out any other duties as directed by the company.	**Senior Technician (Equipment)** 1. Lead the equipment technicians to execute according to specification, WI, and OPL to maintain equipment in the production 2. Supervise production line equipment maintenance on shift to meet planned KPIs goal 3. Lead the equipment ramp up and conversion to support production volume loading 4. Provide technical support/solutions to resolve equipment, hardware and software related issues 5. Conduct training on equipment operation and maintenance to operator and technician 6. Meet all company requirements on 5S, quality and EHS
Level 3	**New Product Introduction (NPI) Technician** 1. Assist/work with technicians and engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement. 2. Monitor the running of the golden lot 3. Co-ordinate the lot through process flow completion 4. Able to use word processing and spreadsheet application software.	**Process Technician (Engineering)** 1. Assist/work with Engineers to improve product yield, quality and output. 2. Control processes as established in standard operating procedures. 3. Support production in the resolution of process issues. 4. Perform process audit on specified frequency. 5. Liaise with relevant personnel from related departments for matters affecting process performance. 6. Escalate to the Engineer based on the response plan. 7. Provide weekly update on the Key Performance Indicators (KPI).	**Technician (Equipment)** 1. Carry out routine maintenance of equipment 2. Carry out repair & troubleshooting of equipment 3. Update prompt important daily production issue. Take necessary steps to resolve anything in the shift 4. Identify and update spare parts listing regularly 5. Maintain all machine records with good traceability. Update PM/CAL/ESD list to date 6. Update equipment status list (PM/ESD specifications) 7. Involve in manufacturing and running of production materials in the shop floor

AREA	**ENGINEERING (PROCESS/NEW PRODUCT INTRODUCTION)** Responsibilities May Include	**ENGINEERING (PROCESS)** Responsibilities May Include	**ENGINEERING (EQUIPMENT)** Responsibilities May Include
		8. To carry out any other duties as directed by the company. 9. Able to utilise word processing and spread sheet application software.	
Level 2	**Junior Technician (Engineering), Assistant Technician** 1. Assist/work with Technicians and Engineers to improve product yield, quality and output. 2. Control processes as established in standard operating procedures. 3. Support production in the resolution of process issues. 4. Perform process audit on specified frequency. 5. Escalate to the engineer based on the response plan. 6. Carry out any other duties as directed by the company. 7. Able to utilise word processing and spread sheet application software	**Junior Technician (Engineering), Assistant Technician** 1. Assist/work with Technicians and Engineers to improve product yield, quality and output. 2. Control processes as established in standard operating procedures. 3. Support production in the resolution of process issues. 4. Perform process audit on specified frequency. 5. Escalate to the engineer based on the response plan. 6. Carry out any other duties as directed by the company. 7. Able to utilise word processing and spread sheet application software	**Junior Technician (Equipment), Assistant Technician** 1. Assist technician to carry out routine maintenance of equipment 2. Assist technician to carry out repair & troubleshooting of equipment 3. Update prompt important daily production issue. 4. Assist in identify and update spare parts listing regularly 5. Assist in maintain all machine records with good traceability 6. Update PM/CAL/ESD list to date 7. Assist in updating equipment status list (PM/ESD specifications) 8. Involved in manufacturing and running of production materials on the shop floor
Level 1	No Level	No Level	No Level

MSIC Division: 26 - Manufacture of Computer, Electronic and Optical Products
MSIC Group: 261 - Manufacture of Electronic Components and Boards

Table 4.12: Job Responsibilities versus NOSS Level (Job Area Description – Production, Quality Assurance and Document Control)

AREA	**PRODUCTION** Responsibilities May Include	**QUALITY ASSURANCE (QA)** Responsibilities May Include	**DOCUMENT CONTROL** Responsibilities May Include
Level 8	Not Available	Not Available	Not Available
Level 7	Not Available	Not Available	Not Available
Level 6	Not Available	Not Available	Not Available
Level 5	**Production Executive (Manufacturing)** 1. Manage the lot running as per scheduled and follows FIFO concept. 2. Monitor that no backlog situation is reported. 3. Analyse the production performance per defined KPI and compile reports daily/monthly/quarterly or as assigned by superior. 4. Coordinate and cooperate with related departments to promote and manage countermeasures for problem solving. 5. Organize and prepare all the tools required by subordinate and control its usage. 6. Monitor the production lines in the factory. 7. Reduce or eliminate the rejected items during production processes. 8. Expedite production processes by using lesser manpower and optimise production output. 9. Maintain production output quality. 10. Lead and ensure subordinate carry out job functions efficiently and meet production output target set by company.	**QA Engineer** 1. Responsible for QA/QC functions within the plant in particular manufacturing quality measures and conformation to the product 2. Develop and implement quality plans, standards and procedures in fulfilment of customer and internal quality expectations 3. To drive in product quality improvement and meeting customer satisfaction and lead operation in building a reliable quality manufacturing operation 4. Lead internal auditor, as a management representative (QMR), to ensure that the company Quality Management System is properly established, implemented, continually improved and effective 5. Manage a team of customer quality assurance engineers and technicians to support internal and customer complaints 6. Provides direct coaching to the engineers in failure analysis, containment, root cause analysis and implementation of systemic	**Document Control Executive (Document Control)** 1. Assist the manager in coordinating the review board meeting for any request change approval with the management team. 2. Manage documents circulation, incoming and outgoing correspondences, and document records. 3. Manage the overall dispatch activities for submission and documents circulation. 4. Assist and support the project core team where administrative duties are concerned 5. Work with process owners to develop/update policies and procedures and ensure that they are in line with a requirement. 6. Conduct internal audit. 7. Manage document control. 8. Participate in Quality meeting. 9. Assist Quality manager in management review.

AREA	**PRODUCTION** Responsibilities May Include	**QUALITY ASSURANCE (QA)** Responsibilities May Include	**DOCUMENT CONTROL** Responsibilities May Include
		preventive action. The quality of 8D is critical under the stringent automotive expectation 7. Support site customer audits and visits. To provide the related product quality performance data as well as summarizing the quality incidents and action taken 8. Publish the weekly, monthly and quarterly customer product and quality responsive reports	
Level 4	**Assistant Production Executive (Production)** 1. Coordinate the running lot is as per schedule and follows the FIFO concept. 2. Monitor that no backlog situation is reported.	**QA Senior Technician** 1. Review the SPC, control plan data and status report 2. Check the measurement of gages and inspection equipment 3. Check the calibration for gages and inspection equipment 4. Check the MSA, GRR for gages and inspection equipment (DAGE, measurement scopes) 5. Assist QA engineer from technical aspects, incoming reject verification, lots tracking, evaluations and follow up for closure 6. Lead audit on document control requirement compliance	**Assistant Document Control Executive (Document Control)** 1. Ensure there is no failure in document registration and it meets as per checklist 2. Perform regular audit on the system and intranet check. 3. Ensure all the necessary documents (Hard or softcopy) are properly filed in the defined folder or binder (Database) 4. Ensure correct document number is used on the production floor and uses the latest version updated. 5. Assume duties during absence of executive.
Level 3	**Line Leader (Production)** 1. Coordinate and monitor production runs according to product run sheets and work instruction 2. Lead a group of operator towards achieving the KPI sets. 3. Ensure subordinate compliances to the procedure in daily routine job. 4. Supervise and coordinate the housekeeping 5's and safety activity in the work place.	**QA Technician** 1. Maintain and summarize the SPC, control plan data and regularly report status to supervisor 2. Lead the measurement of gages and inspection equipment 3. Lead the calibration for gages and inspection equipment 4. Lead the MSA, GRR for gages and inspection equipment (DAGE, measurement scopes)	**Document Controller (Document Control)** 1. Check the submitted document for registration based on the registration checklist 2. Issue a document code for a new document or provide the most current editable version to the requesting author who will create/revise the document 3. Maintain all the necessary document (Hard or softcopy) in the defined folder or binder (Database)

AREA	**PRODUCTION** Responsibilities May Include	**QUALITY ASSURANCE (QA)** Responsibilities May Include	**DOCUMENT CONTROL** Responsibilities May Include
	5. Maintain and prepare operational reports 6. Assume duties during absence of Production Executive. 7. Assist other worker's manufacturing tasks as and when required.	5. Train the quality technician and quality operator 6. Assist QA engineer from technical aspects, incoming reject verification, lots tracking, evaluations and follow up for closure 7. Perform random audit on document control requirement compliance 8. Other responsibilities that may be assigned from time to time	4. Ensure intranet tallies with what is in the current local database. 5. Perform the quarterly document control check 6. Issue controlled copy slip to those who have requested a copy of the registered document. 7. Issue copies to the line and updates the master list
Level 2	**Senior Operator (Production), Quality Inspector** 1. Perform and monitor production runs according to product run sheets and work instruction 2. Ensure compliances to the procedure in daily routine job. 3. Carry out inspection under defined frequency and referring to its criteria 4. Maintain and prepare operational reports 5. Carry out the Mentor roles for new operator 6. Assume duties during absence of Line leader	**QA Operator** 1. Assist daily production quality activity. 2. Assist Daily 5S task. 3. Utilise test and measurement equipment. 4. Utilise flowchart, Standard Operation Procedure (SOP) and quality standards	No Level
Level 1	**Operator (Production)** 1. Perform production runs according to product run sheets and work instruction. 2. Ensure compliances to the procedure in daily routine job. 3. Carry out inspection under define frequency and referring to its criteria.	No Level	No Level

MSIC Division: 26 - Manufacture of Computer, Electronic and Optical Products

MSIC Group: 262 - Manufacture of computers and peripheral equipment, 263 - Manufacture of communication equipment, 264 - Manufacture of consumer electronics, 265 - Manufacture of measuring, testing, navigating and control equipment; watches and clocks, 266 -Manufacture of irradiation, electro medical and electrotherapeutic equipment, 267- Manufacture of optical instruments and photographic equipment and 268 - Manufacture of magnetic and optical media

Table 4.13: Job Responsibilities versus NOSS Level (Job Area Description – Production Engineering)

AREA	**PRODUCTION ENGINEERING (PROCESS ENGINEERING)** Responsibilities May Include	**PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)** Responsibilities May Include
Level 8	Not Available	Not Available
Level 7	Not Available	Not Available
Level 6	Not Available	Not Available
Level 5	**Engineer** 1. Prepare SOP document / Process Flow / Process Layout 2. Analyse Motion and Ergonomic chart/factor 3. Perform body movement analysis 4. Analyse and develop Line Balancing 5. Plan and Verified improvement activity 6. Coordinate and Plan New Model Introduction 7. Formulate and analyse cost, tools part and supplies 8. Coordinate activities with supervisor and management 9. Carry out activities to achieve KPI (Key Performance Index) 10. Conduct technical training 11. Coordinate New Model Introduction meeting with other department 12. Determine critical and new process and parameter requirement	**Engineer** 1. Plan New Model Introduction. 2. Plan improvement activity. 3. Formulate and analyse cost, tools part and supplies. 4. Prepare yearly equipment and tools budget. 5. Prepare Total Preventive Maintenance requirements. 6. Maintain tools and equipment. 7. Maintain and monitor safety check on equipment and plant. 8. Carry out activities to achieve KPI (Key Performance Index). 9. Summarise all daily activity reports (Maintenance, model change, breakdown, etc.) 10. Analyse Test Data and product quality. 11. Prepare technical training manual. 12. Conduct technical training. 13. Coordinate New Model Introduction meeting with other departments. 14. Design and fabricate equipment/jig mechanical/electrical/fabricate hardware.

AREA	**PRODUCTION ENGINEERING (PROCESS ENGINEERING)** Responsibilities May Include	**PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)** Responsibilities May Include
		15. Identify critical, new process and parameter requirements.
Level 4	**Assistant Engineer /Senior Technician** 1. Compile Tact Time for Line Balancing Report 2. Assist Engineer to Analyse and develop Line Balancing 3. Supervise daily process problem at production 4. Supervise change model activity 5. Supervise improvement activity 6. Apply SOP document / Process Flow / Process Layout 7. Carry out new model introduction	**Assistant Engineer / Senior Technician** 1. Supervise daily problem at production 2. Supervise change model activity 3. Supervise improvement activity 4. Verify daily breakdown report 5. Verify Total Preventive Maintenance 6. Verify Test Data. 7. Carry out new model introduction. 8. Utilise office productivity software and spreadsheets for reporting. 9. Utilise electronic test and measurement equipment. 10. Utilise flowchart and SOP Standard Operation Procedure. 11. Interpret mechanical drawing and electrical drawing.
Level 3	**Technician** 1. Compile Tact Time for Line Balancing Report. 2. Attend daily problem at production. 3. Provide and interpret Standard Operating Procedures (SOP) document. 4. Verify Production Process is according to SOP. 5. Carry out improvement activity. 6. Arrange production manpower. 7. Utilise test and measurement equipment according to procedures.	**Technician** 1. Attend daily problem at production 2. Carry out change model activity 3. Carry out improvement activity 4. Check daily breakdown report 5. Perform subordinates tasking arrangement. 6. Carry out Total Preventive Maintenance. 7. Compile Test Data 8. Utilise office productivity software and spreadsheets for reporting. 9. Utilise electronic test and measurement equipment. 10. Utilise flowchart and SOP Standard Operation Procedure. 11. Interpret mechanical drawing and electrical drawing.
Level 2	**Assistant Technician** 1. Assist daily process problem at production line. 2. Assist in changing model activity. 3. Assist process improvement activity. 4. Record Process Tact time.	**Assistant Technician** 1. Assist daily process problem at production line. 2. Assist in changing model activity. 3. Assist process improvement activity. 4. Record Process Tact time.

AREA	**PRODUCTION ENGINEERING (PROCESS ENGINEERING)** Responsibilities May Include	**PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)** Responsibilities May Include
	5. Utilise test and measurement equipment. 6. Utilise flowchart and SOP Standard Operation Procedure. 7. Interpret mechanical drawing and electrical drawing.	5. Utilise test and measurement equipment. 6. Utilise flowchart and SOP Standard Operation Procedure. 7. Interpret mechanical drawing and electrical drawing.
Level 1	No Level	No Level

AREA	**PRODUCTION OPERATION (PRODUCTION)** Responsibilities May Include	**PRODUCTION OPERATION (QUALITY CONTROL)** Responsibilities May Include	**PRODUCTION OPERATION (PLANNING)** Responsibilities May Include
Level 8	Not Available	Not Available	Not Available

AREA	**PRODUCTION OPERATION (PRODUCTION)** Responsibilities May Include	**PRODUCTION OPERATION (QUALITY CONTROL)** Responsibilities May Include	**PRODUCTION OPERATION (PLANNING)** Responsibilities May Include
Level 7	Not Available	Not Available	Not Available
Level 6	Not Available	Not Available	Not Available
Level 5	**Production Executive** 1. Arrange work schedule for supervisors. 2. Monitor production output progress. 3. Ensure production operation meets KPI. 4. Prepare daily production progress and problem report (quality, cost and delivery). 5. Coordinate daily production meeting. 6. Disseminate information on company policies to subordinates and ensure they adhere to company policies. 7. Conduct performance review. 8. Motivate production department staff.	**Quality Control Engineer** 1. Review product measurement, new product measurement test and quality measurement results. 2. Review quality records, audit reports and quality issue investigation results. 3. Monitor issuing of CAR (Corrective Action Report) to related department. 4. Supervise subordinates. 5. Conduct quality training. 6. Interpret blue print (mount diagram, Bill Of Material (BOM) / work standing instruction WSI) and technical drawing. 7. Interpret product standard (product specification) and QC standard. 8. Interpret AQL table (Acceptance Quality Level). 9. Utilise test equipment and hand tools according to procedures. 10. Utilise flowchart, SOP Standard Operation Procedure and quality standard. 11. Ensure test and measuring equipment is within calibration period 12. Utilise data analysis skills.	**Planning Officer** 1. Carry out planning production output for one or multiple products. 2. Carry out planning of operations to ensure maximum performance and minimum delay. 3. Plan manpower, equipment and raw materials needed to cover production demand. 4. Plan scheduling of production order execution. 5. Verify production costing and technical completion of production orders. 6. Perform raw materials & product inventory management. 7. Prepare schedule shift according to production needs. 8. Investigate issues that arise aiming for minimum disruption. 9. Carry out analysis on output information (number of finished products, percentage of defectives etc.). 10. Prepare status and performance reports. 11. Collaborate with quality control, warehouse and other staff in terms of planning production.
Level 4	**Production Supervisor** 1. Interpret production schedule 2. Arrange tasking of daily work to operator 3. Track production output progress 4. Solve problem at production line (output, quality, delivery, manpower)	**QC Assistant Engineer** 1. Check product measurement, new product measurement test and quality measurement results. 2. Check quality records, audit reports and quality issue investigation results.	**Assistant Planning Officer** 1. Assist in planning production output for one or multiple products. 2. Assist planning operations to ensure maximum performance and minimum delay.

AREA	**PRODUCTION OPERATION (PRODUCTION)** Responsibilities May Include	**PRODUCTION OPERATION (QUALITY CONTROL)** Responsibilities May Include	**PRODUCTION OPERATION (PLANNING)** Responsibilities May Include
	5. Maintain time keeping and personal records 6. Disseminate information from upper management to subordinate 7. Prepare performance report 8. Recruit and train new operator 9. Ensure subordinates adhere to company policies 10. Conduct performance review 11. Motivate team members	3. Perform issuing of CAR (Corrective Action Report) to related department. 4. Interpret blue print (mount diagram, Bill Of Material (BOM) / work standing instruction WSI) and technical drawing. 5. Interpret product standard (product specification) and QC standard. 6. Interpret AQL table (Acceptance Quality Level). 7. Utilise test equipment and hand tools according to procedures. 8. Utilise flowchart, SOP Standard Operation Procedure and quality standard 9. Utilise data analysis skills.	3. Assist manpower, equipment and raw materials needed to cover production demand. 4. Assist in shifting schedules according to production needs. 5. Address issues when they arise aiming for minimum disruption. 6. Assist in obtaining output information (number of finished products, percentage of defectives etc.) 7. Assist in preparing and submitting status and performance reports. 8. Assist in collaborating with quality control, warehouse and other staff. 9. Assist with project management and documentation. 10. Apply Data organization skills.
Level 3	**Line Leader** 1. Supervise product inspection, packaging and machine operation 2. Confirm proper set up of machinery and electronic material for production 3. Ensure operator adhere to their appropriate duties based on SOP 4. Maintain a safe and clean work space (5S) 5. Check updated records as required 6. Carry out training of new operator 7. Back up new operator 8. Ability to use test and measurement equipment 9. Ability to understand flowchart and SOP Standard Operation Procedure	**Quality Control Technician/ Production Technician** 1. Perform routine product measurement check. 2. Record quality measurement result 3. Perform reporting of quality records to superior. 4. Perform audit process and reporting. 5. Perform new product measurement test. 6. Investigate quality issue. 7. Interpret blue print (mount diagram, Bill Of Material (BOM) / work standing instruction WSI) 8. Interpret technical drawing. 9. Interpret product standard (product specification) and QC standard. 10. Interpret AQL table (Acceptance Quality Level). 11. Utilise test equipment and hand tools according to procedures.	No Level

AREA	**PRODUCTION OPERATION (PRODUCTION)** Responsibilities May Include	**PRODUCTION OPERATION (QUALITY CONTROL)** Responsibilities May Include	**PRODUCTION OPERATION (PLANNING)** Responsibilities May Include
		12. Utilise flowchart, SOP Standard Operation Procedure and quality standard 13. Utilise data analysis skills.	
Level 2	**Senior Operator** 1. Carry out product inspection, packaging and machine operation 2. Perform appropriate duties based on Standard Operating Procedures (SOP) 3. Maintain a safe and clean work space (5S) 4. Update records as required 5. Train new operator 6. Carry out critical process 7. Back up new operator 8. Ability to use test and measurement equipment 9. Ability to understand flowchart and SOP Standard Operation Procedure	**Quality Inspector** 1. Interpret blue print (Mount diagram, Bill of material BOM / Work Standing Instruction WSI) 2. Perform routine product quality check 3. Record quality inspection result 4. Perform reporting of quality records to superior 5. Perform audit process and reporting 6. Perform new product quality inspection 7. Utilise flowchart, Standard Operation Procedures (SOP) and quality standards. 8. Utilise test equipment and hand tools according to procedures 9. Utilise office productivity software for reporting purposes.	No Level
Level 1	**Operator** 1. Carry out packaging and machine operation 2. Perform appropriate duties based on Standard Operating Procedures (SOP) 3. Perform housekeeping to ensure a safe and clean work space (5S) 4. Update records and checklists as required 5. Ability to use test and measurement equipment 6. Ability to understand flowchart and SOP Standard Operation Procedure	No Level	No Level

Table 4.14: Job Responsibilities versus NOSS Level (Job Area Description – Quality Assurance and Document Control)

AREA	**QUALITY ASSURANCE (QA)** Responsibilities May Include	**DOCUMENT CONTROL** Responsibilities May Include
Level 8	Not Available	Not Available
Level 7	Not Available	Not Available
Level 6	Not Available	Not Available
Level 5	**QA Engineer** 1. Apply Design Software and Programming software. 2. Apply Six Sigma, Statistical analysis, 7 QC tools. 3. Design and fabricate equipment/jig mechanical/electrical. 4. Review quality specifications and technical design documents to provide timely and meaningful feedback. 5. Create detailed, comprehensive and well-structured test plans and test cases. 6. Plan and coordinate quality testing activities. 7. Develop exploratory and automated tests to ensure product quality. 8. Ensure every step of the production process meets quality standards. 9. Develop the quality management policies and procedures that will be followed by all employees who are a part of the production process 10. Run the various tests necessary to prove the product performs as intended. 11. Provide regular status reports to management. 12. Determine critical and new process parameter requirement.	**Document Control Officer** 1. Manage and plan all the production documents 2. Verify edited document's accuracy. 3. Check reviewed and updated technical documents (e.g. manuals and workflows) 4. Manage file documents for production activity 5. Distribute project-related copies to internal teams 6. Manage all the file documents in physical and digital records 7. Manage the flow of documentation within the organization 8. Ensure all the confidentiality around sensitive information and terms of agreement 9. Develop ad-hoc reports on projects as needed 10. Check that all technical documents, such as reports, drawings and blueprints, are collected and registered in system
Level 4	**QA Assistant Engineer/Senior Technician** 1. Supervise daily production of Quality Department staff. 2. Supervise quality improvement activity. 3. Supervise daily 5S quality activity. 4. Verify Total Preventive Maintenance quality. 5. Carry out new model introduction quality verification/check. 6. Utilise quality tools. 7. Perform process control.	**Assistant Document Control Executive (Document Control)** 1. Manage all the production documents 2. Supervise document accuracy and editing of files. 3. Review and update technical documents (e.g. manuals and workflows) 4. Supervise filing of documents for production activity 5. Prepare project-related copies to internal teams 6. Prepare all the file documents in physical and digital records 7. Prepare the flow of documentation within the organization 8. Prepare ad-hoc reports on projects as needed

AREA	**QUALITY ASSURANCE (QA)** Responsibilities May Include	**DOCUMENT CONTROL** Responsibilities May Include
		9. Maintain confidentiality around sensitive information and terms of agreement 10. Ensure all technical documents, such as reports, drawings and blueprints, are collected and registered in system
Level 3	**QA Technician** 1. Attend daily production quality activity 2. Carry out quality improvement activity 3. Manpower quality arrangement 4. Carry out Total Preventive Maintenance quality inspections 5. Carry out daily 5S quality activity 6. Utilise quality tools.	**Document Controller (Document Control)** 1. Copy, scan and store documents. 2. Check documents accuracy and edit files. 3. Review and update technical documents (e.g. manuals and workflows). 4. File documents in physical and digital records. 5. Retrieve files as requested by employees and clients.
Level 2	**QA Operator** 1. Assist daily production quality activity. 2. Assist Daily 5S task. 3. Utilise test and measurement equipment. 4. Utilise flowchart, Standard Operation Procedure (SOP) and quality standards	No Level
Level 1	No Level	No Level

4.6 Mapping of OS Job Areas versus Available NOSS

Below is the mapping between the available NOSS and the job areas identified in the industry's OS.

Table 4.15: Occupational Area Structure for Sections C, Division 26, Group 261 versus Available NOSS

MSIC Section	**C – MANUFACTURING**							
MSIC Division	**26 – MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**							
MSIC Group	**261 - Manufacture of electronic components and boards**							
Area	**Engineering (Material)**	**Engineering (Process)**		**Engineering (New Product Introduction)**	**Engineering (Equipment)**	**Production**		**Quality Assurance (QA)**	**Document Control**
8	*Not Available*	N/A			N/A	N/A		N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*		Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*	Senior Production Manager**		Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager*	Staff Engineer/ Manager*		Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager* **		QA Manager	Document Control Manager
5	Engineer*	EE-022-5:2012 Front End Wafer Fabrication Process Operation	EE-020-5:2013 Semiconductor Manufacturing Management (Back End Process)	Engineer*	Engineer*	EE-020-5:2013 Semiconductor Manufacturing Management (Back End Process)	EE-023-5:2012 Front End Wafer Fabrication Manufacturing Operation	QA Engineer	Document Control Executive
4	No Level	EE-022-4:2012 Front End Wafer Fabrication Operation	EE-020-4:2013 Semiconductor Manufacturing Technical Supervision (Back End Process)	Senior Technician*	Senior Technician*	EE-020-4:2013 Semiconductor Manufacturing Technical Supervision (Back End Process)		QA Senior Technician	Assistant Document Control Executive
3	No Level	EE-020-3:2013 Semiconductor Assembly Production		Technician*	Technician* **	EE-020-3:2013 Semiconductor Assembly Production		QA Technician	Document Controller
2	No Level	Junior Technician /Assistant technician*		Junior Technician/ Asst Tech *	Junior Technician/ Asst Tech *	Senior Operator/ Quality Inspector* **		QA Operator	No Level
1	No Level	No Level		No Level	No Level	Operator* **		No Level	No Level

Table 4.16: Occupational Area Structure for Sections C, Division 26, Group 262-268 versus Available NOSS

MSIC Section	**C – MANUFACTURING**						
MSIC Division	**26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**						
MSIC Group	**262 - Manufacture of computers and peripheral equipment, 263- Manufacture of communication equipment, 264- Manufacture of consumer electronics, 265 - Manufacture of measuring, testing, navigating and control equipment; watches and clocks, 266 - Manufacture of irradiation, electro medical and electrotherapeutic equipment, 267- Manufacture of optical instruments and photographic equipment, 268- Manufacture of magnetic and optical media**						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	EE-021-5:2012 Electronic Product Design & Management	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	EE-021-4:2012 Electronic Product Development	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	EE-021-3:2012 Electronic Equipment Troubleshooting, Repair & Maintenance	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	EE-021-2:2012 Electronic Equipment and Appliance Installation & Troubleshooting	Line Leader* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

4.7 Occupational Description (OD)

The OD describes the occupations under the industry's OS in terms of competencies and duties that are designated to be performed by competent personnel. The OD are usually referred by JPK's certified facilitators prior to the development of the relevant NOSS. The OD can also be referred by potential job candidates, students, academicians, skills training trainers and industry practitioners. Academic institutions or skills training institutions may also refer to the OD to develop their curriculum as they will be able to understand what is required and expected of those in the particular occupations.

The OD included in this report are sample OD for some of the jobs which are facing skills gap issues in the Electronics Components and Products Manufacturing Industry. Please refer to the details of these OD in Annex 4 of this report.

The OD has five (5) parts, which includes (an example is shown below):

a. Sub-sector, Job Area, MSIC Details related to the Job Title
b. Job Title
c. List of Responsibilities
d. Knowledge, Skills and Attributes

A sample of the OD can be referred in Figure 4.3.

MSIC GROUP : 262-268
AREA : PRODUCTION OPERATION (PRODUCTION)
LEVEL : 6

Responsibilities:
A Production Manager is responsible to plan production schedule, prepare production budget, ensure health and safety regulations of production are adhered to, manage and evaluate machine resources to ensure high productivity and minimal down time, oversee production manpower, plan activities to increase operation productivity and reduce production expenses, plan and organise technical and soft skill training for production staff, lead daily production meeting, set production KPI and communicate production issues to higher management.

Knowledge:
- Manpower planning.
- Departmental budgeting.
- Operation management.
- Interpersonal skills.
- Departmental report format and requirements.
- ISO 9001/14000.
- OSHA 18001.
- Lean Manufacturing.

Skills:
- Plan production schedule.
- Prepare production budget
- Ensure health and safety regulations of production are adhered to
- Manage and evaluate machine resources to ensure high productivity and minimal down time
- Oversee production manpower
- Plan activities to increase operation productivity and reduce production expenses
- Plan and organise technical and soft skill training for production staff
- Lead daily production meeting
- Set production KPI
- Communicate production issues to higher management.

Attributes (Attitude/Safety/Environmental):
- Possess effective management skills.
- Possess effective decision making skills and skills in handling production crisis.
- Is highly result oriented and possess high level of commitment to KPI.
- Possess problem solving, trouble shooting skills and continuous improvement skills.
- Ensures staff adhere safety regulation and environmental regulations.
- Possess negotiation skills and effective communication skills.

Figure 4.3: Sample of Occupational Description (OD)

4.8 Skills In Demand

This section elaborates on the survey findings regarding jobs and skills in demand.

4.8.1 Jobs In Demand

The jobs in demand as stated in the Table 4.17 below were obtained from survey findings and discussion in FGD workshops.

Table 4.17: Jobs in Demand

No.	Sub-sector - Job Area/ Job titles	Factor(s) contributing to the demand	Specific requirements and skills
1.	**Operator (For all relevant Job Areas)**	• Majority are foreign workers • Difficult to recruit local workers • Support on the business ramp-up (to support production demands) • Due to working hours in shifts where some workers are reluctant to work in shifts	• Communication skills • Able to read and write • Able to interpret instructions and simple diagrams (i.e. trends) • Skills in utilising basic computer function of various systems used at the production line such as real time monitoring, automation systems etc. • Adapt to automation skills set
2.	**Senior operator/ Statistical Process Control operator / QA Operator**	• Leader to sustain the team to produce the KPI • Working in shift pattern • Specific knowledge and skills needed • Are high in demand	• Communication skills • Able to read and write • Able to interpret instructions and simple diagrams (i.e. trends) • Skills in utilising basic computer function of various systems used at the production line such

			as real time monitoring, automation systems etc. • Adapt to automation skills set • Skills in Critical processes (Specialised) • Basic problem solving • Interpret data (control chart, statistical data) and relay information to superiors/others • Out of Control Action Plan
3.	**Technician (Process, engineering, equipment, etc.)**	• High in Demand • Support on the business ramp-up • To fulfil Key Performance (KPI) • To ensure daily operation is running smoothly • Lack of exposure to equipment • Technicians with experience in certain areas are usually in more demand • Working in shift pattern • Working environment/foreign workers	• Technical skills in operating and handling equipment • Basic product knowledge • Possesses knowledge on current technology • 6 Sigma yellow belt level (Analytical skill)

4.	**Engineer (i.e. equipment engineering)**	• Fresh graduates do not possess the knowledge and technical skills that meet the requirements of the company • Support on the business ramp-up • To fulfil Key Performance (KPI) • High in Demand	• Team work, leadership skills and communication skills • Problem solving skills and reporting • Hands on exposure and related knowledge on the overall production process (Have more industrial training, Training centres /universities have Joint Ventures with industry) • 6 Sigma green belt level (Analytical skill)
5.	**Manager (i.e. Process Manager, Production Manager)**	• Change/risk management • Management skills	• Resource planning • Leadership skills
6.	**Senior Manager (i.e. Process Manager, Senior Equipment Manager)**	• Leader to lead team in meeting the KPI	• Resource planning • Leadership skills

4.8.2 Skills Gaps

In addition to the specific job titles in demand as highlighted above, the Electronics Components and Products Manufacturing Industry is in demand of workers who demonstrate the skills as stated in Table 4.18 below:

Table 4.18: Skills Gaps

No.	Sub-sector - Job Area/ Job titles	Factor(s) contributing to the demand	Specific requirements and skills
1.	• Programming • Technical Drawing		

	• Usage of drawing software • Product understanding		
	Technical Skills in Engineering and Manufacturing from Technician level till Engineer	• Inability to adapt to new technology • Lack of exposure • Insufficient equipment and machinery	• Training • Review of syllabus at training centre or universities • Joint venture with industry to provide facilities
2.	Communication		
	Overall for all job areas from Operator level till management level	• Lack of ability to understand verbal or written instructions	• Training in communication at the workplace
3.	Trouble shooting and Problem solving skills		
	Overall for all job areas for Technician levels and above	• Lack of exposure to real working environment problems • Staff are not resourceful when solving problems	• Training and personal development • Review of syllabus at training centre or universities
4.	Basic problem solving and escalation of issues to superior		
	Overall for all job areas starting from the Operator level	Lack of accountability	• Training and personal development • Review of syllabus at training centre or universities
5.	Technical Skills in Engineering and Manufacturing		

	From Operator level till Engineer	• Inability to adapt to new technology • Lack of exposure • Insufficient equipment and machinery	• Training • Review of syllabus at training centre or universities • Joint venture with industry to provide facilities
6.	Computer knowledge using basic word processor software applications		
	From Operator level till Engineer	Inability to perform work that relates to system	• Training in basic computer function at the workplace

4.8.3 Emerging Skills

The following Table 4.19 shows the emerging skills as highlighted by the industry:

Table 4.19: Emerging Skills

No.	EMERGING SKILLS	JOB AREAS/ JOB TITLES	REASON OF REQUIRED EMERGING SKILLS
1.	Industry 4.0 related skills – Utilisation of automation systems which include ability to configure, utilise, debug, maintain the system	• Production • Manufacturing Engineering • Process Engineering	• Increase productivity, reduce cost and improve efficiency • To minimise human error
2.	Innovation – for continuous improvement	• Production • Manufacturing Engineering • Process Engineering • From Operator to Manager level	• Increase productivity, reduce cost and improve efficiency • To enhance capability to optimise resources and new technology

4.9 Chapter Conclusion

Based on the discussions with panel members during the development workshops and survey findings, the OS of the nine (4) sub-sectors are presented in this chapter. The OS graphical representation included would enable the Electronics Components and Products Manufacturing Industry to be interpreted at a glance in terms of:

a. The competency or job areas applicable to the industry, and
b. The skill level of the different job titles, according to the MOSQF Level Descriptors, and the available career paths.

In this chapter, the jobs and skills in demand, and the specific steps proposed to be taken by various parties to bridge the skills gaps are elaborated so that the parties concerned could take the necessary steps to overcome such challenges.

In total there are 318 jobs have been identified, which covers all the MSIC Groups of Section C and Division 26. The majority of job titles are at level 5, level 6 and level 7, which the industry requires workers with the capability to perform complex problem solving, analysis and planning especially with the advent of Industry 4.0. There are various jobs that require the skills set of IR 4.0. There are job titles for operators for each of the production/Manufacturing job areas. Jobs relevant to Industry 4.0 are mostly under the production and manufacturing job areas starting from Operator level to Engineer level.

CHAPTER 5: DISCUSSION, RECOMMENDATION & CONCLUSION

5.1 Discussion

The NOSS can act as a tool to bridge the skills gaps as identified in the Chapter 4, this is because the NOSS is based on input from the industry to deliver skills training and has a component of hands on training and practical skills assessment. Skills training based on the NOSS also has the option of trainees undergoing apprenticeship which is seen as an effective method of training for the Electronics Components & Products Manufacturing Industry as hands on experience prior to entering the workforce has been highlighted by the industry focus group and survey respondents.

5.2 Recommendations

The following are specific recommendations proposed to address the issues of skills gaps and to fill jobs in demand highlighted in this document.

5.2.1 NOSS Development and Review

Based on the findings in Chapter 4, it can be concluded that in terms of NOSS review or new development, it is not as much based on critical job areas, but more to fitting into the segmentation based on the MSIC Divisions and Groups, plus to enhance skills at entry levels of the NOSS such as level 1-3 based on current technological advancements such as Industry 4.0. This can mainly be seen in areas of Manufacturing and Engineering.

5.2.2 Encourage Apprenticeship Training (National Dual Training System –NDTS)

The industry can benefit greatly from the advent of the related NOSS as Apprenticeship training can then be conducted directly in the industry workplace. Apprenticeship training (National Dual Training System –NDTS) allows trainees to concurrently undergo blocks of theoretical classes and practical training in the actual working environment. This is to address the need to expose potential job candidates to the working environment prior to their job entry.

5.2.3 Recognition of Prior Achievements (*Pengiktirafan Pencapaian Terdahulu (PPT)*)

The development of the NOSS will also enable experienced workers in the industry to be certified via Recognition of Prior Achievements. It is one of the methods of certification by JPK, which is the Recognition of Prior Achievements (Pengiktirafan Pencapaian Terdahulu (PPT)), that should be implemented so that experienced personnel who meet the specified requirements under the PPT programme are awarded with the relevant Malaysian Skills Certificate (Sijil Kemahiran Malaysia – SKM) by JPK, thus enabling career progression and up-skilling.

5.3 Chapter Conclusion

The conclusion is divided based on the earlier objectives of the OF research as elaborated below:

Conclusion for Objective 1: Occupational Structure

The occupational analysis conducted has identified 2 main sub-sectors under the Electronic Components and Products Manufacturing Industry and 318 job titles. Please refer to Chapter 4 (Occupational Structure) and the Summary of Job titles for details. These sub-sectors are still segmented based on the MSIC where based on industry input, the main areas of manufacturing can be segregated to the similar processes for electronic components and the other for electronic products.

Conclusion for Objective 2: Occupational Descriptions

Samples of Occupational Descriptions for job areas in the Electronics Components and Products Manufacturing Industry OS are included in Annex 4. This may serve as reference of job scope and the required competencies for the purpose of NOSS development.

The OD have also been developed in a way that will make it easier to be referred in terms of NOSS development because it includes the main elements of the NOSS curriculum which are MSIC details, skills, knowledge and attributes such as attitude and safety.

Conclusion for Objective 3: Skills in Demand

The occupational framework analysis conducted has found that job competency levels from Operator level till Engineer level in areas such as Manufacturing and Engineering are experiencing skills gaps such as below:

a. Technical skills (Programming, technical drawing, product understanding)
b. Communication skills
c. Trouble shooting skills
d. Problem solving skills
e. Skills to escalate issues to superior
f. Computer knowledge using basic word processor software applications

Other skills that seen to be in demand by the industry in the near future and should be embedded in the NOSS Emerging skills which are mainly related to Industry 4.0 and continuous improvement skills. These skills have been included in the Occupational Descriptions in Annex 4 for the relevant job titles.

Conclusion for Objective 4: Critical Jobs

Jobs in demand, or commonly known by JPK as “Critical Job Titles”, are identified based on the following scenarios in order of importance:

a. Shortages of skilled workers supply in the industry
b. Shortages of workers for a particular job area in the industry
c. Strategic assessment in terms of direction for both short term and long term periods

Below is the list of Critical Job Titles:

Table 5.1 List of Critical Job Titles

No	Critical Job Title	Sub-Sector: Job Area	Level
1.	Engineer*	Group 261: Engineering (Process/New Product)	L5
2.	Senior Technician*	Group 261: Engineering (Process/New Product)	L4
3.	Technician*	Group 261: Engineering (Process/New Product)	L3
4.	Junior Technician /Assistant technician*	Group 261: Engineering (Process/New Product)	L2
5.	Engineer*	Group 261: Engineering (Equipment Engineering)	L5
6.	Senior Technician*	Group 261: Engineering (Equipment Engineering)	L4
7.	Technician*	Group 261: Engineering (Equipment Engineering)	L3
8.	Junior Technician /Assistant Technician*	Group 261: Engineering (Equipment Engineering)	L2
9.	Production Executive*	Group 261: Production	L5
10.	Assistant Production Executive*	Group 261: Production	L4
11.	Line Leader*	Group 261: Production	L3
12.	Senior Operator/ Quality Inspector*	Group 261: Production	L2
13.	Operator *	Group 261: Production	L1
14.	Engineer*	Group 262: Production Engineering (Process Engineering)	L5
15.	Assistant Engineer /Senior Technician*	Group 262: Production Engineering (Process Engineering)	L4
16.	Technician*	Group 262: Production Engineering (Process Engineering)	L3
17.	Assistant Technician*	Group 262: Production Engineering (Process Engineering)	L2

No	Critical Job Title	Sub-Sector: Job Area	Level
18.	Engineer*	Group 262: Production Engineering (Manufacturing Engineering)	L5
19.	Assistant Engineer / Senior Technician*	Group 262: Production Engineering (Manufacturing Engineering)	L4
20.	Technician*	Group 262: Production Engineering (Manufacturing Engineering)	L3
21.	Assistant Technician*	Group 262: Production Engineering (Manufacturing Engineering)	L2
22.	Production Executive*	Group 262: Production Operation (Production)	L5
23.	Production Supervisor*	Group 262: Production Operation (Production)	L4
24.	Line Leader*	Group 262: Production Operation (Production)	L3
25.	Senior Operator*	Group 262: Production Operation (Production)	L2
26.	Operator*	Group 262: Production Operation (Production)	L1
27.	Engineer*	Group 263: Production Engineering (Process Engineering)	L5
28.	Assistant Engineer /Senior Technician*	Group 263: Production Engineering (Process Engineering)	L4
29.	Technician*	Group 263: Production Engineering (Process Engineering)	L3
30.	Assistant Technician*	Group 263: Production Engineering (Process Engineering)	L2
31.	Engineer*	Group 263: Production Engineering (Manufacturing Engineering)	L5
32.	Assistant Engineer / Senior Technician*	Group 263: Production Engineering (Manufacturing Engineering)	L4
33.	Technician*	Group 263: Production Engineering (Manufacturing Engineering)	L3
34.	Assistant Technician*	Group 263: Production Engineering (Manufacturing Engineering)	L2

No	Critical Job Title	Sub-Sector: Job Area	Level
35.	Production Executive*	Group 263: Production Operation (Production)	L5
36.	Production Supervisor*	Group 263: Production Operation (Production)	L4
37.	Line Leader*	Group 263: Production Operation (Production)	L3
38.	Senior Operator*	Group 263: Production Operation (Production)	L2
39.	Operator*	Group 264: Production Operation (Production)	L1
40.	Engineer*	Group 264: Production Engineering (Process Engineering)	L5
41.	Assistant Engineer /Senior Technician*	Group 264: Production Engineering (Process Engineering)	L4
42.	Technician*	Group 264: Production Engineering (Process Engineering)	L3
43.	Assistant Technician*	Group 264: Production Engineering (Process Engineering)	L2
44.	Engineer*	Group 264: Production Engineering (Manufacturing Engineering)	L5
45.	Assistant Engineer / Senior Technician*	Group 264: Production Engineering (Manufacturing Engineering)	L4
46.	Technician*	Group 264: Production Engineering (Manufacturing Engineering)	L3
47.	Assistant Technician*	Group 264: Production Engineering (Manufacturing Engineering)	L2
48.	Production Executive*	Group 264: Production Operation (Production)	L5
49.	Production Supervisor*	Group 264: Production Operation (Production)	L4
50.	Line Leader*	Group 264: Production Operation (Production)	L3
51.	Senior Operator*	Group 264: Production Operation (Production)	L2

No	Critical Job Title	Sub-Sector: Job Area	Level
52.	Operator*	Group 264: Production Operation (Production)	L1
53.	Engineer*	Group 265: Production Engineering (Process Engineering)	L5
54.	Assistant Engineer /Senior Technician*	Group 265: Production Engineering (Process Engineering)	L4
55.	Technician*	Group 265: Production Engineering (Process Engineering)	L3
56.	Assistant Technician*	Group 265: Production Engineering (Process Engineering)	L2
57.	Engineer*	Group 265: Production Engineering (Manufacturing Engineering)	L5
58.	Assistant Engineer / Senior Technician*	Group 265: Production Engineering (Manufacturing Engineering)	L4
59.	Technician*	Group 265: Production Engineering (Manufacturing Engineering)	L3
60.	Assistant Technician*	Group 265: Production Engineering (Manufacturing Engineering)	L2
61.	Production Executive*	Group 265: Production Operation (Production)	L5
62.	Production Supervisor*	Group 265: Production Operation (Production)	L4
63.	Line Leader*	Group 265: Production Operation (Production)	L3
64.	Senior Operator*	Group 265: Production Operation (Production)	L2
65.	Operator*	Group 265: Production Operation (Production)	L1
66.	Engineer*	Group 266: Production Engineering (Process Engineering)	L5
67.	Assistant Engineer /Senior Technician*	Group 266: Production Engineering (Process Engineering)	L4
68.	Technician*	Group 266: Production Engineering (Process Engineering)	L3

No	Critical Job Title	Sub-Sector: Job Area	Level
69.	Assistant Technician*	Group 266: Production Engineering (Process Engineering)	L2
70.	Engineer*	Group 266: Production Engineering (Manufacturing Engineering)	L5
71.	Assistant Engineer / Senior Technician*	Group 266: Production Engineering (Manufacturing Engineering)	L4
72.	Technician*	Group 266: Production Engineering (Manufacturing Engineering)	L3
73.	Assistant Technician*	Group 266: Production Engineering (Manufacturing Engineering)	L2
74.	Production Executive*	Group 266: Production Operation (Production)	L5
75.	Production Supervisor*	Group 266: Production Operation (Production)	L4
76.	Line Leader*	Group 266: Production Operation (Production)	L3
77.	Senior Operator*	Group 266: Production Operation (Production)	L2
78.	Operator*	Group 266: Production Operation (Production)	L1
79.	Engineer*	Group 267: Production Engineering (Process Engineering)	L5
80.	Assistant Engineer /Senior Technician*	Group 267: Production Engineering (Process Engineering)	L4
81.	Technician*	Group 267: Production Engineering (Process Engineering)	L3
82.	Assistant Technician*	Group 267: Production Engineering (Process Engineering)	L2
83.	Engineer*	Group 267: Production Engineering (Manufacturing Engineering)	L5
84.	Assistant Engineer / Senior Technician*	Group 267: Production Engineering (Manufacturing Engineering)	L4
85.	Technician*	Group 267: Production Engineering (Manufacturing Engineering)	L3

No	Critical Job Title	Sub-Sector: Job Area	Level
86.	Assistant Technician*	Group 267: Production Engineering (Manufacturing Engineering)	L2
87.	Production Executive*	Group 267: Production Operation (Production)	L5
88.	Production Supervisor*	Group 267: Production Operation (Production)	L4
89.	Line Leader*	Group 267: Production Operation (Production)	L3
90.	Senior Operator*	Group 267: Production Operation (Production)	L2
91.	Operator*	Group 267: Production Operation (Production)	L1
92.	Engineer*	Group 268: Production Engineering (Process Engineering)	L5
93.	Assistant Engineer /Senior Technician*	Group 268: Production Engineering (Process Engineering)	L4
94.	Technician*	Group 268: Production Engineering (Process Engineering)	L3
95.	Assistant Technician*	Group 268: Production Engineering (Process Engineering)	L2
96.	Engineer*	Group 268: Production Engineering (Manufacturing Engineering)	L5
97.	Assistant Engineer / Senior Technician*	Group 268: Production Engineering (Manufacturing Engineering)	L4
98.	Technician*	Group 268: Production Engineering (Manufacturing Engineering)	L3
99.	Assistant Technician*	Group 268: Production Engineering (Manufacturing Engineering)	L2
100.	Production Executive*	Group 268: Production Operation (Production)	L5
101.	Production Supervisor*	Group 268: Production Operation (Production)	L4
102.	Line Leader*	Group 268: Production Operation (Production)	L3

No	Critical Job Title	Sub-Sector: Job Area	Level
103.	Senior Operator*	Group 268: Production Operation (Production)	L2
104.	Operator*	Group 268: Production Operation (Production)	L1

Based on the survey findings and focus group discussions, a total of 104 job titles have been identified to be Jobs in Demand. It must be noted that only jobs at Levels 1-5 can be developed as a NOSS as stated in the National Skills Development Act, 2006. Therefore, it is recommended that a review of training for jobs in demand at higher levels can be conducted at university level or where suitable, can be developed as a National Competency Standard (NCS).

The key to the growth of this industry in the midst of a challenging environment is the continuing supply of highly skilled talents who are forward looking, agile and responsive to change. Therefore, in order to be an industry at par with other countries, the industry stakeholders must ensure that all job areas in this industry should focus on enhancing the skills and competency levels discussed in this analysis which are mainly at operation level under manufacturing as to accommodate the technological advancements mainly related to the Industry Revolution 4.0 and need to lessen foreign workers at these levels of competency.

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ANNEX 1

MOSQF LEVEL DESCRIPTORS

MALAYSIAN OCCUPATIONAL SKILLS QUALIFICATION FRAMEWORK (MOSQF)
LEVEL DESCRIPTOR

LEVEL	LEVEL DESCRIPTION
8	Achievement at this level reflects the **ability to develop original understanding** and extend a sub-area of knowledge or professional practice. It reflects the ability to address problematic situations that involve many complexes, interacting factors through initiating, designing and undertaking research, development or strategic activities. It involves the exercise of broad autonomy, judgement and leadership in sharing responsibility for the development of a field of work or knowledge, or for creating substantial professional or organisational change. It also reflects a critical understanding of relevant theoretical and methodological perspectives and how they affect the field of knowledge or work.
7	Achievement at this level reflects the ability to **reformulate** and use relevant understanding, methodologies and approaches to address **problematic situations** that involve many interacting factors. It includes taking responsibility for **planning and developing** courses of action that initiate or underpin substantial change or development, as well as exercising broad autonomy and judgment. It also reflects an understanding **of theoretical and relevant methodological perspectives, and how they affect their sub-area of study or work**
6	Achievement at this level reflects the ability to **refine** and use relevant understanding, methods and skills to address **complex problems that have limited definition**. It includes taking responsibility for planning and developing courses of action **that are able to underpin substantial change or development, as well as exercising broad autonomy and judgment.** It also reflects an understanding of different perspectives, **approaches of schools of thought and the theories that underpin them**
5	Competent in applying a significant range of **fundamental principles and complex techniques across** a wide and often unpredictable variety of contexts. Very **substantial personal autonomy** and often significant responsibility for the work of others and for the allocation of substantial resources feature strongly, as do personal accountabilities for **analysis and diagnosis, design, planning, execution and evaluation**. Specialisation of technical skills should be demonstrated.
4	Competent in performing **a broad range of complex technical or professional work** activities carried out in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present. **Higher level of technical skills** should be demonstrated.

3	Competent in performing **a broad range of varied work activities**, performed in a variety of context, most of which are **complex and non-routine.** There is considerable responsibility and autonomy and **control or guidance of others** is often required.
2	Competent in performing **a significant range of varied work activities**, performed in a variety of context. Some of the **activities are non-routine** and required individual responsibility and autonomy.
1	Competent in performing a range of varied work activities, most of which are **routine and predictable.**

(Source: JPK. 2013)

ANNEX 2

LIST OF CONTRIBUTORS

LIST OF OCCUPATIONAL FRAMEWORK DEVELOPMENT PANEL MEMBERS

NO	NAME	POSITION	ORGANISATION	MSIC Group
1.	Noorhisyam Bin Abdul Hamid	Quality Engineering Manager	ON Semiconductor (Malaysia) Sdn. Bhd.	261
2.	Ismayazzir Bin ismail	Equipment Manager	Nexperia Semiconductors Sdn. Bhd.	261
3.	Mohd Nahrulhisham Bin Mahamud	Assistant Manager	SONY EMCS (Malaysia) Sdn. Bhd.	264
4.	Abd Rahim Bin Mansor	Manager	Asteria Electronics MFG Sdn. Bhd.	264
5.	Dr. Roslee Bin Mohd Sabri	Staff Engineer	Mimos Semiconductor (M) Sdn. Bhd.	262 & 264
6.	Shahrol Hisham Bin Baharom	Staff Engineer	Mimos Semiconductor (M) Sdn. Bhd.	262 & 264
7.	Muhammad Helmi Bin Hussain	Product Support Engineer	Ericsson Resource & Competence Center Sdn. Bhd.	263
8.	Muhd Ridth'wan Bin Md Asror	Engineer	Ericsson Resource & Competence Center Sdn. Bhd.	263
9.	Aida Syukrena Binti Mohd. Idris	Senior Principal Assistant Director	Sectoral Policy, Ministry of International	261, 262, 263, 264, 265 & 267

NO	NAME	POSITION	ORGANISATION	MSIC Group
			Trade and Industry (MITI)	
10.	Norhizam Bin Ibrahim	Senior Deputy Director	Electrical & Electronics Division, Malaysian Investment Development Authority (MIDA)	261, 262, 263, 264, 265 & 267

LIST OF OCCUPATIONAL FRAMEWORK EVALUATION PANEL MEMBERS

NO	NAME	POSITION	ORGANISATION
1.	Rahman Bin Rasul	Manager	RV Ceben Enterprise
2.	Tajul Ariffin Bin Abd Karim	Assistant Manager	Onkyo Asia Electronics Sdn. Bhd.
3.	Muhammad Ramzul Bin Abu Bakar	Senior Assistant Director	Electrical & Electronics Division, Malaysian Investment Development Authority (MIDA)
4.	Zuraini Binti Abu Kassim	Principal Assistant Director	Labour Market Planning & Research Section, ILMIA, Ministry of Human Resources
5.	Ir. Dr. Norhana Binti Arsad	Associate Professor	Department of Electrical, Electronic & Systems Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia

NO	NAME	POSITION	ORGANISATION
6.	Hamdan Bin Muhamad Isa	Assistant Director	Department of Statistics Malaysia
7.	Nurlayli Binti Mohd. Ali Khan	Core Team Member	Malaysian Bureau of Labour Statistics (MBLS), Department of Statistics Malaysia
8.	Beram@Ibrahim Bin Johan	Chief Engineer	Facility, Health, Safety & Environmental Center, Hitachi Electronic Products (M) Sdn. Bhd.

LIST OF DEPARTMENT OF SKILLS DEVELOPMENT OFFICERS

NO	NAME	POSITION/ ORGANISATION
1.	Hj Mohd. Yazid Bin Awalludin	Director, NOSS Division, Department of Skills Development
2.	Siti Hasmah Binti Mustapha	Principal Assistant Director, NOSS Division, Department of Skills Development
3.	Noor Azura Binti Adnan	Senior Assistant Director, NOSS Division, Department of Skills Development
4.	Noorita Binti Lateh	Senior Assistant Director, NOSS Division, Department of Skills Development
5.	Ahmad Azran Bin Ranaai	Senior Assistant Director, NOSS Division, Department of Skills Development
6.	Jefrizain Bin Abdul Rasid	Assistant Director, NOSS Division, Department of Skills Development
7.	Zainal Bin Abd. Jalil	Assistant Skills Development Officer, NOSS Division, Department of Skills Development

LIST OF RESEARCH TEAM AND SECRETARIAT

NO	NAME	POSITION/ORGANISATION
1.	Evarina Binti Amiron	Facilitator/Researcher, PRITEC Academy
2.	Dr. Raemah Abdullah Hashim	Researcher, Precious Galaxy
3.	Cristnorish Lianu	Secretariat, Precious Galaxy
4.	Khairul Alia Binti Mohd Kharuddin	Proof Reader, Precious Galaxy

ANNEX 3

QUESTIONNAIRE

COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS MANUFACTURING SECTOR OCCUPATIONAL FRAMEWORK SURVEY

In collaboration with the Department of Skills Development (DSD), the researcher is currently conducting an analysis on the Occupational Framework of the Electronics and Electrical Manufacturing Industry. From this analysis, the industry framework, occupational structure , occupational job titles, and job description will be summarised for the use of the Government, private sector, investors , employers, employees, educators or any personnel involved either directly or indirectly with this industry.

The main objective of this research is to enhance skills training starting from the entry level position for any job in this industry based on input from the industry. It will also provide a reference competency for skills required by workers to perform as required in the industry.

This survey will be used as field data in order to conduct a comprehensive analysis of the Occupational Framework in the industry. The target group for this survey is the organisation's representative either from the Human Resource Department or personnel at Management level.

We would like to extend our heartfelt gratitude upon your cooperation in answering this survey. Please fill in where necessary in the forms provided. Do advise us if you wish to remain anonymous in your survey response. There will be further communication with survey respondents in order to verify our findings. The completed questionnaire can be emailed to:
Person In Charge, Evarina Amiron :pritec_academy@yahoo.com

Survey Respondent Details

Name : _____

Position : _____

Organisation : _____

Date : _____

Please answer the questions below in the space provided, additional pages may be added if necessary.
IMPORTANT NOTE*:*
The job areas stated in this questionnaire do not include the common job areas available in other industries such as below

- **Human Resource**
- **Accounts and Finance, Etc.**

QUESTION 1: OCCUPATIONAL STRUCTURE

Below is the segmentation of the industry as defined in the Malaysian Industrial Standard Classification (MSIC) document produced by the Department of Statistics Malaysia, as shown in Figure 1.

Figure 1: Segmentation of industry

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
PRODUCTS	• Manufacture of electronic components and boards • Manufacture of diodes, transistors and similar semiconductor devices • Manufacture electronic integrated circuits micro assemblies • Manufacture of diodes, transistors and related discrete devices • Manufacture of dice or wafers, semiconductor, finished or semi-finished • Manufacture of light emitting diodes (LED)	• Manufacture of computers and peripheral equipment • Manufacture of computers • Manufacture of peripheral equipment • Manufacture of desktop computers • Manufacture of laptop computers • Manufacture of main frame computers • Manufacture of hand-held computers (e.g. PDA) • Manufacture of magnetic disk drives, flash	• Manufacture of communication equipment • Manufacture of communication equipment • Manufacture of central office switching equipment • Manufacture of cordless telephones • Manufacture of private branch exchange (PBX) equipment • Manufacture of telephone and facsimile equipment,	• Manufacture of consumer electronics • Manufacture of consumer electronics • Manufacture of video cassette recorders and duplicating equipment manufacture of televisions • Manufacture of television monitors and displays (d) manufacture of audio recording and duplicating systems (e) manufacture of stereo equipment	• Manufacture of measuring, testing, navigating and control equipment • Manufacture of GPS devices • Manufacture of aircraft engine instruments • Manufacture of automotive emissions testing equipment • Manufacture of meteorological instrument manufacture of physical properties testing and inspection equipment • Manufacture of polygraph machines manufacture of	• Manufacture of irradiation, electro medical and electrotherapeutic equipment • Manufacture of irradiation, electro medical and electrotherapeutic equipment	• Manufacture of optical instruments and photographic equipment • Manufacture of optical instruments and equipment • Manufacture of photographic equipment • Manufacture of film cameras and digital cameras • Manufacture of motion picture and slides projectors • Manufacture of overhead transparency projectors • Manufacture of other	• Manufacture of magnetic and optical media • Manufacture of magnetic and optical recording media • Manufacture of blank magnetic audio and video tapes and cassettes • Manufacture of blank diskettes • Manufacture of blank optical discs

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
	• Manufacture of microprocessors • Manufacture of integrated circuit (analogue, digital or hybrid) • Manufacture of optical cable sets or assemblies • Manufacture of electrical capacitors and resistors • Manufacture of printed circuit boards • Manufacture of display components • Manufacture of other components for electronic applications • Manufacture of bare printed circuit boards • loading of components onto printed circuit boards • (c) printed circuit boards assemblies • Manufacture of electron tubes • Manufacture of display components (plasma, polymer, LCD)	drives and other storage devices • Manufacture of optical CD-RW, CD-ROM, DVD-ROM, DVD-RW, disk drives • Manufacture of printers • Manufacture of monitors • Manufacture of keyboards • Manufacture of all types of mice, joysticks and trackball accessories • Manufacture of dedicated computer terminal (e.g. Automatic teller machines, point-of-sale terminal, etc.) • Manufacture of computer servers • Manufacture of other peripheral equipment (e.g. Scanners, including bar	including telephone answering machines • (e) manufacture of data communications equipment (e.g. Bridges, routers and gateways) • Manufacture of transmitting and receiving antenna • Manufacture of cable television equipment • Manufacture of pagers • Manufacture of cellular phones • Manufacture of mobile communication equipment • Manufacture of radio and television studio and broadcasting	(f) manufacture of radio receivers (g) manufacture of speaker systems (h) manufacture of household-type video cameras • Manufacture of jukeboxes • Manufacture of amplifiers for musical instruments and public address systems • Manufacture of microphones • Manufacture of CD and DVD players • Manufacture of karaoke machines • Manufacture of headphones (e.g. Radio,	instruments for measuring and testing electricity and electrical signals (including for telecommunications) (g) manufacture of radiation detection and monitoring instruments (h) manufacture of surveying instruments (i) manufacture of thermometers liquid-in-glass and bimetal types (except medical) (j) manufacture of humidistat (k) manufacture of hydronic limit controls (l) manufacture of flame and burner controls (m) manufacture of spectrometers (n) manufacture of pneumatics gauges		photographic equipment	• Manufacture of hard drive media • Manufacture of other magnetic and optical recording media • Manufacture of storage units for use with computer or other devices including memory cards, thumb drives/pen drives, etc.

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
	• manufacture of solenoids, switches and transducers for electronic applications (b) manufacture of interface cards (e.g. Sound, video, controllers, network) • Manufacture of printer cables, monitor cables, USB cables, connectors, etc. (d) manufacture of internal/external computer modems • manufacture of electronic component-type connectors, sockets, and switches (f) manufacture of inductors (e.g. Chokes, coils, transformers), electronic component type • manufacture of electronic crystals and crystal assemblies	code scanners, smart card readers)	equipment, including television cameras • Manufacture of local area network and wide area network communication equipment (e.g. Bridges, routers, gateways, etc.) • Manufacture of modems, carrier equipment • Manufacture of burglar and fire alarm systems, sending signals to a control station • Manufacture of radio and television transmitters • Manufacture of infrared devices (e.g.	stereo, computer) • Manufacture of video game consoles • Manufacture of other consumer electronics equipment	manufacture of consumption meters (e.g. Water, gas) • Manufacture of flow meters and counting devices (q) manufacture of tally counters • Manufacture of mine detectors, pulse (signal) generators; metal detectors manufacture of search, detection, navigation, aeronautical and nautical equipment, including sonobuoys • Manufacture of environmental controls and automatic controls for appliances • Manufacture of industrial process control equipment			

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
	• manufacture of other components for electronic applications		Remote controls) • Manufacture of telecommunication equipment for satellites		• Manufacture of watches and clocks • Manufacture of watches and clocks and parts • Manufacture of measuring and recording equipment (e.g. Flight recorders) manufacture of motion detectors manufacture of laboratory analytical instruments (e.g. Blood analysis equipment) manufacture of laboratory type distilling apparatus, laboratory centrifuges, laboratory ultrasonic cleaning machinery manufacture of laboratory scales, balances, incubators and miscellaneous			

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
					laboratory apparatus for measuring, testing, etc. Manufacture of other measuring and controlling devices, such as radiation detection equipment, polygraph machines, thermometers (except bimetal medical type), meteorological instruments • Manufacture of watches and clocks of all kinds, including instrument panel clocks manufacture of watches and clock cases, including cases of precious metals manufacture of components for clocks and watches (d)			

	Manufacture of electronic components and boards	Manufacture of computers and peripheral equipment	Manufacture of communication equipment	Manufacture of consumer electronics	Manufacture of measuring, testing, navigating and control equipment; watches and clocks	Manufacture of irradiation, electro medical and electrotherapeutic equipment	Manufacture of optical instruments and photographic equipment	Manufacture of magnetic and optical media
					manufacture of time-recording equipment and equipment for measuring, recording and otherwise displaying intervals of time with a watch or clock movement or with synchronous motor, such as parking meters, time clocks, time/date stamps, process timers manufacture of time switches and other releases with a watch or clock movement or with synchronous motor such as manufacture of time locks, etc.			

1 (a): Please tick your industry segment based on the details of the industry segmentation provided above.

1)	**Manufacture of electronic components and boards**	
2)	**Manufacture of computers and peripheral equipment**	
3)	**Manufacture of communication equipment**	
4)	**Manufacture of consumer electronics**	
5)	**Manufacture of measuring, testing, navigating and control equipment; watches and clocks**	
6)	**Manufacture of irradiation, electro medical and electrotherapeutic equipment**	
7)	**Manufacture of optical instruments and photographic equipment**	
8)	**Manufacture of magnetic and optical media**	

Below are samples of Occupational Structures according to levels of competency and career paths for various jobs in the industry/

Table 1: Occupational Structure for Sections C, Division 26, Group 261

MSIC Section	**C – MANUFACTURING**						
MSIC Division	**26 – MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS**						
MSIC Group	**261 - Manufacture of electronic components and boards**						
Area	**Engineering (Material)**	**Engineering (Process)**	**Engineering (New Product Introduction)**	**Engineering (Equipment)**	**Production**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A		N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager*	Senior Production Manager**	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager*	Staff Engineer/ Manager*	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager* **	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Engineer*	Engineer*	Production Executive* **	QA Engineer	Document Control Executive
4	No Level	Senior Technician*	Senior Technician*	Senior Technician*	Assistant Production Executive* **	QA Senior Technician	Assistant Document Control Executive
3	No Level	Technician* **	Technician*	Technician* **	Line Leader* **	QA Technician	Document Controller
2	No Level	Junior Technician /Assistant technician*	Junior Technician /Assistant technician*	Junior Technician /Assistant Technician*	Senior Operator/ Quality Inspector* **	QA Operator	No Level
1	No Level	No Level	No Level	No Level	Operator* **	No Level	No Level

Table 2: Occupational Structure Sections C, Division 26, Group 262-268

MSIC Section	C – MANUFACTURING						
MSIC Division	26- MANUFACTURE OF COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS						
MSIC Group	262 - Manufacture of computers and peripheral equipment, 263- Manufacture of communication equipment, 264- Manufacture of consumer electronics, 265 - Manufacture of measuring, testing, navigating and control equipment; watches and clocks, 266 - Manufacture of irradiation, electro medical and electrotherapeutic equipment, 267- Manufacture of optical instruments and photographic equipment, 268- Manufacture of magnetic and optical media						
Area	**Production Engineering (Process Engineering)**	**Production Engineering (Manufacturing Engineering)**	**Production Operation (Production)**	**Production Operation (Quality Control)**	**Production Operation (Planning)**	**Quality Assurance (QA)**	**Document Control**
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Senior Staff Engineer/ Senior Manager	Senior Staff Engineer/ Senior Manager	Senior Production Manager**	Senior Quality Control Manager	Senior Planning Manager	Senior QA Manager	Senior Document Control Manager
6	Staff Engineer/ Manager	Staff Engineer/ Manager	Production Manager**	Quality Control Manager	Planning Manager	QA Manager	Document Control Manager
5	Engineer*	Engineer*	Production Executive* **	Quality Control Engineer	Planning Officer	QA Engineer	Document Control Officer
4	Assistant Engineer /Senior Technician*	Assistant Engineer / Senior Technician*	Production Supervisor* **	QC Assistant Engineer/Senior Tech	Assistant Planning Officer	QA Assistant Engineer/Senior Technician	Asst. Officer/ Document Control Executive
3	Technician* **	Technician* **	Line Leader* **	Quality Control Technician/ Production Technician	No Level	QA Technician	Document Controller
2	Assistant Technician*	Assistant Technician *	Senior Operator* **	Quality Inspector	No Level	QA Operator	No Level
1	No Level	No Level	Operator* **	No Level	No Level	No Level	No Level

1(b): Kindly provide a sample of the organisation chart used in your organisation showing the different departments and occupational areas.

1(c): Do you agree with the proposed (General) Occupational Structure for this industry? If not, kindly elaborate your reasons.

QUESTIONS 2: JOBS IN DEMAND

Please fill in the jobs currently in demand in your organisation and the reason for the demand.
Examples of reason for demand:

- To fulfil Key Performance(KPI)
- Insufficient Manpower
- Not skilled, low performing

No.	(A) SUPPORT		(B) EXECUTIVE		(C) MANAGEMENT		(D) SENIOR MANAGEMENT	
	Job Area /Job Title	**Reason for Demand**	**Job Area** /Job Title	**Reason for Demand**	**Job Area** /Job Title	**Reason for Demand**	**Job Area** /Job Title	**Reason for Demand**
1	**SAMPLE ANSWER: Operator**	**Majority are foreign workers/Difficult to recruit local workers**	**SAMPLE ANSWER: Technician**	**High in Demand**	**SAMPLE ANSWER: Engineer**	**High in Demand**		
2								
3								
4								

QUESTION 3: SKILLS GAP(S)

Please provide the job areas and job titles that have critical skills gaps in your organisation.

No.	(A) SKILLS REQUIRED	(B) JOB AREAS / JOB TITLES	(C) REASONS OF SKILLS GAP(S)	(D) PROPOSED SOLUTION(S)	PLEASE STATE IF YOU AGREE , IF NOT PLEASE STATE REASON
1.	Communication (English)	Overall for all job areas from Operator level till Engineer level	Lack of ability to understand verbal or written instructions	Training in communication at the workplace	
2.	• Programming • Technical Drawing • Usage of drawing software • Product understanding	Technical Skills in Engineering and Manufacturing From Operator level till Engineer	• Inability to adapt to new technology • Lack of exposure • Insufficient equipment and machinery	• Training • Review of syllabus at training centre or universities • Joint venture with industry to provide facilities	
3.	Trouble shooting and Problem solving skills	Overall for all job areas Technician and above	Lack of exposure Not resourceful	• Training and personal development • Review of syllabus at training centre or universities	
4.	Basic problem solving and escalation of issues to superior	Overall for all job areas Operator level	Lack of accountability	• Training and personal development • Review of syllabus at training centre or universities	
5.	Others, please specify :				

QUESTION 4: EMERGING SKILLS

Please fill in the emerging skills required relevant to your organization. Emerging skills are Skills that are not yet core but required in the near future.

No.	(A) EMERGING SKILLS	(B) JOB AREAS/ JOB TITLES	(C) REASON OF REQUIRED EMERGING SKILLS	PLEASE STATE IF YOU AGREE , IF NOT PLEASE STATE REASON
1.	IR 4.0 related skills – Utilisation of automation systems which include ability to configure, utilise, debug, maintain the system	Production, Manufacturing Engineering, Process Engineering	• Increase productivity, reduce cost and improve efficiency • To minimise human error	
2.	Innovation – for continuous improvement	Production, Manufacturing Engineering, Process Engineering From Operator to Manager level	• Increase productivity, reduce cost and improve efficiency • To enhance capability to optimise resources and new technology	
3.	Others, please specify :			
4.	Others, please specify :			

End of Questionnaire.

Thank you for your cooperation.

Should you have any questions or inquiries concerning completing this survey, please contact:

Evarina Amiron: pritec_academy@yahoo.com

Tel No. 018-7708224

ANNEX 4
CRITICAL OCCUPATIONAL DESCRIPTIONS
(OD)

MSIC GROUP : 261

JOB AREA : ENGINEERING (PROCESS/NEW PRODUCT INTRODUCTION)

LEVEL : 2

Responsibilities:

A Junior TechniciaNot Availablessistant Technician is responsible to assist/work with Technicians and Engineers to improve product yield, quality and output, control processes, support production in the resolution of process issues, perform process audit on specified frequency and escalate issues to the engineer based on the response plan.

Knowledge:

- Product yield, quality and output.
- Process audit
- Response plan.

Skills:

- Assist/work with Technicians and Engineers to improve product yield, quality and output.
- Control processes as established in standard operating procedures.
- Support production in the resolution of process issues.
- Perform process audit on specified frequency.
- Escalate to the engineer based on the response plan.
- Carry out any other duties as directed by the company.
- Able to utilise word processing and spread sheet application software

Attribute (Attitude/Safety/Environmental):

- Resourceful and creative
- High level of commitment and strong team player
- Ability to work under pressure
- Ability to work in shifts
- Possess good oral and written communication skills (Bahasa Melayu, English)

MSIC GROUP: 261

AREA : ENGINEERING (PROCESS/NEW PRODUCT INTRODUCTION)

LEVEL : 3

Responsibilities:

A New Product Introduction (NPI) Technician is responsible to assist/work with technicians and engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement, monitor the running of the golden lot and co-ordinate the lot through process flow completion.

Knowledge:

- New Product Introduction (NPI) development process steps, cost monitoring and process improvement.
- Running of the golden lot and process flow completion.

Skills:

- Assist/work with technicians and engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement.
- Monitor the running of the golden lot
- Co-ordinate the lot through process flow completion
- Able to use word processing and spreadsheet application software.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details
- High level of commitment and strong team player
- Ability to work under pressure
- Ability to work with different cross functional group
- Possess good oral and written communication skills (Bahasa Melayu, English)

MSIC GROUP: 261

AREA : ENGINEERING (PROCESS)

LEVEL : 3

Responsibilities:

A Process Technician is responsible to assist/work with Engineers to improve product yield, quality and output, control processes as established in standard operating procedures, support production in the resolution of process issues, perform process audit on specified frequency, liaise with relevant personnel from related departments for matters affecting process performance, escalate issues to the Engineer based on the response plan and provide weekly update on the Key Performance Indicators (KPI).

Knowledge:

- Semiconductors flows.
- Basic statistic tools, such as control chart and histogram.

Skills:

- Assist/work with Engineers to improve product yield, quality and output.
- Control processes as established in standard operating procedures.
- Support production in the resolution of process issues.
- Perform process audit on specified frequency.
- Liaise with relevant personnel from related departments for matters affecting process performance.
- Escalate to the Engineer based on the response plan.
- Provide weekly update on the Key Performance Indicators (KPI).
- To carry out any other duties as directed by the company.
- Able to utilise word processing and spreadsheet application software.

Attributes (Attitude/Safety/Environmental):

- Resourceful and creative
- High level of commitment and strong team player
- Ability to work under pressure
- Ability to work in shifts
- Possess good oral and written communication skills (Bahasa Melayu, English)

MSIC GROUP: 261

AREA : ENGINEERING (PROCESS)

LEVEL : 4

Responsibilities:

A Senior Process Technician (Engineering) is responsible to support Process Engineering with process and equipment qualifications, process evaluation or simulations and process improvement, support production in the resolution of process issue, is capable and has the authority to make decision and take proper action in support of production process quality and yield, compiles and analyses statistical data for critical processes, liaise with relevant personnel from related departments for matters affecting process performance, maintain and summarize production data (yield, output, machine stoppages) and regularly report status to supervisor.

Knowledge:

- Semiconductors flows.
- Basic statistic tools, such as control chart and histogram.
- Affected process.

Skills:

- Ability to support Process Engineering with process and equipment qualifications, process evaluation or simulations and process improvement.
- Ability to support production in the resolution of process issues.
- Capable and has authority to make decision plus take proper action in support of production process quality and yield.
- Compiles and analyses statistical data for critical processes.
- Liaise with relevant personnel from related departments for matters affecting process performance.
- Maintain and summarize production data (yield, output, machine stoppages) and regularly report status to supervisor.
- Carry out any other duties as directed by the company.

Attributes (Attitude/Safety/Environmental):

- Resourceful and creative
- High level of commitment and strong team player
- Ability to multi task and work under pressure

MSIC GROUP: 261

AREA : ENGINEERING (NEW PRODUCT)

LEVEL : 4

Responsibilities:

A Senior New Product Introduction (NPI) Technician is responsible to assist/work with engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement, coordinate and plan for golden lot to be run and provide full report on its status to supervisor, initiate the new BOM registration inside systems (if any) and provide the first level analysis on failures observed while running the golden lot.

Knowledge:

- Semiconductors flows.
- New Product Introduction (NPI) development process steps, cost monitoring and process improvement.
- Bill of Material registration.

Skills:

- Assist/work with engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement.
- Coordinate and plan for golden lot to be run and provide full report on its status to supervisor.
- Initiate the new BOM registration inside systems (if any)
- Provide the first level analysis on failures observed while running the golden lot.
- Able to utilise word processing and spread sheet application software

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details
- High level of commitment and strong team player
- Ability to work under pressure
- Ability to work with different cross functional group
- Possess good oral and written communication skills (Bahasa Melayu, English)

MSIC GROUP: 261

AREA : ENGINEERING (PROCESS)

LEVEL : 5

Responsibilities:

A Process Engineer is responsible to develop and implement engineering solutions that will improve product line yield, process improvement and operation efficiency, perform failure and root cause analysis for the rejects and quality issues seen on manufacturing processes, generate manufacturing process documentation including PFMEA, Control Plan, work instruction and visual aids for direct labour (DL) training and ensure standard work compliance and effectiveness, implement Engineering changes, process qualification or optimization and validation activities and also monitor the SPC (Statistical Process Control) performance.

Knowledge:

- Semiconductors flows.
- Failure Mode Effect Analysis (FMEA) and Control Plan.
- Basic statistical tools, such as 7 QC tools and Design of Experiment (DOE), SPC.
- Problem solving methodology, such as DMAIC and 8D.
- Office Productivity tools.

Skills:

- Develop and implement engineering solutions that will improve product line yield, process improvement and operation efficiency.
- Perform failure and root cause analysis for the rejects and quality issues seen on manufacturing processes.
- Generate manufacturing process documentation including PFMEA, Control Plan, work instruction and visual aids for direct labour (DL) training and ensure standard work compliance and effectiveness.
- Generate and implement Engineering changes, process qualification or optimization and validation activities.
- Monitor the SPC (Statistical Process Control) performance.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details, creative and analytical.
- High level of commitment, strong team player and able to work under pressure.

MSIC GROUP: 261

AREA : ENGINEERING (NEW PRODUCT)

LEVEL : 5

Responsibilities:

A New Product Introduction (NPI) Engineer is responsible to perform New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement and also coordinate the release of new product release per time line committed.

Knowledge:

- Semiconductors flows.
- Failure Mode Effect Analysis (FMEA) and Control Plan.
- Basic statistical tools, such as Design of Experiment (DOE).
- Project management skills and tools.
- Office productivity software tools.

Skills:

- Involved in new product introduction (NPI) through developing process steps, cost monitoring and process improvement.
- Coordinate the release of new product release per time line committed.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details
- High level of commitment and strong team player
- Ability to work under pressure
- Creative, critical and analytical thinking

MSIC GROUP: 261

AREA : ENGINEERING (PROCESS)

LEVEL : 6

Responsibilities:

A Process Staff Engineer/Manager (Engineering) is responsible to collaborate with Manufacturing Engineering team in ensuring process optimization, improvement and execution to plan, undertake technology benchmarking and drive 'best in class' engineering solution, provide problem solving and customer focused support to individual businesses, implement continuous improvement in areas of cost, quality, yield and delivery, implement process changes and process change management, manage engineering resources as per defined priority and set goals and KPI for the engineering team.

Knowledge:

- Semiconductors flows
- Failure Mode Effect Analysis (FMEA) and Control Plan
- Advanced knowledge in basic statistical tools, such as 7 QC tools and Design of experiment (DOE), SPC
- Problem solving methodology, such as DMAIC and 8D.
- Office productivity software tools, statistical software (MiniTAB)

Skills:

- Works closely with Manufacturing Engineering leads in tandem with the manufacturing lead to drive process optimization, improvement and execution to plan
- Undertake technology benchmarking and drive 'best in class' engineering solution
- Provide expert problem solving and customer focused support to individual businesses
- Implement continuous improvement in areas of cost, quality, yield and delivery.
- Implement process changes and process change management.
- Manage engineering resources as per defined priority.
- Set goals and KPI for the engineering team.

Attributes (Attitude/Safety/Environmental):

- High level of commitment and strong team player
- Ability to work under pressure
- Creative, critical and analytical thinking
- Strong leadership in technical area.
- Good technical skills including problem-solving, statistical data analysis and DOE.

- Proactive personality with good attention to details and curious mind.
- Good analytical and comprehensive problem solving capability to drive for conclusive technical cause finding; attention to details.
- Strong working knowledge of Statistical data analysis, and ability to analyse data to present information.
- Critical thinking skills, ability to understand complex issues and problems, and develop plans to address both internal, supplier and customer needs and its objectives

MSIC GROUP: 261

AREA : Engineering (New Product)

Level : 6

Responsibilities:

A New Product Introduction (NPI) Staff Engineer/Manager (Engineering) is responsible to perform integration technical support in new technology transfer projects, perform benchmarking and interconnect-related process analysis for new technologies to achieve maximum process capability against benchmark and work with the team for defects elimination and drive continuous improvement, design and execute experiments and perform technical analysis and documentation on the results towards new product release, assess process changes and process change management for new product release, plan and manage engineering resources as per priority defined, ensure sure the changes done are as per approved/certified design rules, responsible on the TPT that is applied for the new product release flow from start to end, interpret process sensitivities and potential process risks and limits and decides whether a machine or process can meet requirements for new products.

Knowledge:

- Semiconductors flows.
- Failure Mode Effect Analysis (FMEA) and Control Plan.
- Project management skills and tools.
- Possess practical and theoretical know-how which he could apply in new and changing contexts. Example of knowledge areas are SMT equipment and processes and design FMEA.
- Office productivity tools.

Skills:

- Perform integration technical support in new technology transfer projects
- Perform benchmarking and interconnect-related process analysis for new technologies to achieve maximum process capability against benchmark and work with the team for defects elimination and drive continuous improvement.
- Design and execute experiments and perform technical analysis and documentation on the results towards new product release.
- Assess process changes and process change management for new product release.
- Plan and manage engineering resources as per priority defined.
- Ensure sure the changes done are as per approved/certified design rules.

- Responsible on the TPT applies for the new product release flow from start to end.
- Interpret process sensitivities and potential process risks and limits
- Decides whether a machine or process can meet requirements for new products.

Attributes (Attitude/Safety/Environmental):

- Possess good technical skills including problem-solving, statistical data analysis and DOE.
- High level of commitment and strong team player
- Ability to work under pressure
- Creative, critical and analytical thinking
- Strong leaderships for technical area.
- Good technical skills including problem-solving, statistical data analysis and DOE.
- Proactive personality with good attention to details and curious mind.
- Good analytical and comprehensive problem solving capability to drive for conclusive technical cause finding; attention to details.

MSIC GROUP: 261

AREA : ENGINEERING (EQUIPMENT)

LEVEL : 2

Responsibilities:

An Equipment Engineering Junior TechniciaNot Availablessistant Technician is responsible to assist the technician to carry out routine maintenance of equipment and repair & troubleshooting of equipment, identify and update spare parts listing regularly, maintain all machine records with good traceability and updating equipment status list (Preventive Maintenance (PM)/ Electrostatic Discharge (ESD) specifications). They are also responsible to update prompt important daily production issue and PM/CAL/ESD list to date and also be involved in manufacturing and running of production materials on the shop floor.

Knowledge:

- Semiconductor processes and flow.
- Computer knowledge.
- Safety and environment regulations.

Skills:

- Assist technician to carry out routine maintenance of equipment
- Assist technician to carry out repair & troubleshooting of equipment
- Update prompt important daily production issue.
- Assist in identify and update spare parts listing regularly
- Assist in maintain all machine records with good traceability
- Update PM/CAL/ESD list to date
- Assist in updating equipment status list (PM/ESD specifications)
- Involved in manufacturing and running of production materials on the shop floor

Attributes (Attitude/Safety/Environmental):

- Possess strong interpersonal skills with good attention to details
- Possess high level of commitment and strong team player
- Ability to work under pressure
- Possess creative, critical and analytical thinking
- Adhere to safety regulations
- Adhere to environmental regulation

MSIC GROUP: 261

AREA : ENGINEERING (EQUIPMENT)

LEVEL : 3

Responsibilities:

A New Product Introduction (NPI) Technician is responsible to assist/work with technicians and engineers in New Product Introduction (NPI) through developing process steps, cost monitoring and process improvement, monitor the running of the golden lot and co-ordinate the lot through process flow completion.

Knowledge:

- Semiconductor Processes and Flow.
- Office Productivity Tools.
- Equipment Operations and Maintenance.
- Safety and environment regulations.

Skills:

- Carry out routine maintenance of equipment
- Carry out repair & troubleshooting of equipment
- Update prompt important daily production issue. Take necessary steps to resolve anything in the shift
- Identify and update spare parts listing regularly
- Maintain all machine records with good traceability. Update PM/CAL/ESD list to date
- Update equipment status list (PM/ESD specifications)
- Involve in manufacturing and running of production materials in the shop floor

Attributes (Attitude/Safety/Environmental):

- Possess strong interpersonal skills with good attention to details
- Possess high level of commitment and strong team player
- Ability to work under pressure
- Creative, critical and analytical thinking
- Adhere to safety regulations and environmental regulations

MSIC GROUP : 261

AREA : ENGINEERING (EQUIPMENT)

LEVEL : 4

Responsibilities:

An Equipment Senior Technician is responsible to lead the equipment technicians to execute according to specification, Work Instruction (WI), and One Point Lesson (OPL) to maintain equipment in the production, supervise production line equipment maintenance on shift to meet planned KPIs goal, lead the equipment ramp up and conversion to support production volume loading, provide technical support/solutions to resolve equipment, hardware and software related issues, conduct training on equipment operation and maintenance to operator and technician and meet all company requirements on 5S, quality and Environmental Health and Safety.

Knowledge:

- Semiconductor processes and flow.
- Equipment operations and maintenance.
- Office productivity tools usage.
- Safety and environment regulations.
- Quality tools.
- Product knowledge.

Skills:

- Lead the equipment technicians to execute according to specification, Work Instructions (WI) and One Point Lesson (OPL) to maintain equipment in the production
- Supervise production line equipment maintenance on shift to meet planned KPIs goal
- Lead the equipment ramp up and conversion to support production volume loading
- Provide technical support/solutions to resolve equipment, hardware and software related issues
- Conduct training on equipment operation and maintenance to operator and technician
- Meet all company requirements on 5S, quality and Environmental Health and Safety.

Attributes (Attitude/Safety/Environmental):

- Possess strong interpersonal skills with good attention to details
- Possess high level of commitment and strong team player
- Ability to work under pressure

- Creative, critical and analytical thinking
- Adhere to safety regulations
- Adhere to environmental regulation
- Possess leadership skills
- Possess communication skills, both written and verbal

MSIC GROUP: 261

AREA : ENGINEERING (EQUIPMENT)

LEVEL : 5

Responsibilities:

An Equipment Engineering Engineer is responsible to provide technical expertise in maximizing overall equipment effectiveness, working with production and process team to drive for equipment and operations improvement, improve equipment design, establish programs and solutions for increasing uptime and for equipment problems that affect the manufacturing process, provide technical support to the process development, process engineering and manufacturing equipment maintenance, plan and execute training programs for equipment technicians and prepare yearly equipment budget.

Knowledge:

- Semiconductor processes and flow.
- Equipment operations and maintenance.
- Office productivity tools usage.
- (Define Measure Analyse Implement And Control)DMAIC of Six Sigma and other project management tools.
- Quality tools.
- Statistical knowledge (Process Capability (CPK), Design of Experiment (DOE) and control chart).
- EFMEA (Equipment Failure Mode and Effect Analysis).
- Safety and environmental regulations.
- Hardware/software functionality and specifications.

Skills:

- To provide technical expertise in maximizing overall equipment effectiveness
- Working with production and process team to drive for equipment and operations improvement
- Interpret equipment performance and reliability to improve equipment design
- Establish programs and solutions for increasing uptime and for equipment problems that affect the manufacturing process.
- Provide technical support to the process development, process engineering and manufacturing equipment maintenance.
- Plans and execute training programs for equipment technicians

- Prepare yearly equipment budget

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details
- High level of commitment and strong team player
- Communication skills, Creative, critical and analytical thinking
- Adhere to safety regulations and environmental regulation

MSIC GROUP: 261

AREA : PRODUCTION

LEVEL : 1

Responsibilities:

An Operator (Production) is responsible to Perform production runs according to product run sheets and work instruction, ensure compliances to the procedure in daily routine job and carry out inspection under define frequency and referring to its criteria.

Knowledge:

- Production process.
- Product knowledge.
- Run sheets and work instructions.
- Safety and environmental regulations.

Skills:

- Perform production runs according to product run sheets and work instruction.
- Ensure compliances to the procedure in daily routine job.
- Carry out inspection under define frequency and referring to its criteria.

Attributes (Attitude/Safety/Environmental):

- Ability to work in shifts.
- Maintain good housekeeping 5’s and safety in the work place.
- Computer Literate.
- Able to speak and write simple English.
- Adhere to safety and environmental regulations.

MSIC GROUP: 261

AREA : PRODUCTION

LEVEL : 2

Responsibilities:

A Senior Operator (Production)/Quality Inspector is responsible to perform and monitor production runs according to product run sheets and work instruction, ensure compliance to procedures in their daily routine job, carry out inspection under defined frequency and referring to its criteria, maintain and prepare operational reports, carry out the Mentor roles for new operator and assume duties during absence of Line leader.

Knowledge:

- Production process.
- Product knowledge.
- Run sheets and work instructions.
- Safety and environmental regulations.

Skills:

- Perform and monitor production runs according to product run sheets and work instruction
- Ensure compliances to the procedure in daily routine job.
- Carry out inspection under defined frequency and referring to its criteria
- Maintain and prepare operational reports
- Carry out the Mentor roles for new operator
- Assume duties during absence of Line leader

Attributes (Attitude/Safety/Environmental):

- Ability to work in shifts.
- Maintain good housekeeping 5's and safety in the work place.
- Computer Literate.
- Able to speak and write simple English.
- Adhere to safety and environmental regulations.

MSIC GROUP: 261

AREA : PRODUCTION

LEVEL : 3

Responsibilities:

A Line Leader is responsible to Coordinate and monitor production runs according to product run sheets and work instruction, lead a group of operator towards achieving the Key Performance Index (KPI) sets, ensure subordinate compliances to the procedure in daily routine job, supervise and coordinate the housekeeping 5's and safety activity in the work place, maintain and prepare operational reports, assume duties during absence of Manufacturing Executive and assist other worker's manufacturing tasks as and when required.

Knowledge:

- Production process.
- Product knowledge.
- Run sheets and work instructions.
- Safety and environmental regulations.

Skills:

- Coordinate and monitor production runs according to product run sheets and work instruction
- Lead a group of operator towards achieving the KPI sets.
- Ensure subordinate compliances to the procedure in daily routine job.
- Supervise and coordinate the housekeeping 5's and safety activity in the work place.
- Maintain and prepare operational reports
- Assume duties during absence of Manufacturing Executive.
- Assist other worker's manufacturing tasks as and when required.

Attributes (Attitude/Safety/Environmental):

- Ability to work in shifts.
- Ability to lead a group of operator.
- Maintain good housekeeping 5's and safety in the work place.
- Computer Literate.
- Able to speak and write simple English.
- Adhere to safety and environmental regulations.

MSIC GROUP: 261

AREA : PRODUCTION

LEVEL : 4

Responsibilities:

An Assistant Manufacturing Executive (Production) is responsible to coordinate the running lot is as per schedule and follows the First In First Out (FIFO) concept and monitor there is no backlog situation reported.

Knowledge:

- Semiconductors flows.
- Lot monitoring.
- FIFO concept.
- Backlog situation.
- Problem solving process.

Skills:

- To plan and manage the running lot is as per schedule and follows the FIFO concept.
- To monitor that no backlog situation is reported.

Attributes (Attitude/Safety/Environmental):

- Ability to work in shifts.
- Ability to lead a group of operator.
- Maintain good housekeeping 5’s and safety in the work place.
- Computer Literate.
- Able to speak and write simple English.
- Adhere to safety and environmental regulations.

MSIC GROUP : 261

AREA : PRODUCTION

LEVEL : 5

Responsibilities:

A Production Executive is responsible to manage the lot running as per scheduled following the FIFO concept, monitoring of no backlog situation and relevant reports, analyse the production performance per defined KPI and compile it daily/monthly/quarterly or as assigned by superior, coordinate and cooperate with related departments to promote and manage countermeasures for problem solving, organize and prepare all the tools required by subordinate and controlling its usage, monitor the production lines in the factory, maintain a safe and cleaner environment, reduce or eliminate the rejected items during production processes, expedite production processes by using lesser manpower, optimise production output, maintain output quality, lead and ensure subordinates carry out job functions effectively meeting production output target set by company.

Knowledge:

- Semiconductors manufacturing flow.
- PDCA (Plan, Do, Check, Act) and QC tools.
- Proficient in Mathematics Calculation.

Skills:

- Manage the lot running as per schedule and follows FIFO concept.
- Monitor that no backlog is reported.
- Analyse the production performance per defined KPI and compiling it daily/monthly/quarterly or as assigned by superior.
- Coordinate and cooperate with related departments to promote and manage countermeasures for problem solving.
- Organize and prepare all the tools required by subordinate and control its usage.
- Monitor the production lines in the factory.
- Reduce or eliminate the rejected items during production processes.
- Expedite production processes by using lesser manpower and optimise production output.
- Maintain production output quality.
- Lead and ensure subordinate carry out job functions efficiently and meet production output target set by company.

Attributes (Attitude/Safety/Environmental):

- Self-motivated and as an active team member.
- Possess computer skills
- Good oral and written communication skills (Local, English)

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (PROCESS ENGINEERING)

LEVEL : 2

Responsibilities:

An Assistant Technician is responsible to assist daily process problem at production line, assist in changing model activity, assist process improvement activity and record Process Tact time.

Knowledge:

- Mechanical drawing and electrical drawing.
- Electronic test equipment procedures and functionality.
- Office productivity software and spread sheets usage procedures and functionality.
- Offhand tools usage procedures and functionality.
- Model activity improvement process.
- Process tact time.

Skills:

- Assist daily process problem at production line.
- Assist in changing model activity.
- Assist process improvement activity.
- Record Process Tact time.
- Utilise test and measurement equipment.
- Utilise flowchart and SOP Standard Operation Procedure.
- Interpret mechanical drawing and electrical drawing.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details.
- High level of commitment and strong team player.
- Ability to work under pressure.
- Proper use offhand tools according to safety measures and procedures.
- Utilise office productivity software and spread sheets for reporting.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (PROCESS ENGINEERING)

LEVEL : 3

Responsibilities:

A Technician is responsible to assist daily process problem at production line, assist in changing model activity, assist process improvement activity and record Process Tact time.

Knowledge:

- Mechanical drawing and electrical drawing.
- Electronic test equipment procedures and functionality.
- Office productivity software and spread sheets usage procedures and functionality.
- Offhand tools usage procedures and functionality.
- Model activity improvement process.
- Tact time and line balancing reporting procedures and format.

Skills:

- Compile Tact Time for Line Balancing Report.
- Attend daily problem at production.
- Provide and interpret Standard Operating Procedures (SOP) document.
- Verify Production Process is according to SOP.
- Carry out improvement activity.
- Arrange production manpower.
- Utilise test and measurement equipment according to procedures.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details.
- High level of commitment and strong team player.
- Ability to work under pressure.
- Possess problem solving and trouble shooting skills.
- Creative, critical and analytical thinking
- Adhere to safety regulations and environmental regulations.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (PROCESS ENGINEERING)

LEVEL : 4

Responsibilities:

An Assistant Engineer/Senior Technician is responsible to compile Tact Time for Line Balancing Report, assist Engineer to analyse and develop Line Balancing, supervise daily process problem at production line, supervise change model activity, supervise improvement activity, apply SOP document / Process Flow / Process Layout and carry out new model introduction.

Knowledge:

- Mechanical drawing and electrical drawing.
- Flow chart.
- Office productivity software and spreadsheets usage procedures and functionality.
- Stop watch usage procedures and functionality.
- Model activity improvement process.
- Continuous improvement ideas
- Tact time and line balancing reporting procedures and format.
- Sop / process layout.
- Time analysis.

Skills:

- Compile Tact Time for Line Balancing Report
- Assist Engineer to Analyse and develop Line Balancing
- Supervise daily process problem at production
- Supervise change model activity
- Supervise improvement activity
- Apply SOP document / Process Flow / Process Layout
- Carry out new model introduction

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills, creative, critical and has analytical thinking.
- High level of commitment, strong team player and able to work under pressure
- Possess problem solving and trouble shooting skills.
- Adhere to safety regulations and environmental regulations.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (PROCESS ENGINEERING)

LEVEL : 5

Responsibilities:

An Engineer is responsible to prepare SOP document / process flow / process layout,, analyse motion and ergonomic chart/factor, conduct body movement analysis, analyse and develop line balancing, plan improvement activity, coordinate new model introduction, formulate and analyse cost, tools part and supplies, coordinate activities with supervisor and management, carry out activities to achieve KPI (Key Performance Index), conduct technical training and coordinate New Model Introduction meeting with other departments.

Knowledge:

- Six Sigma , Statistical analysis and 7 QC tools.
- QESH (Quality, Environment, Safety and Health)
- Line Balancing Software (Simulation software)

Skills:

- Prepare SOP document / Process Flow / Process Layout
- Analyse Motion and Ergonomic chart/factor
- Perform body movement analysis
- Analyse and develop Line Balancing
- Plan and Verified improvement activity
- Coordinate and Plan New Model Introduction
- Formulate and analyse cost, tools part and supplies
- Coordinate activities with supervisor and management
- Carry out activities to achieve KPI (Key Performance Index)
- Conduct technical training
- Coordinate New Model Introduction meeting with other department
- Determine critical and new process and parameter requirement

Attribute (Attitude/safety/environmental)

- Delegate and empowering others
- Strong interpersonal skills, creative, critical and has analytical thinking.
- High level of commitment, strong team player and able to work under pressure
- Possess problem solving and trouble shooting skills.

- Adhere to safety regulations and environmental regulations.
- Excellent problem identification and trouble shooting skills
- Analytical and process improvement skill

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)

LEVEL : 2

Responsibilities:

An Assistant Technician is responsible to assist daily problem at production line, assist change model activity, assist improvement activity and prepare daily breakdown report

Knowledge:

- Mechanical drawing and electrical drawing.
- Electronic test equipment procedures and functionality.
- Office productivity software and spread sheets usage procedures and functionality.
- Offhand tools usage procedures and functionality.
- Model activity improvement process.
- Process tact time.

Skills:

- Assist daily process problem at production line.
- Assist in changing model activity.
- Assist process improvement activity.
- Record Process Tact time.
- Utilise test and measurement equipment.
- Utilise flowchart and SOP Standard Operation Procedure.
- Interpret mechanical drawing and electrical drawing.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills with good attention to details.
- High level of commitment and strong team player.
- Ability to work under pressure.
- Proper use offhand tools according to safety measures and procedures.
- Utilise office productivity software and spread sheets for reporting.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)

LEVEL : 3

Responsibilities:

A Technician is responsible to attend daily problem at production line, carry out change model and improvement activities, check daily breakdown report, perform subordinates tasking arrangement, carry out Total Preventive Maintenance and compile Test Data.

Knowledge:

- Mechanical drawing and electrical drawing.
- Electronic test equipment procedures and functionality.
- Office productivity software and spread sheets usage procedures and functionality.
- Hand tools usage procedures and functionality.
- Model activity improvement process.
- Total preventive maintenance.

Skills:

- Attend daily problem at production
- Carry out change model activity
- Carry out improvement activity
- Check daily breakdown report
- Perform subordinates tasking arrangement.
- Carry out Total Preventive Maintenance.
- Compile Test Data
- Utilise office productivity software and spreadsheets for reporting.
- Utilise electronic test and measurement equipment.
- Utilise flowchart and SOP Standard Operation Procedure.
- Interpret mechanical drawing and electrical drawing.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills, creative, critical and has analytical thinking.
- High level of commitment, strong team player and able to work under pressure
- Possess problem solving and trouble shooting skills.
- Adhere to safety regulations and environmental regulations.
- Proper use of hand tools according to safety measures and procedures.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)

LEVEL : 4

Responsibilities:

An Assistant Engineer/Senior Technician is responsible to supervise daily problem at production line, supervise change model and improvement activities, verify daily breakdown report, Total Preventive Maintenance and Test Data. They will also be required to carry out new model introduction.

Knowledge:

- Mechanical drawing and electrical drawing.
- Electronic test equipment procedures and functionality.
- Office productivity software and spread sheets usage procedures and functionality.
- Hand tools usage procedures and functionality.
- Model activity improvement process.
- Total preventive maintenance.

Skills:

- Supervise daily problem at production
- Supervise change model activity and improvement activity
- Verify daily breakdown report
- Verify Total Preventive Maintenance
- Verify Test Data.
- Carry out new model introduction.
- Utilise office productivity software and spread sheets for reporting.
- Utilise electronic test and measurement equipment.
- Utilise flowchart and SOP Standard Operation Procedure.
- Interpret mechanical drawing and electrical drawing.

Attributes (Attitude/Safety/Environmental):

- Strong interpersonal skills, creative, critical and has analytical thinking.
- High level of commitment, strong team player and able to work under pressure
- Possess problem solving and trouble shooting skills.
- Adhere to safety regulations and environmental regulations.
- Proper use of hand tools according to safety measures and procedures.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)

LEVEL : 5

Responsibilities:

An Engineer is responsible to formulate and analyse cost, tools part and supplies, prepare yearly equipment and tools budget, maintain and monitor safety check on equipment and plant, carry out activities to achieve KPI (Key Performance Index), prepare Total Preventive Maintenance requirements, summarise all daily activity reports, plan New Model Introduction and improvement activities, analyse Test Data and product quality, Prepare technical Training manual, conduct technical training, coordinate New Model Introduction meeting with other departments, design and fabricate equipment/jig mechanical/electrical/fabricate hardware.

Knowledge:

- Design software
- Programming software
- Six sigma, statistical analysis and 7 QC tools.
- Quality, environment, safety and health (QESH).
- Software design and debugging.
- Total preventive maintenance.
- Technical training.
- Improvement and New Product Introduction activities.

Skills:

- Plan New Model Introduction.
- Plan improvement activity.
- Formulate and analyse cost, tools part and supplies.
- Prepare yearly equipment and tools budget.
- Prepare Total Preventive Maintenance requirements.
- Maintain tools and equipment.
- Maintain and monitor safety check on equipment and plant.
- Carry out activities to achieve KPI (Key Performance Index).
- Summarise all daily activity reports (Maintenance, model change, breakdown, etc.)
- Analyse Test Data and product quality.
- Prepare technical training manual.
- Conduct technical training.

- Coordinate New Model Introduction meeting with other departments.
- Design and fabricate equipment/jig mechanical/electrical/fabricate hardware.
- Identify critical, new process and parameter requirements.

Attributes (Attitude/Safety/Environmental):

- Possess excellent problem identification and trouble shooting skills.
- Possess analytical and process improvement skills.
- Delegate and empowering others.
- Strong interpersonal skills with good attention to details.
- High level of commitment and strong team leader.
- Ability to work under pressure.
- Creative, critical and analytical thinking.
- Adhere and responsible to safety regulations.
- Adhere and responsible to environmental regulations.

MSIC GROUP : 262-268

AREA : PRODUCTION ENGINEERING (MANUFACTURING ENGINEERING)

LEVEL : 6

Responsibilities:

A Staff Engineer is responsible to prepare departmental budget for Manufacturing Engineering department, monitor New Model Introduction, develop innovative and new processing method, perform management decision making, establish Quality Standard and Management, set up new manufacturing process and development , set up Manufacturing Engineering departmental KPI and prepare Manufacturing Engineering Staff appraisal.

Knowledge:

- Quality and Standard management.
- Change management in terms of technologies, information, market, risk etc.
- Decision making techniques and crisis management.
- Quality, Environment, Safety and Health requirements, policies and regulations.
- Research knowledge on new method for improvement.

Skills:

- Prepare departmental budget for Manufacturing Engineering department.
- Monitor New Model Introduction.
- Develop innovative and new processing method.
- Perform management decision making.
- Establish Quality Standard and Management.
- Set up new manufacturing process and development.
- Set up Manufacturing Engineering departmental KPI.
- Prepare Manufacturing Engineering Staff appraisal.

Attributes (Attitude/safety/environmental):

- Strong interpersonal skills with good attention to details, creative, critical and analytical thinking
- High level of commitment and strong team leader with good supervisory, crisis handling, decision making, negotiation skills. and delegation skills and able to empower others.
- Ability to work under pressure with effective time management and completes jobs in hand according to schedule.
- Adhere and responsible to safety and environmental regulations.

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL : 1

Responsibilities:

An Operator is responsible to perform product inspection, packaging and machine operation, perform appropriate duties based on Standard Operating Procedures (SOP), maintain a safe and clean work space based on 5S, update records as required, utilise test and measurement equipment and interpret flowchart and SOPs.

Knowledge:

- 5s practices
- Standard Operating Procedures (SOP) and flowchart.
- Basic Knowledge - Reading, Writing and Calculation.
- Basic computer knowledge.
- Proper use of hand tools and test equipment.
- Product and Production process.

Skills:

- Carry out product inspection, packaging and machine operation
- Perform appropriate duties based on Standard Operating Procedures (SOP)
- Maintain a safe and clean work space (5S)
- Update records as required
- Ability to use test and measurement equipment
- Ability to understand flowchart and SOP Standard Operation Procedure

Attributes (Attitude/Safety/Environmental):

- Possesses good eye sight.
- Adhere to production regulation and SOP.
- Team spirit oriented and self-directed learning.
- Adhere to safety and environmental regulations.
- Committed to quality and delivery.
- Adhere to instructions.

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL : 2

Responsibilities:

A Senior Operator is responsible to carry out product inspection, packaging and machine operation, perform appropriate duties based on Standard Operating Procedures (SOP), maintain a safe and clean work space based on 5S, update records as required, train new operator, carry out critical process and back up new operators when required.

Knowledge:

- 5s practices
- Standard Operating Procedures (SOP) and flowchart.
- Basic Knowledge - Reading, Writing and Calculation.
- Basic computer knowledge.
- Proper use of hand tools and test equipment.
- Product and Production process.

Skills:

- Carry out product inspection, packaging and machine operation
- Perform appropriate duties based on Standard Operating Procedures (SOP)
- Maintain a safe and clean work space (5S)
- Update records as required
- Train new operator
- Carry out critical process
- Back up new operator
- Ability to use test and measurement equipment
- Ability to understand flowchart and SOP Standard Operation Procedure

Attributes (Attitude/Safety/Environmental):

- Possesses good eye sight
- Adhere to production regulation and SOP
- Team spirit oriented and self-directed learning.
- Adhere to safety and environmental regulations.
- Committed to quality and delivery.
- Adhere to instructions.

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL : 3

Responsibilities:

A Line Leader is responsible to supervise product inspection, packaging and machine operation, confirm proper set up of machinery and electronic material for production, ensure operators adhere to their appropriate duties based on SOP, maintain a safe and clean work space 5S, check updated records as required, carry out training of new operator and back up new operators.

Knowledge:

- 5s practices
- Standard operating procedures (sop) and flowchart.
- Basic knowledge - reading, writing and calculation.
- Basic computer knowledge.
- Functionality and proper use of hand tools and test equipment.
- Product and Production process.

Skills:

- Supervise product inspection, packaging and machine operation
- Confirm proper set up of machinery and electronic material for production
- Ensure operator adhere to their appropriate duties based on SOP
- Maintain a safe and clean work space (5S)
- Check updated records as required
- Carry out training of new operator
- Back up new operator
- Ability to use test and measurement equipment
- Ability to understand flowchart and SOP Standard Operation Procedure

Attributes (Attitude/Safety/Environmental):

- Coaching and training skills
- Multitasking skills
- Communication skills
- Adhere to production regulations and SOP
- Result oriented and self-directed learning

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL : 4

Responsibilities:

A Production Supervisor is responsible to interpret production schedule, arrange tasking of daily work to operator, track production output progress, solve problem at production line (output, quality, delivery, manpower), maintain time keeping and personal records, disseminate information from upper management to subordinates, prepare performance report, recruit and train new operator, ensure subordinates adhere to company policies, carry out performance review and motivate team members.

Knowledge:

- Manpower management.
- Handling staff grievances
- Product specification and production process requirements.
- Production schedule details and format.
- Performance review process.
- Problem solving skills and methods.
- Continuous improvement skills.

Skills:

- Interpret production schedule
- Arrange tasking of daily work to operator
- Track production output progress
- Solve problem at production line (output, quality, delivery, manpower)
- Maintain time keeping and personal records
- Disseminate information from upper management to subordinate
- Prepare performance report
- Recruit and train new operator
- Ensure subordinates adhere to company policies
- Conduct performance review
- Motivate team members

Attributes (Attitude/Safety/Environmental):

- Possess supervisory and leadership skills.
- Possess problem solving, trouble shooting skills and continuous improvement skills.
- Strong interpersonal skills with good attention to details.
- Possess high level of commitment and discipline.
- Adhere to safety regulation and environmental regulations

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL : 5

Responsibilities:

A Production Executive is responsible to arrange work schedule for supervisors, monitor production output progress, ensure production operation meets KPI, prepare daily production progress and problem report (quality, cost and delivery), coordinate daily production meeting, disseminate information on company policies to subordinates and ensure they adhere to company policies, conduct performance review and motivate production department staff.

Knowledge:

- Manpower management.
- Handling staff grievances.
- Production schedule specifications and requirements.
- Performance review process.
- Problem solving skills and methods.
- Continuous improvement skills.
- ISO documentation format and requirements.

Skills:

- Arrange work schedule for supervisors.
- Monitor production output progress.
- Ensure production operation meets KPI.
- Prepare daily production progress and problem report (quality, cost and delivery).
- Coordinate daily production meeting.
- Disseminate information on company policies to subordinates and ensure they adhere to company policies.
- Conduct performance review.
- Motivate production department staff.

Attributes (Attitude/Safety/Environmental):

- Possess supervisory and leadership skills.
- Possess problem solving, trouble shooting skills and continuous Improvement skills.
- Strong interpersonal skills with good attention to details.
- Possess high level of commitment and discipline.

- Adhere to safety regulation and environmental regulations.
- Creative, critical and analytical thinking.
- Possess negotiation skills.
- Effective communication skills.

MSIC GROUP : 262-268

AREA : PRODUCTION OPERATION (PRODUCTION)

LEVEL 6

Responsibilities:

A Production Manager is responsible to plan production schedule, prepare production budget, ensure health and safety regulations of production are adhered to, manage and evaluate machine resources to ensure high productivity and minimal down time, oversee production manpower, plan activities to increase operation productivity and reduce production expenses, plan and organise technical and soft skill training for production staff, lead daily production meeting, set production KPI and communicate production issues to higher management.

Knowledge:

- Manpower planning
- Departmental budgeting
- Operation management
- Interpersonal skills
- Departmental report format and requirements
- ISO 9001/14000
- OSHA 18001
- Lean Manufacturing

Skills:

- Plan production schedule.
- Prepare production budget
- Ensure health and safety regulations of production are adhered to
- Manage and evaluate machine resources to ensure high productivity and minimal down time
- Oversee production manpower
- Plan activities to increase operation productivity and reduce production expenses
- Plan and organise technical and soft skill training for production staff
- Lead daily production meeting
- Set production KPI
- Communicate production issues to higher management.

Attributes (Attitude/Safety/Environmental):

- Possess effective management skills.
- Possess effective decision making skills and skills in handling production crisis.
- Is highly result oriented and possess high level of commitment to KPI.
- Possess problem solving, trouble shooting skills and continuous improvement skills.
- Ensures staff adhere safety regulation and environmental regulations.
- Possess negotiation skills and effective communication skills.