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**TỔNG CỤC GIÁO DỤC NGHỀ NGHIỆP**  
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# Future Logistics and the Reliance on Digital Skills

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AUS4SKILLS

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## Abbreviations

ASEAN	Association of Southeast Asian Nations
CBTA	Competency-based Training and Assessment
DFAT	Department of Foreign Affairs and Trade (Australia)
DVET	Directorate of Vocational Education and Training (Vietnam)
GEDSI	Gender Equality, Disability and Social Inclusion
GoV	Government of Vietnam
HCMC	Ho Chi Minh City
HRD	Human Resource Development
LIRC	Logistics Industry Reference Council
MOLISA	Ministry of Labour, Invalids and Social Affairs (Vietnam)
OPD	Organisation of People with Disability
PWD	People with Disability
RD	Disadvantaged rural
VCCI	Vietnam Chamber of Commerce and Industry
VET	Vocational Education and Training

## Introduction

The Logistics Industries in both Australia and Vietnam are expected to grow significantly in the next six years. The industry in Australia is predicted to grow by some 26% by 2029 and the industry in Vietnam is predicted to grow by some 44% in the same period. Predictions for the logistics industry in both countries are shown in the table below<sup>1</sup>:

		Australia	Vietnam
Expected Market Size	2023	\$89.86 b USD	\$45.19 b USD
	2029	\$113.94 b USD	\$65.34 b USD
Compound Annual Growth Rate	2023 - 2029	4.04%	6.34%
Total expected Growth	2024 - 2029	44.60%	26.80%
Logistics as percentage of GDP	2023	8.60%	4.65%

Table 1 Logistics Growth

There are many challenges facing the logistics industry in the near future and these need to be addressed to meet the expected market increases. These challenges include population growth, an ageing workforce, workforce retention, staff and skills shortages and the changing customer needs and wants.

### Logistics Challenges

#### Population growth

Australia's population is expected to grow from 26.47 million people in 2023 to an expected 30.26 million people in 2029, an increase of 14.3%. At the same time, Vietnam's population is expected to increase from 98.85 million people to 102 million, an increase of 3.2%. As can be seen from the Table 1 above, the growth in logistics is significantly outstripping the population increases in both countries.

#### Ageing workforce

Over the past two decades, the share of workers 55 and older has almost doubled, increasing from 13% in 2000 to 23% in 2021. The Australian Bureau of Statistics projects this growth will continue and, by 2031, fully one quarter of the labour force will be 55 years or older.<sup>2</sup>

#### Workforce retention

Workforce retention is reported as a challenge, particularly for manual intensive roles that are usually undertaken by a younger workforce who are embracing casual arrangements and not seeing opportunities for career development in the sector. This is having a significant impact on logistics resources and productivity through the need to continually induct and train new staff.

#### Staff and Skills shortages

Staffing shortages were one of the three top challenges for businesses; the others being inflation and supply chain disruptions. According to the Australian CEO Survey undertaken by the Australian Industry Group in 2023, staff shortages are bad, and are getting worse, finding that:

- 90% of businesses expect to be affected by staffing shortages in 2023,

<sup>1</sup> Mordor Market Intelligence Logistics Report July 2023 (www.Mordorintelligence.com)

<sup>2</sup> Australian Bureau of Statistics 2023

- 36% of businesses report that skills shortages will inhibit their business growth, and
- 26% say that total labour shortages – both skilled and non-skilled – would inhibit growth.

#### Staff Turnover

In 2019 the Australian logistics workforce totalled 575,000 with an annual turnover of 8.5% or 48,900 people.<sup>3</sup> Considering that the cost of employing a new operator is in the vicinity of 50% of the annual wage (when recruitment, administration, loss of productivity are taken into account), reducing the turnover rate to an industry acceptable standard of 4%, has the potential to save the Australian logistics industry some \$1.445b AUD per year.

#### Customer Needs and Wants

Customer demand changed significantly during the COVID pandemic with customers switching to on-line sales in preference to traditional buying at physical stores. With this change came a demand for smaller orders delivered faster and cheaper. The B2C market in Australia is expected to reach \$56.5b AUD in 2023 and rise to \$82.1b AUD in 2027.<sup>4</sup> Moving more to B2C is generating a demand for a greater number of small orders, delivered faster and cheaper.

#### How to fill the Gap

The gap in meeting future logistics needs can be filled by the adoption of automation to support operations and through the development of digital skills.

## Future Logistics Technologies

#### Automated Guided Vehicles

Automated Guided Vehicles (AGVs) in logistics are predominantly driverless forklifts that operate automatically to lift and transport goods. AGVs can only drive on a set route defined by Wire Guidance, Magnetic spots or Laser Guidance technology. AGVs will stop when an obstacle blocks their path and will wait for the path to be cleared,



AGV Types – Narrow Aisle Turret Truck, Reach Truck, Pallet Transfer Truck

#### Autonomous Mobile Robots

Autonomous Mobile Robots (AMRs) move autonomously using maps that are normally uploaded to the AMR, which allows them to move through their environment in ‘real time’. With an array of on-board sensors and digital warehouse maps, AMRs will independently

<sup>3</sup> AIS Logistics Report 2019

<sup>4</sup> Statista Market Research 2023 <https://www.statista.com/outlook/dmo/ecommerce/australia>

detect obstacles and avoid them. If an AMR encounters an obstacle, it will first calculate if there is sufficient room to safely pass, if not, the AMR will select the next shortest route to its destination.



AMRs



AMR Carton Transfer Unit

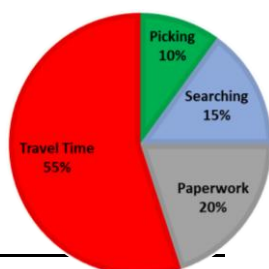
In 2023, the Australian workforce stands at some 13.88 million<sup>5</sup> and by 2034, automation is expected to displace some 2.7m workers, and technology to augment 4.5m workers roles<sup>6</sup>. The global outlook is similar and will also impact Vietnam’s workforce of 55 million.<sup>7</sup>

Already automaton is doubling, and in some cases, tripling the picking productivity in warehouses. Unlike humans, automated machinery does not have the ability to examine a process and determine if an error has been made or if there is a more efficient process. For example, if a carton falls off an AMR, operators are not present to correct the issue. In this case, operators need to be continually monitoring the AMR control system to identify and correct any abnormalities. Failure to identify and take immediate action can cause significant disruption to the operation. In the above example of a carton falling off an AMR, in a high-volume operation AMRs may present 210 products to pickers every hour. With eight pickers this equates to 1,680 presentations per hour. If the anomaly of AMRs manoeuvring around the dislodged carton isn’t detected for an hour, and the AMRs are delayed by three seconds per presentation, the operation will suffer up to 1.5 hours of disruption.

Therefore, Problems need to be addressed and resolved quickly to ensure the continued successful operation of all automation to ensure the Seven Rs of logistics are maintained: Right product, Right Customer, Right Quantity, Right Condition, Right Place, Right Time and Right Cost.

The main purpose of this type of automation is to reduce the non-value-added time taken by operators to simply move product from one point to another. In a traditional manual operation, pick operators normally spend 55% of their time travelling and only around 10% of their time picking. By introducing automation to bring product to pickers or for AMRs to work alongside pickers, the time for picking can be increased three or four-fold, as shown in the charts below:

Manual Pick



Automated Pick



<sup>5</sup> Australian Bureau of Statistics March 2023

<sup>6</sup> Australian Digital Transformation Expert Panel February 2021

<sup>7</sup> World Bank 2021

**Table 2 Manual Pick Operation v Automated Pick Operation**

Automation has the potential to significantly increase logistics productivity and reduce costs however, to achieve the desired outcomes, the systems need to be constantly monitored and interrogated to reduce the likelihood or impact of any disruptions. To reduce the risk of disruption and to ensure maximum efficiency, digital skills are required to be embedded into the workforce.

## Digital Skills

### Digital Literacy Definition

Digital literacy covers the physical operations of digital devices and the software operations in those devices (UNESCO, 2018). It incorporates the ability to search and navigate, create, communicate and collaborate, think critically, analyse information, and address safety and wellbeing using a variety of digital technologies. These skills are essential for individuals to participate effectively in today's society. Digital literacy skills exist on a continuum with varying degrees of competency required depending on the context (personal and community; workplace and employment; education and training) within which the skills are applied.<sup>8</sup>

### Digital Skills

The Australian Governments Digital Economy Strategy 2030 reported that 87% of jobs, across all industry sectors now require digital skills.<sup>9</sup> These digital skills and capabilities include virtual warehouse mapping, developing workflows and process maps, monitoring automation reporting and outputs, Warehouse Management System configuration, data collection, real-time monitoring and management of resources, and the list goes on.

Australia has developed a Australian Digital Capability Framework (ADCF) that describes the generic digital capabilities required in occupations related to Australian Vocational Education and Training (VET) qualifications. The Framework provides a common language that can be used by employers, employees and students, training product developers, VET professionals and policymakers to describe these generic digital skills, to identify where they are needed in different occupations (and the associated VET qualifications) and where there are commonalities across occupations.<sup>10</sup>

This framework development was led by Australian Industry Standards and input was provided by employers, employees, students, training product developers, VET professionals, policy makers and several Industry Reference Committees including Sustainability and Transport and Logistics.

The ADCF describes the broad digital capabilities required by workers across a wide range of Australian occupations and industries. The ADCF has been validated using occupations that require VET qualifications and comprises five focus areas:

1. Information and data literacy,
2. Communication and collaboration,
3. Digital content creation,

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<sup>8</sup> Draft Digital Literacy Skills Framework April 2020

<sup>9</sup> Productivity Commission, 5 year productivity enquiry August 2022

<sup>10</sup> © Australian Industry Standards Limited, Digital Capability for Workforce Skills Final Report 2022

4. Protection and Safety, and
5. Technical proficiency and problem solving.

The ADCF along with the User Guide and Digital Occupational Profile is currently housed on the Australian Industry Skills website: <https://www.industryskillsaustralia.org.au/workforce-projects>.

### Role of Education in Digital Skills Training

Developing new skills in older and semi-skilled workers tends to present the greatest source of resistance to new technologies and the rapid change to their way of working. The challenge with a continually aging workforce is how to have the various cohorts willingly adopt the new technology and understand the benefits that these changes will bring.

The main role of education in Digital Skills training is to establish robust partnerships with industry to develop and implement timely and responsive digital training. Firstly, education and training needs to strategically review all training packages against the needs of Digital Transformation to identify:

- new skills required by the current technologies being adopted,
- where current skills need to be revised to accommodate current technologies and the pathways to reskilling,
- where skills need to be strengthened, and
- how to recognize and establish portable skills.

The second role of education and training is to understand:

- New and emerging technologies that are being adopted or being contemplated by industry,
- The impacts of new and emerging technologies on industry and the workforce,
- What industry needs in relation to new training requirement and existing training that needs to be adapted to accommodate new and emerging technologies,
- Develop training packages to deliver training while new technologies are adopted, and
- How to reduce the lag between the time when new technology has been identified and when new training requirements can be delivered to industry.<sup>11</sup>

Area 5 of the ADCF focuses on technical proficiency and problem solving, and includes the identification and resolution of problems. Therefore, VET cannot consider digital skills training in isolation and must also consider training and upskilling industry in the practices of monitoring performance and problem solving.

## Problem Solving and Monitoring Performance

Digital education is not just the provision of digital competence eg programming and monitoring, and also needs to include topics such as:

- Fault finding,

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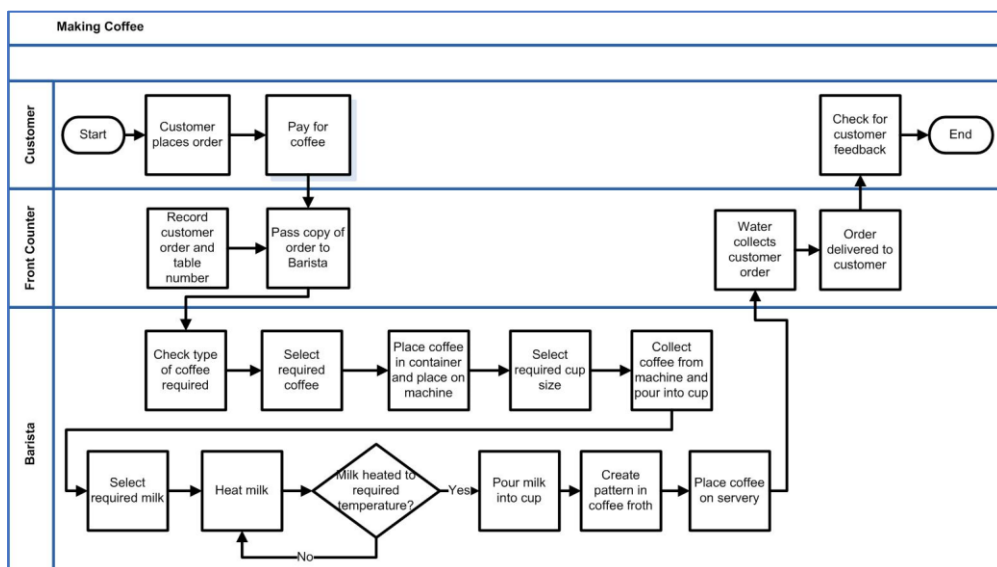
<sup>11</sup> Digital Capability for Workforce Skills presentation 2022

- Problem solving,
- Business continuity planning,
- Innovation, and
- Analysis and Analytics.

With the introduction of automation and technology, employers will no longer have the luxury of operators identifying problems and reporting issues for correction. Therefore, operators will need to continually monitor and interrogate systems to identify potential and actual faults. Industry also needs to identify ‘Lead’ Indicators to identify potential problems – the aim is to avert problems. The main problem solving and monitoring tools that need to be included in conjunction with digital skills training are process mapping, cause and effect and charting techniques.

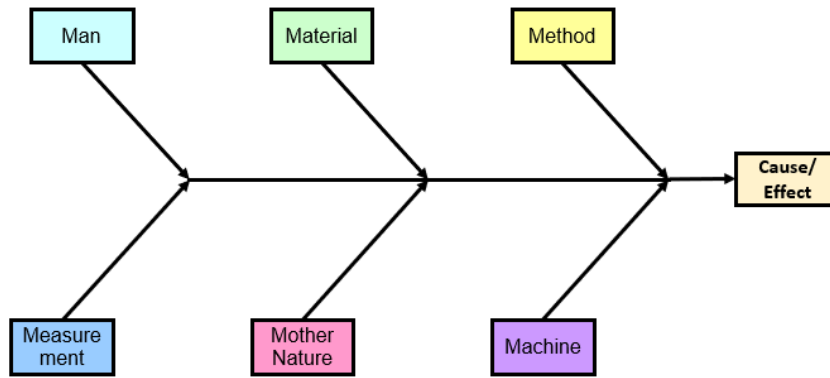
### Process Mapping

The adage of ‘garbage in – garbage out’ still holds true today. Many businesses don’t have any formal processes to guide their employees, and many have rudimentary processes that are dated or do not reflect current practices. Few have efficient practices that can be used to train staff, or to ensure an efficient and effective operation. All too often outdated processes are ignored or overlooked, and there are many workarounds that are used to complete tasks. Unfortunately, these workarounds vary from employee to employee so trying to find a root cause can be quite daunting to near on impossible. A sample process map is shown below.



### Cause and Effect

The Cause and Effect (or Ishikawa) diagram is essentially a problem solving tool that helps to identify the causes of variation for a given problem, or the desired effect. The diagram is an excellent tool that is used to graphically link the causes to the end effect, and provides a basis for taking action. The standard layout for a Cause and Effect diagram is shown below:

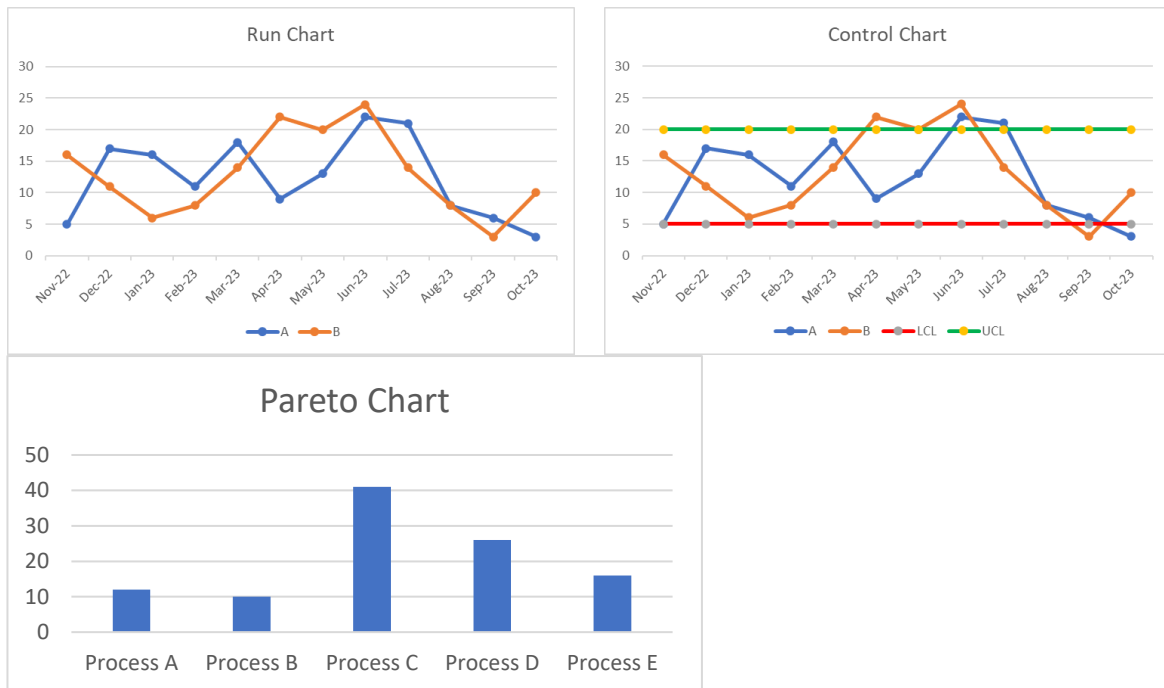


**Table 3 Cause and Effect (Ishikawa) Diagram**

### Systems Monitoring

The main systems monitoring tools are run charts, control charts and Pareto charts. A run chart is the simplest of charts which use a line, or lines to plot a value over time. A run chart can help identify upward and downward trends and it can show a general picture of a process. Control charts include upper and lower control limit lines that are based on the data being plotted. Data points within the control lines are considered to be ‘in control’ whereas data points outside the control lines show that a process may not be stable, and that corrective action may be required.

A Pareto chart is a bar chart that is based on the 80/20 rule. The pareto principle is that for many events, some 80% of the effects are generated by 20% of the causes. The Pareto chart simply identifies which causes have the greatest impact and should be actioned first. Examples of these charts are shown below.



## Sustainability

Automation and the implementation of digital skills have the potential to provide significant benefits, particularly to the logistics industry. However, with these efficiencies come the added benefits of a reduction in the environmental impact of the industry. The major environmental benefits are through a reduction in fuel consumption, the benefits of lithium batteries and lighting.

The introduction of Euro engine emission standards to reduce the emission of nitrous oxides and carbon dioxide have significantly reduced vehicle sourced pollution.

Some Australian transport companies have reportedly reduced emissions by up to 40% in the last six years.



Due to their longer operating life, lithium-ion forklift batteries offer substantial resource savings across their life. Some of the ways they contribute to resource savings are as follows:

- With highly efficient charging lithium-ion batteries less energy is needed to charge when compared to lead acid batteries.
- Lithium-ion forklift batteries have an operational life time that is often two to three times longer than lead acid batteries. The longer operational life offers a significant resource savings across its life as replacement batteries do not need to be purchased as often, reducing the overall amount of resources consumed.
- The ability to be able to opportunity charge lithium-ion forklift batteries is perhaps the most significant advantage they hold over lead acid counterparts. Short charge burst when time permits greatly contributes to the length of time the forklift can be operated.
- lithium-ion batteries keep a constant voltage level during their discharge cycle. This can equal 50% savings in energy compared to lead-acid.

AGVs and AMRs do not require lighting for their operation. Therefore, only those areas where people operate need to be lit, leading to a large reduction in the power required to illuminate a building.

## Summary

The logistics industry is set to grow considerably over the next six years and is forecast to significantly outstrip the population growth. The logistics market over the next six years, is expected to grow by some 44% in Australia and by 26% in Vietnam. In the same period, the population is expected to grow by 14% in Australia and 3.2% in Vietnam. There has also been a change in the needs and wants of customers who have refocused logistics more into B2C models that see customers ordering lower quantities more often, and are demanding faster and more flexible delivery options.

There are many challenges facing the logistics industry including an ageing workforce, staff and skills shortages, staff turnover and an industry where the increasing volume is outstripping the population growth necessary to provide future resources. A solution to offset

many of the challenges, to a large extent is automation, and with this technology comes the need for digital skills to manage technology and to interrogate systems to increase productivity and avoid disruption.

Australia has developed and adopted the ADCF which describes the broad digital capabilities required by workers across a wide range of Australian occupations and industries. The ADCF has been validated using occupations that require VET qualifications and comprises five focus areas:

1. Information and data literacy,
2. Communication and collaboration,
3. Digital content creation,
4. Protection and Safety, and
5. Technical proficiency and problem solving.

The main role of education in Digital Skills training is to establish robust partnerships with industry to develop and implement timely and responsive digital training. Education and training providers need to strategically review of all training packages against the needs of digital transformation for new and emerging technology, and how to develop and deliver these new skills in a timely manner to meet the implementation of the new technology.

Area 5 of the ADCF focuses on technical proficiency and problem solving, and includes the identification and resolution of problems. Therefore, VET cannot consider digital skills training in isolation and must also consider training and upskilling industry in the practices of monitoring performance and problem solving.

Performance monitoring and problems solving tools that need to be included in training to maintain productivity and minimise disruption are process mapping, cause and effect diagrams, run charts, control charts and pareto charts.

The shift to automation, supported by an increase in digital skills also has the added benefit of reducing the impact on our environment. Vehicle engines have become more efficient, battery technology has improved significantly and automation technology generally uses much less power for their day-to-day operations. These advances in technology reduce both the harmful emissions and the reliance on resources.

## **Conclusion**

Logistics has many challenges that need to be overcome to meet the future needs of the industry and its customers. However, through the adoption of automation and the development and implementation of digital skills to support the new technology, future logistics and changing customer needs will be met without an increase in resources.

## **Bibliography**

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