BAGONG PILIPINAS

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

SKILLS NEEDS ANTICIPATION

WORKPLACE SKILLS AND SATISFACTION SURVEY AND SKILLS MAPPING (MANUFACTURING SECTOR)

SKILLS NEEDS ANTICIPATION AND SKILLS MAPPING

(Manufacturing Sector)

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

4IR	Fourth Industrial Revolution
AMDEV	Advanced Manufacturing Workforce Development Alliance
CISTEM	Center for Integrated STEM Education, Inc
CS	Competency Standard
IOT	Internet of Things
MIT-OL	Massachusetts Institute of Technology Office of Open Learning
NTESDP	National Technical Education and Skills Development Plan
PDP	Philippine Development Plan
PLC	Programmable Logic Controlled
PSF	Philippine Skills Framework
PTTC	Philippine Trade Training Center
RLA	Regional Lead Assessors
RLT	Regional Lead Trainers
TESDA	Technical Education and Skills Development Authority
TR	Training Regulation
TVET	Technical and Vocational Education and Training
ULF	United Laboratories Foundation, Inc.
UP-ISSI	University of the Philippines Institute for Small-Scale Industries
USAID	United States Agency for International Development
UTPRAS	Unified TVET Program Registration and Accreditation System
WSS	Workplace Skills and Satisfaction Survey

LIST OF TABLES

I. BACKGROUND

Manufacturing is considered as the engine of the economy as it can stimulate more economic activity with its high employment, income and output multiplier. The industry is considered as one of the backbones of the Philippines' development that focuses on long-term productive employment, value-added services, and innovation. The industry creates employment with its inter-industry and inter-sectoral linkages both in domestic and international. Also, manufacturing activities have spillover effects of creating demands for the agriculture and resource-based industries. Moreover, it affects the activity in the services and logistics as these sectors are mostly reliant on the output of the production and manufacturing industry.

The Philippine manufacturing industry is forecasted to continue contributing to the growth and employment as investments and capital continue to flow in the country. The country's manufacturing has the growth potential in becoming globally competitive, and is positioned to be the next manufacturing powerhouse in the region. As a dynamic and growing industry, it has to be supported with sound policies specifically on its funding, development (i.e. infrastructure and technology) as well as education and training skills programs. To fully realize this, it has to make a crucial investment in its workforce.

The sector also plays a crucial role in the Philippines' economy, employing a significant portion of the workforce. It encompasses 68 industry groups engaged in "activities involving physical or chemical transformation of materials, substances, or components into new products." With approximately 24,000 establishments, it provides jobs for around 1.38 million workers. Over the years, manufacturing has consistently been a major contributor to the country's income. According to the 2019 annual survey of business and industry, this sector generated an impressive 5.96 trillion pesos in annual total revenue.

Despite the challenges posed by the COVID-19 pandemic, manufacturing has shown resilience. Recent government reports indicate that its contribution to the national GDP remains close to pre-pandemic levels as the global economy gradually recovers. In 2021, the World Bank estimated that manufacturing's value added accounted for approximately 18% of the Philippines' GDP, highlighting its continued significance in driving economic growth.

However, the country faces significant challenges that hinder its manufacturing growth trajectory. One major issue is the missed market opportunities arising from the Fourth Industrial Revolution. The Philippine Development Plan acknowledges the sector's "low technological utilization," noting that many companies are still transitioning from Industry 2.0 to Industry 3.0. This is particularly true for micro, small, and medium enterprises (MSMEs), which comprise over 99% of commercial establishments, including those in manufacturing. Unfortunately, these MSMEs exhibit "low technological readiness" for Industry 4.0, meaning they fail to fully leverage available technologies that could greatly enhance productivity.

For instance, digital platforms connecting various operational points, advanced equipment/materials enhancing efficiency, and "smart technologies" facilitating rapid information processing and predictive analytics remain underutilized. The emergence of advanced manufacturing also reshapes the labor market, demanding workers to be proficient in scientific, technology-based knowledge, and advanced cognitive skills relevant to the evolving workplace. This includes mastery of advanced technologies like automation, big data, AI, and cloud-based operations.

However, only 24% of Filipino workers fall into the highly skilled category, as per the World Economic Forum's human capital outlook for the ASEAN region. This scarcity of highly skilled workers hampers businesses from adapting to emerging manufacturing trends and competing globally. Moreover, disruptions in education due to the COVID-19 pandemic have further strained the workforce's alignment with industry needs.

Addressing these challenges requires a comprehensive review of current and emerging competency requirements in manufacturing. It also calls for structured training and education programs to consistently produce well-equipped, highly skilled Filipino talent capable of meeting industry demands.

The results of the Philippine advanced manufacturing workforce survey in 2023 note the following competencies required by the sector:

- Functional Competencies
    - Quality Inspection and Continuous Improvement
    - Manufacturing Process Applications and Operations
    - Production and Process Monitoring
    - Corrective and Preventive Actions
    - Machining Skills, Manufacturing Tools and Equipment Operations
    - Maintenance Troubleshooting and Repair
    - Lean Manufacturing
    - Occupational Safety, Health, Security and Environment

    - Systems
    - Production Materials - Sources and Types
    - Automated Systems and Control Operations
    - Technical Drawing and Schematics
    - Programmable Logic Controlled (PLC) Industrial Equipment, Maintenance, Installation and Repair
    - Precision Measurement
    - Clean Room Protocol

- Enabling Competencies
    - Problem Solving
    - Communication
    - Decision Making
    - Self Management
    - Adaptability
    - Collaboration
    - Customer Orientation
    - Sense Making
    - Digital Fluency

- Industry 4.0 Technologies
    - Supply Chain Integration
    - Additive Manufacturing
    - Big Data and Analytics
    - Industrial Internet of Things (IOT)
    - Advanced Robotics
    - Cybersecurity
    - Horizontal Integration
    - Simulation and Digital Twin
    - Augmented Reality
    - Cloud

TESDA is a key player in the government's development strategy as the organization responsible for managing and directing technical education and skills development. Crucial to TESDA's role as the TVET authority in the country is its capacity to steer and provide guidance to the sector by gathering inputs from relevant stakeholders through various methods and procedures to determine the most recent skill requirements and offer cutting-edge training programs in order to carry out its mandate. The conduct of surveys and consultations with industry is among those procedures.

With the view of setting out clear directions and establishing priorities, the

availability of timely, relevant and accurate information is very critical. The skills mapping and anticipation for the Manufacturing Sector is especially relevant given that the industry's goals and targets is to rebuild the sector as an innovative, value adding, technology enhancing, and globally competitive to attain inclusive and sustainable growth. Manufacturing is also one of the priority sectors of the government as stipulated in the policy planning of the government such as the AmBisyon Natin 2040, the Philippine Development Plan (PDP) 2023-2028, and the National Technical Education and Skills Development Plan (NTESDP) 2023-2028.

TESDA, through its partnership with the Advanced Manufacturing Workforce Development Alliance (AMDev)[1], has been instrumental in the conduct of the survey and through the alliance's member companies. The alliance has committed to train operators, technicians and engineers in the sector through its innovative approaches in education and training.

II. OBJECTIVES

The skills mapping survey and consultation intends to determine the necessary training-related support and programs for the sector. Specifically, it intends to:

- Determine the challenges and opportunities in the manufacturing sector;
- Present and validate the skills requirements of the sector;
- Identify emerging and future skills; and
- Determine the skills requirements for the development of training programs for the sector.

III. METHODOLOGY

The Manufacturing industry is divided into three (3) sectors; the consumer goods, intermediate goods and capital goods. These sectors are defined as follows:

- Consumer Goods - referred to as final goods, are products that are bought by individuals or households for personal use.
- Intermediate Goods - are products used to produce a final good or finished product.
- Capital Goods - are physical assets that a company uses in the production process to manufacture products and services that consumers will later use.

[1] The Advanced Manufacturing Workforce Development Alliance (AMDev) is a program supported by the United States Agency for International Development (USAID) and implemented by the United Laboratories Foundation, Inc. (ULF). The primary goal of the program is to develop a pipeline of highly skilled and adaptive workforce that meets the evolving requirements of Industry 4.0 or advanced manufacturing. Consequently, it aims to contribute to a longer-term impact of strengthening the Philippines' education system through an industry-led, hybrid education and skills training system.

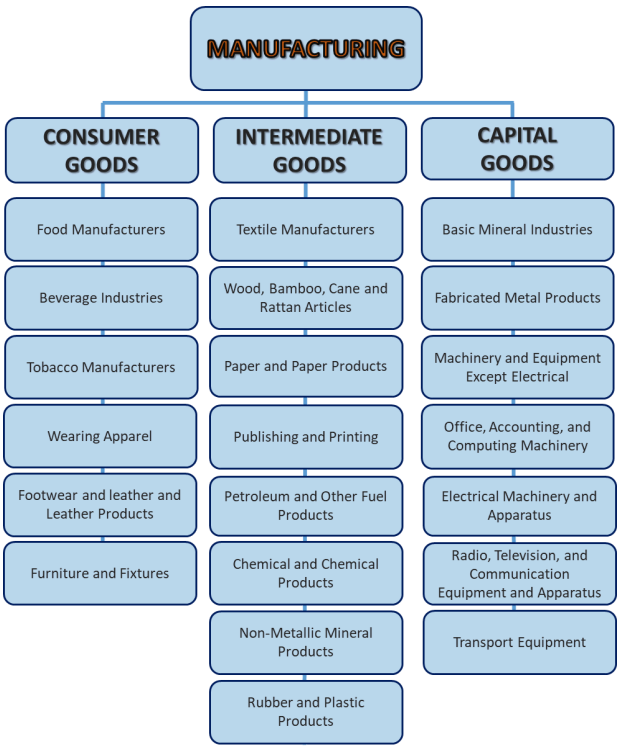

Figure 1: Taxonomy of Manufacturing Industry

These sectors are composed of 21 subsectors. But for the purpose of the survey, the focus subsectors are as follows: Food and beverage, chemicals, non-metallic minerals and pharmaceuticals, and electronics. These subsectors were selected according to their contributions to, and growth rates in, employment and gross value add.

IV. HIGHLIGHTS OF THE RESULTS

A. Distribution of Manufacturing Facilities by Manufacturing Subsector

Table 1.
Distribution of Manufacturing Facilities by Manufacturing Subsector

Subsector	Number of Facilities
Electronics	199
Consumer Goods	250
Intermediate Goods (Chemicals, Ceramics)	80
TOTAL	***529***

The distribution of manufacturing facilities by Manufacturing subsector is based on the number of members for each of the following industry associations:

Table 2.
Association per Selected Manufacturing Subsector

Subsector	Association
Electronics	Semiconductors and Electronics Industries in the Philippines, Inc.
Consumer Goods	Philippine Chamber of Food Manufacturers, Inc.
	Philippine Food Processors and Exporters Organization
Intermediate Goods	Ceramic Tiles Manufacturers Association
	Cement Manufacturers Association of the Philippines
	Samahan sa Pilipinas ng mga Industriyang Kimika

B. Distribution of the Sample Size, Number of Respondents and Response Rate by Manufacturing Subsectors

Table 3.
Distribution of the Sample Size, Number of Respondents and Response Rate by Manufacturing Subsectors

Subsector	Number of Facilities	Sample Size	Number of Respondents	Response Rate
Electronics	199	31	5	16.13%
Consumer Goods	250	32	3	9.38%
Intermediate Goods (Chemicals, Ceramics)	80	14	3	21%
TOTAL	***529***	***77***	***11***	***14.29%***

The number of respondents and the response rate for each of the manufacturing

subsectors are quite low. This has always been the challenge encountered in employers' surveys despite continuous follow-ups.

C. Challenges and Opportunities

The table below presents the challenges and opportunities in the economic, employment and education areas as perceived by the companies in the Philippine manufacturing sector.

Table 4.
Challenges and Opportunities in the Manufacturing Sector

Areas	Challenges	Opportunities
ECONOMIC	• Global inflation • weak global economy • High prices of inputs • Supply chain costs • Local Sources are abroad • Low minimum wage • High Energy/Electricity Cost • Industry Downturn • Customer over-inventory correction/depletion • Material shortages and supply chain disruptions • Regulatory burdens and bureaucracy	• Tax Holidays during downturn • CHIP Act • Wage increases • Macro-economic recovery and policy reforms • Innovation and digitalization adapting enterprise specific technologies and artificial intelligence in workplaces • Untapped employment potential and affordable labor • Industrial markets including renewable energy, power electronics, wireless technologies, • Electric vehicle and its ecosystem (including start ups)
EMPLOYMENT	• Job Matching • Skills matching/Skills mismatch to manufacturing needs • Higher Than Normal Attrition Rate • Contractualization • Talent shortage/availability • Looking for engineering and IT talent who are interested to work in Cebu • Sector concentration in non-manufacturing such as agriculture • Import dependency on materials and goods reducing local production and employment	• Industry - Academe Linkage • Executive order and Labor policy on contractualization • Brand the companies specially in Cebu through expos for potential talent to be familiarized with the companies • Launch activities to encourage students to take STEM • Integration of local manufacturers into Global Supply Chain • Job creation from approved Investments and upskilled workforce • Promote diversity in STEM

Areas	Challenges	Opportunities
		fields to tap into a broader talent pool
EDUCATION	● Low number of engineering graduates ● Component shortage and supply chain disruptions ● School curriculum is either not updated or aligned with the university standards ● High cost of tuition ● Insufficient Hands-On Knowledge Of New Graduates ● Skills gap and workforce development ● Disparities on access to education and educational resources - economic in nature ● Infrastructure deficiencies such as lack of and/or crowded classrooms ● Poor quality of education i.e., outdated curricula, lack of critical thinking emphasis ● It is difficult to change the curriculum through CHED	● Provide scholarship program focus on Engineering ● Career guidance for Junior High School ● Academe-Industry Partnerships (OJT, Ncg Programs) ● Partnership with universities to develop electives ● Inclusive, diverse and industry-relevant vocational and technical training through industry-academia partnerships and STEM, entrepreneurship/innovation education ● Infrastructure investment including labs, workshops and tech-enabled classrooms ● Curriculum modernization that promote both technical and soft skills development
OTHERS	● Transportation - Too Few Infrastructure Projects To Mitigate Worsening Traffic In Metro Manila And in the South ● Deepening Global Tensions ● Cyber-Security Threats ● Lack of growth mindset in the Filipino workforce	● Increase Government Spending On Modernizing The Electronics Industry, Expansion Of Existing Infrastructures ● Regional Cooperation, Exchange Student, Immersion Programs ● Leverage On Artificial Intelligence Platforms (Ex: Chat Gpt) ● Lifelong learning that encourages continuous learning and upskilling throughout an individual's career.

D. Distribution of employees by employment status (in %)

Table 5.
Distribution of employees by employment status

Employment Status	%
Full time/permanent	55.95
Part-time	22.03
Outsourced	22.03
Total	100.00

Table 5 presents the distribution of employees in manufacturing companies by employment status, with the majority of employees in full time employment. During the validation of results, some companies said that up to 70% of their workers are on regular employment status, and 30% are contractual status.

E. Distribution of employees by employment status and sex (in %)

Table 6.
Distribution of employees by employment status and sex (in %)

Employment Status	%	
	Female	Male
Full time/permanent	14.47	85.53
Part-time	0.00	100.00
Outsourced	12.00	88.00

F. Distribution of employees by subsector, age group and sex (in %)

Table 7.
Distribution of employees by age group and sex (in %)

Age Group	Female	Male	Total
18 to 34	26.23	73.77	100.00
35 to 44	16.93	83.07	100.00
45 and above	11.38	88.62	100.00

Based on the data in tables 6 and 7, it could be seen that the male employees are dominant across employment status and age groups. However, during the validation, the electronics sector mentioned that there are approximately 70 to 80% female and 20 to 30% male employees. The high number of female employees is due to their agility, particularly on the assembly line, while tasks requiring strength, such as lifting, are generally handled by male employees. In the case of an intermediate goods manufacturing company, 60% of their employees are male, and 40% are female.

G. Distribution of Employees by Occupational Type and Employment Status

Table 8.
Distribution of Employees by Occupational Type and Employment Status

Occupational Type	Distribution (%)		
	Full Time (%)	Part-time (%)	Outsourced (%)
Managers	5.93	100.00	0.00
Professionals	16.34	0.00	1.00
Technicians and Associate Professionals	9.82	0.00	0.00
Clerical Support	13.39	0.00	0.00
Service and Sales Workers	4.13	0.00	67.50
Skilled Agricultural, Forestry and Fisheries Workers	0.00	0.00	0.00
Craft and Related Trade Workers	14.17	0.00	0.00
Plant and Machine Operators, and Assemblers	35.83	0.00	0.00
Elementary Occupation	0.39	0.00	31.50
Total	**100.00**	**100.00**	**100.00**

For those in full time employment, Plant and Machine Operators, and Assemblers have the largest share, followed by Professionals, Craft and Related Trade Workers and Clerical Support.

There are only two (2) respondents that have part-times roles in their companies. Those who have part-time roles are in the management positions.

For employees that are outsourced, these are mostly Service and Sales Workers, followed by those in Elementary Occupations.

H. Distribution of Vacancies in the Manufacturing Facilities by Required Educational Qualification

Table 9.
Distribution of the Employees in the Manufacturing Facilities by Highest Educational Attainment

Required Educational Qualification	%
No Level Completed	0.00
Primary Education (Grade 1-6)	0.00
Lower Secondary Education Old Curriculum Undergraduate	0.00
Lower Secondary Education Old Curriculum Graduate	28.40
Lower Secondary Education K-12 Undergraduate	0.00
Lower Secondary Education K-12 Graduate	5.60
Upper Secondary Education Undergraduate	4.00

Upper Secondary Education Graduate	3.00
TechVoc Course Undergraduate	2.60
TechVoc Course Graduate	8.80
College Level Undergraduate	2.60
College Level Graduate	44.60
Master's Degree	0.40
Doctoral Degree	0.00
Total	**100.00**

Table 9 presents the distribution of employees by highest educational attainment. During the validation of the results, one of the responding companies from the intermediate goods subsector said that approximately 40% of their employees are professionals, while the remaining 60% are scattered across various qualifications. This data coincides with the percentage of employees that have college degrees which is at 44.6%.

I. Distribution of Employees by Performance Evaluation (in %)

Table 10.
Distribution of Employees by Performance Evaluation (in %)

Performance Evaluation	%
Able to perform the job but not beyond	63.60
Unable to perform the job	6.00
Have the potential to perform with more demanding duties than they currently have	30.40
Total	**100.00**

In the validation among employer respondents, employers typically do skills gap analysis and training needs analysis in terms of employees' technical and soft skills. The results of these are tied to the respective employee's individual development plans, and employees will undergo training, whether technical or soft skills, in-house or external training, to fill in the gaps. Employers typically allocate a set number of training hours and training budget for each employee.

J. Distribution of Manufacturing Facilities with Underperforming Employees per Reason (in %)

Table 11.
Distribution of Manufacturing Facilities with Underperforming Employees per Reason (in %)

Reason	%
Lack of basic manufacturing skills (e.g. business environment, customer needs, work procedures, use of core equipment etc.	66.67
Lack of specialized technical skills for manufacturing	33.33
Lack of advanced manufacturing skills	33.33
Lack of soft skills (e.g. communication, collaboration and teamwork etc.)	66.67

Reason	%
Lack of socio-emotional skills (e.g. extraversion, emotional stability, agreeableness, grit, consciousness, decision-making, openness, etc.)	100.00
Lack of management and leadership skills	33.33
Lack of language skills (including listening, speaking, reading, and writing skills)	33.33
Lack of office and admin skills	33.33
Lack of digital skills	0.00
Lack of industry specific STEM-related skills/competencies (including problem solving, creativity, inquiry skills, math and science skills, and engineering-design thinking)	33.33

Note: Multiple responses were allowed.

The most common reason for underperformance of employees is lack of socio-emotional skills. This is followed by lack of basic manufacturing skills and lack of soft skills.

K. Percentage of Manufacturing Facilities that have Undertaken Actions or Interventions to Employees with the Potential to Perform More Demanding Duties

Table 12.
Percentage of Manufacturing Facilities that have undertaken actions or interventions to employees with the potential to perform more demanding duties

Response	%
Learning and Development (e.g., training, mentoring, etc.)	80.00
Job reassignments (e.g., job rotation, deployment, etc.)	80.00
Promotion	80.00
Salary Increase	80.00
Other incentives (e.g., travel, etc.)	40.00

The listed actions or interventions for employees with the potential to perform more demanding duties are common to most of the respondents.

L. Distribution of existing job positions by educational attainment policy

Table 13.
Distribution of existing job positions by educational attainment policy

Requirements by Policy (Highest Educational Attainment)	%
No Grade Completed	0.00
Basic Education Graduate (HS Grad Old Curriculum or SHS Graduate K-12 Curriculum)	46.40
Tech Voc Course Graduate	21.20
Higher Education Graduate (Baccalaureate and Above)	32.40
Total	**100.00**

One of the respondents from the intermediate goods subsector mentioned that there are outsourced workers in their companies who are high school graduates, and they perform manual work. TVET graduates are hired by this company to handle automation because they already have the skills or certifications on electromechanical and electromechanics, which is enabled through their dual training system partnership with an accredited private TVET institution.

M. Distribution of existing job positions per specific policy requirements

Table 14.
Distribution of existing job positions per specific policy requirement

Requirements by Policy	%
Induction training of more than two weeks before the post-holder can perform assigned work	41.69
Continuous learning/developmental activities	42.31
At least 3 years of industry-relevant experience to do the job	16.00

During the validation, one of the manufacturing companies said that it is heavily invested in providing internal training to their employees, and an academy to provide continuous training and skills development. This company provides foundational training, including training required by government regulations (i.e. good manufacturing practices, 6S). Soft skills training is also provided depending on the employee's job role such as data gathering or training on small equipment. Regular employees are provided with a Foreman program for the upskilling of the company's operators. In a report by the Bayan Academy, the foreman performs a supervisory role in the manufacturing operations, and the training covers five (5) key areas: Safety and Compliance, Operations, Quality, Critical Thinking, Leadership and People Supervision.

N. Technical Skills

1. Based on the results of the survey, the following job positions are determined to have shortage:

Table 15.
Job positions with shortage by subsector

Electronics	Consumer Goods	Intermediate Goods
● Draftsman ● Programmer ● Production Operator ● Analog/Digital Chip Analyst ● Test Technician ● Electronics/Semiconductor Machine Technician ● 3D Printing Designer (Additive Manufacturing)	● Programmable Logic Controller - Electrical ● Programmable Logic Controller - Programming ● Material Handlers ● Mechanical/Machinist	● Production Operator ● Technical Operator ● Process Technician ● Quality Assurance Technician ● Electrical Instrumentation and Automation Technician ● Maintenance

Electronics	Consumer Goods	Intermediate Goods
● Equipment Technician ● Maintenance Technician ● Failure Analysis Technician ● Manufacturing Technician ● Manufacturing Equipment Technician ● Integrated Circuit (IC) Design ● Programmable Logic Controller ● Mechanical Designer ● End-of-line (EOL) Technician ● Assembler ● Process Technician ● Quality Control Technician ● Machinist		Technician ● Pharmacy Technician[2]

According to an industry representative, each company would have specific training programs for their Production Operator, Production Supervisor and Technical Operator, thus it will be difficult to have a general training program for these job roles. The representative also added that TESDA will do well in developing a program for Electrical Instrumentation and Automation Technician as these courses are already available in institutions like UPSSI, MFI and Dualtech. There is a shortage of this kind of technician in the manufacturing sector as most of the graduates of these programs go to the Power sector.

2. These are the jobs that are difficult to replace according to the respondents:
   a) Technical Experts
   b) Accounting
   c) Marketing
   d) Engineer
   e) Pollution Control Officer
   f) Safety Officer Level III

3. These are the jobs that require Technical Vocational Certificate/National Certificate
   a) Material Handlers
   b) Mechanical/Machinist
   c) Programmable Logic Controller - Electrical
   d) Programmable Logic Controller - Programming
   e) Aircon Technology

[2] This is one of the inputs during the validation which the Pharmaceutical industry is looking into.

f) Refrigeration System/HVAC
g) Senior Industrial Aircon Technology (Knowledge in Chiller)
h) Knowledge in export documentation and regulatory requirements
i) Machine Operators

O. Soft and Essential Skills

The following are the identified soft and essential skills by the survey respondents:

- Problem Solving Skills
- Design Thinking Skills
- Leadership Skills
- Decision Making
- Work Attitude and Value Enhancement
- Critical Thinking Skills, including finding solutions to problems
- Accountability
- Value Creation
- Adaptability
- Collaborative skills, working with others
- Artificial Intelligence trained workers
- Creativity - Thinking outside the box
- Communication - Conveying ideas
- Initiative
- Growth mindset
- Customer-centric
- Entrepreneurship

P. Emerging Skills

1. Fourth Industrial Revolution (4IR)

Table 16.
Emerging skills for Fourth Industrial Revolution by subsector

	Electronics	**Consumer Goods**	**Intermediate Goods**
Emerging skills that are more in demand	• Software or Algorithms and Data Science • Machine Learning • System Design • Data Science (Statistics) • Computer Vision (hardware-related) • Design Automation • Low Power Design • Software applications	• Innovation Professionals • Modeling Simulation	• Innovation Professionals • Modeling and Simulation • Immersive Visualization • AI and Machine Learning Specialists • Data Science and Analysis • New Technology Specialists • Advanced Materials • Additive Manufacturing

	Electronics	Consumer Goods	Intermediate Goods
	development		• Data Visualization • Artificial Intelligence • Cybersecurity • Robotics • Autonomous Vehicles Production • 3D Printing • Sensor Production • Automotive Servicing for Hybrid Vehicles (Hybrid Specialists) • Computer Numerical Control (CNC) Operator and Programmer • MATERIALS PLANNING (ERP)
Emerging skills that are in demand and remain consistent	• Robotics • Firmware Development	• Sales and Marketing Professionals • Artificial Intelligence • Cybersecurity • Sensor Production	• Programmable Logic Controller • Motion Controls • Servo Motors • Computer-Aided Design and Manufacturing (CAD/CAM Operator) • Smart Press Machine Operator
Emerging skills that are remaining consistent while the demand for skills decreases	• Data Annotation	No response	• Sales and Marketing Professionals

2. Other emerging skills

Table 17.
Other Emerging skills by subsector

	Electronics	Consumer Goods	Intermediate Goods
Emerging skills in the new normal	• Internet of Things (IoT) • Cloud Computing • Data Analytics • Data Mining	• Data Analytics • Production Automation	• Internet of Things (IoT) • Cloud Computing • Data Analytics • Production Automation • Web Meeting
STEM (Science, Technology, Engineering, Mathematics) skills	• Research and development	No response	No response

that are more in demand			
Other emerging skills	• Health and safety officer • Waste management officer	No response	• Good manufacturing practices

Q. Readiness for the Emerging Skills

Table 18.
Readiness for the emerging skills by subsectors

Subsector	Percentage of Responses		
	Established plans to address the requirements	Started some initiatives/programs in terms of training and development of the human resource	Started some initiatives/programs for the acquisition of equipment and materials relevant for the requirements
Electronics	35.7	35.7	28.6
Consumer	33.33	33.33	33.33
Intermediate	33.33	33.33	33.33

Note: multiple responses allowed

The share of responses to each of the questions on the readiness of companies for the emerging skills are almost similar across the subsectors.

R. Green Jobs/Skills

Below are the examples green jobs/skills:

- Environment and Occupational Safety and Health Specialist
- Environment and Occupational Safety and Health Team Leader
- Production Processed Engineer - Waste Water
- Waste water treatment
- Waste Management - Recycling and Reuse
- Sanitary Engineer
- Pollution Control Officer
- Safety Officer
- Waste Handlers
- Circularity or how waste can be turned into energy or other more valuable items
- Carbon Accounting
- Sustainability
- Environmental Assessment
- Energy managers
- Energy auditors

According to one of the respondents, there are micro certificate courses that are available on the emerging green skills. He also mentioned that more skilled personnel on the green jobs are needed.

S. Possible Training Providers

- TESDA
- Ask Lex Ph Academy
- Internal Field Experts
- Government Training Programs (Sparta)
- Internal Training Group Of The Company
- 3rd Party Training Providers
- Colleges And Universities
- Companies Who Already Established The Skillset Needed And Is Willing To Share That Knowledge
- Consultancy Firms
- Internal Subject-Matter Experts
- Technology Suppliers
- UP-ISSI
- Tesda, Dualtech
- Online platforms - LinkedIn, Coursera, IBM/Microsoft
- MFI

T. Sub-industry Employment

- Aerospace
- Automotive and Land Transportation
- Chemicals/Plastics/Petrochemicals
- Electrical and Electronics
- Education
- Energy
- Logistics and Warehousing
- Metals and Engineering
- Processed Food and Beverages
- Human Health / Health Care
- Heating, Ventilation, Airconditioning and Refrigeration (HVAC)
- Utilities

V. TVET Capacity

A. The following skills requirements have been identified as having a corresponding TVET program:

Table 19.
Number of Enrolled, Graduates, Assessed and Certified of the Equivalent TVET program: CY 2021 - 2023

Skills Requirement	Corresponding TVET Program	2021				2022				2023			
		Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified
Draftsman	Technical Drafting NC II	2,002	1,955	2,403	2,111	1,515	1,714	3,595	3,094	1,534	1,299	3,394	2,898
Electronics/Semiconductor Machine Technician	Electronics/Semiconductor Production Line Machine Servicing NC III	0	0	1	1	0	0	0	0	0	0	0	0
Material Handler	Warehousing Services NC II	0	0	0	0	13	0	10	10	20	7	67	67
Machinist	Machining NC I	110	106	133	127	103	104	149	148	130	36	265	221
	Machining NC II	613	433	625	612	716	717	1,042	968	896	749	1,206	1,147
	Machining NC III	0	0	0	0	0	0	0	0	0	0	0	0
Electrical Instrumentation and Automation	Instrumentation and Control Servicing NC II	505	617	446	416	556	512	712	662	491	337	613	530

Skills Requirement	Corresponding TVET Program	2021				2022				2023			
		Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified	Enrolled	Graduates	Assessed	Certified
Technician	Instrumentation and Control Servicing NC III	68	44	20	20	0	43	35	35	0	0	0	0
	Instrumentation and Control Servicing NC IV	0	0	0	0	0	0	0	0	0	0	0	0
Total		**3,298**	**3,155**	**3,628**	**3,287**	**2,903**	**3,090**	**5,543**	**4,917**	**3,071**	**2,428**	**5,545**	**4,863**

Source: Enrolled and Graduates - TESDA - ICTO and Assessed and Certified - TESDA Certification Office
Processed by Planning Office

As the table shows, the TVET data provides an overview of the corresponding TVET programs for the listed skills requirements/job positions, including the number of enrolled students, graduates, those assessed, and those certified over the last three years.

In terms of certification rates over the past three years, the average certification rates were as follows:

- Technical Drafting NC II: 86.43%
- Warehouse Servicing NC II: 100%
- Machining NC I: 92.74%
- Machining NC II: 95.31%
- Instrumentation and Control Servicing NC II: 90.90%

For other TVET programs, there have been no recorded enrollments, graduates, assessments, or certifications.

Table 20.
Number of Registered Programs, Assessment Center, Competency Assessors, and NTTC Holders of the Equivalent TVET programs: As of March 2024

Requirement	Corresponding TVET Program	Registered Programs	Assessment Centers	Competency Assessor	NTTC Holder
Draftsman	Technical Drafting NC II	66	54	71	231
Electronics/Semiconductor Machine Technician	Electronics/Semiconductor Production Line Machine Servicing NC III	0	1	0	0
Material Handler	Warehousing Services NC II	1	4	4	6
Machinist	Machining NC I	10	3	6	0
	Machining NC II	30	23	30	124
	Machining NC III	2	1	0	17
Electrical Instrumentation and Automation Technician	Instrumentation and Control Servicing NC II	14	9	15	55
	Instrumentation and Control Servicing NC III	6	3	3	18
	Instrumentation and Control Servicing NC IV	1	0	0	0
Total		**130**	**98**	**129**	**451**

Source: TESDA - Certification Office
Processed by Planning Office

In terms of infrastructure, as of the 1st quarter of 2024, the Technical Drafting NC II program had the highest number of registered programs, with 66. Machining NC programs collectively accounted for 47 registered programs, while Instrumentation and Control Servicing programs spanned 21 registrations. Notably, there are minimal to no registered programs for the Electronics/Semiconductor Machine Technician program.

In terms of assessment centers, competency assessors, and NTTC holders, Technical Drafting NC II had 54 centers, 71 assessors, and 231 NTTC holders. This was followed by Machining NC II and Instrumentation and Control Servicing programs. However, some programs, such as Electronics/Semiconductor Machine Technician, lack assessment centers, competency assessors, and NTTC holders entirely.

Based on the data, Warehousing Services NC II, Machining NC III, Electronics/Semiconductor Production Line Machine Servicing NC III, and Instrumentation and Control Servicing NC IV show a lack of infrastructure. This indicates a need for further development in these areas.

VI. RECOMMENDATIONS/WAYS FORWARD

TESDA, together with the industry, shall facilitate the following activities to ensure the development and delivery of the corresponding programs:

A. Programs recommended for Training Regulations Development:

Table 21.
Programs recommended for Training Regulations Development

Value Chain	Job/Skill
Product and Service Development	Analog/Digital Chip Analyst
Manufacturing	Production Operator*
	Test Technician
	Programmer

The Planning Office shall assist the industry in preparing the presentation for the prioritization of qualifications to the TESDA Board.

B. Programs for Competency Standards Development:

Table 22.
Programs for Competency Standards Development

Value Chain	Job/Skill
Product and Service	Integrated Circuit (IC) Design

Value Chain	Job/Skill
Development	Programmable Logic Controller
	Test Technician
	Mechanical Designer
Manufacturing	3D Printing Designer (Additive Manufacturing)
	End-of-line (EOL) Technician
	Manufacturing Technician
	Manufacturing Equipment Technician
	Assembler
	Failure Analysis Technician
	Process Technician
	Quality Control Technician
Process	Production Operator*
	Production Supervisor
	Technical Operator
	Print Technician
	Quality Assurance Technician
	Chemical Technician
	Programmable Logic Controller - Programming
	Programmable Logic Controller - Electrical
Maintenance and Repair	Equipment Technician
	Maintenance Technician*

*with existing competency framework

Of the abovementioned requirements, the competency framework for Production Operator and Maintenance Technician has been developed through the Advanced Manufacturing Workforce Development (AMDev) Alliance in collaboration among the Massachusetts Institute of Technology Office of Open Learning (MIT-OL), the Center for Integrated STEM Education, Inc. (CISTEM), the AMDev Model Companies, the AMDev Alliance Partners, and government agencies such as the Philippine Trade Training Center (PTTC) and TESDA. The competency framework follows the

template of the Philippine Skills Framework (PSF), which includes the functional and enabling competencies and their corresponding levels for both the Production Operator and Maintenance Technician. The said competency framework can be used as the starting point in the development of competency standards for the said industry requirements.

The Qualifications and Standards Office shall facilitate the necessary activities for the development of competency standards, and the training regulations and competency assessment tools for programs that have been prioritized by the TESDA Board.

C. Increase in TVET Capacity for the following existing TVET programs that are in-demand per industry requirements:

    1. Warehousing Services NC II
    2. Machining NC III
    3. Electronics/Semiconductor Production Line Machine Servicing NC III
    4. Instrumentation and Control Servicing NC IV

To ensure the utilization of the competency standards and training regulations,

1. The Certification Office (CO) shall facilitate the development of Regional Lead Assessors (RLAs), and shall also monitor the program registration under the Unified TVET Program Registration and Accreditation System (UTPRAS).

2. The National Institute for Technical Education and Skills Development (NITESD) shall capacitate individuals and other industry experts to be Regional Lead Trainers (RLTs) for the programs to be developed in partnership with the AMDev.

3. The Partnerships and Linkages Office (PLO) shall forge partnerships with the AMDev member companies and associations so that they can serve as experts in the development of the training programs, and also register as training providers for the said programs.

4. The ROPOs shall be responsible for the facilitation of the registration of the CS/TR in their respective operating units, while the Training Providers shall register and implement the training programs for the Manufacturing sector.

D. The industry alliance should recognize the developed training programs by utilizing and integrating them into their operations to ensure compliance with industry standards and best practices. The alliance should allow its workers to undergo training and certification to be accredited trainers.

VII. REFERENCES

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