Maritime Technology and Research

https://so04.tci-thaijo.org/index.php/MTR

Research Article

Employability skills of maintenance technicians in container ports: Implications for maritime technical and vocational education and training

Harsha Fernando and Vathsala Wickramasinghe*

Department of Management of Technology, University of Moratuwa, Moratuwa 10400, Sri Lanka

Article information

Received: January 4, 2024
Revision: March 7, 2024
Accepted: April 8, 2024

Keywords
Container ports,
Employability skills,
Maritime education and training,
Technical and vocational education and training

Abstract

The study investigated the employability skills of maintenance technicians engaged in container ports in Sri Lanka. The specific objectives were to investigate 1) employability skill gaps between technicians' evaluations of the level of current possession and the expected level to be possessed for the current job tasks, 2) employability skill gaps between technicians' evaluations of the expected level of skills for current job tasks and immediate superiors' evaluation of the importance of the same for current tasks, and 3) maintenance technicians' exposure to skill development strategies after joining the respective container port terminals. The study was conducted in the two main container ports of Sri Lanka- Colombo and Hambantota. Responses were pooled from two independent sample groups- maintenance technicians and their immediate superiors. Maintenance technicians had graduated from technical and vocational education and training institutions with levels 3 or 4 National Vocational Qualification. Findings identified employability skill preferences of maintenance technicians and their immediate superiors, which led to possible skill gaps. The findings highlight the importance of TVET institutions identifying the preferences of business sectors, they should be prepared to impart employer-preferred skills to their trainees and to bridge any gaps in expectations. This will lead employees to develop realistic expectations of employer preferences. Hence, the findings of the study have implications for technical and vocational education and training institutions, students enrolled in these institutions, employees engaged in container ports, and their employers.

1. Introduction

Employability skills include technical skills, non-technical skills, and personal qualities that enable any person to be employed the first time, remain in that employment, and obtain new employment, or move between different roles in the same employment, if required. Employability skills are also referred to as generic, key, core, and basic skills, or as workplace know-how and essential skills (Gibb & Curtin, 2004). Employability skills have many perspectives, since these are important and of interest to many parties/stakeholders such as employers, employees, students, and education institutions (Tymon, 2013). Employers are very much interested in employability skills, since possession of these skills is directly related to employees' job task performance, and so employers can benefit from not being required to provide additional training on employability skills (Detsimas et al., 2016; Mahajan et al., 2022; Saunders & Zuzel, 2015). Knowing and acting on

*Corresponding author: Department of Management of Technology, University of Moratuwa, Moratuwa 10400, Sri Lanka
E-mail address: vathsala@uom.lk

developing employability skills increases the chances of employees maintaining and growing in their employment. If developed during tertiary education, students have chances to secure better employment once they enter the job market for the very first time (Oresanya et al., 2014; Scott & Willison, 2021).

The literature provides evidence for differences in the expectations of employability skills between job seekers of entry-level job positions and the employers who are interested in hiring them (Collet et al., 2015; Islam et al., 2015; Sri Lanka ICT Association, 2013; Wickramasinghe & Perera, 2010). Such differences or employability skill gaps have consequences for potential job seekers, employers, and training institutes. An employee with skill deficiencies receiving a job offer, and an employer hiring an individual without the required skill set, are rare occurrences. Therefore, it is important for job seekers to know the skill expectations of the workplaces to which they are applying (Hollister et al., 2017; Puwakgahawela et al., 2023). Skill gaps suggest difficulties in placing prospective employees in employment in the relevant fields; if an employee manages to secure employment, it is possible to assume an increase in the costs of the employer in order to train this newly hired personnel. Therefore, to obtain employment, prospective employees should develop the required employability skills during their studies at technical and vocational education and training (TVET) institutions. Hence, TVET institutions assume a greater role in imparting appropriate employability skills to trainees during the study program. In this regard, employers, employees, TVET institutions, and prospective employees should understand employability skill requirements for a particular industry sector. Without a proper understanding of preferred skills, training institutions are unable to incorporate these into the curriculum to prepare career-ready graduates, and to make their programs current and up to date in responding to labor market requirements (Byrom & Aiken, 2014; Mahajan et al., 2022; Scott & Willison, 2021).

In the above context, it is important to understand expectations of potential job seekers and employers on employability skills, and to identify whether there are any employability skill gaps in the evaluations of potential job seekers and employers. Only then can steps be taken to reduce such employability skill gaps. The present study was designed to investigate the employability skills of maintenance technicians engaged in container port terminals. Although the literature provides evidence for employability skill gaps (such as Collet et al., 2015; Hollister et al., 2017; Puwakgahawela et al., 2023; Wickramasinghe & Perera, 2010), no studies have been found that investigated the context of personnel engaged in ports. Therefore, the specific objectives of the study were to investigate 1) employability skill gaps between technicians' evaluations of the level of current possession and the expected level to be possessed for the current job tasks, 2) employability skill gaps between technicians' evaluations of the level of expected level of skills for current job tasks and immediate superiors' evaluation of the importance of the same for current tasks, and 3) maintenance technicians' exposure to skill development strategies after joining the respective container port terminals. For the study, two independent samples were taken into consideration- maintenance technicians and their immediate superiors. Therefore, the study hypothesized that differences may exist between the preferences of maintenance technicians and their immediate superiors, since it is possible for each party to give priority to different employability skills, implying that they are not on the same page on this issue. In the study, a maintenance technician is identified as a person who plays a vital role in any industry by performing a variety of tasks like maintaining, troubleshooting, installing, and repairing highly diversified equipment, machinery, and facilities, according to the predictive and productive maintenance requirement, in a safe and standard manner to achieve the organization's business goals (Employeepedia, 2023). The study was carried out in the two container ports operating in Sri Lanka- Colombo port and Hambantota port. Of these, Colombo port is identified as a large port (with more than four million twenty-foot equivalent units per year) and is ranked 28th place out of 348 global container ports (The World Bank, 2023); the World Shipping Council ranked the Colombo port at 25th place (World Shipping Council, 2023). These rankings are impressive since none of the other container ports in South Asia have surpassed the ranking of the Colombo port.

Hambantota port is the second-largest container port in Sri Lanka (Kavirathna et al., 2021). The main sample of the study consisted of maintenance technicians with National Vocational Qualification (NVQ) levels 3 or 4 (= full national craftsmanship) from technical and vocational education and training institutions in the country.

It is expected that the findings of the study will be valuable in identifying how employability skills were perceived by maintenance technicians and their immediate superiors. Priority differences in employability skills between employees and employers provide maintenance technicians with valuable information on highly sought-after employability skills that they should concentrate on to be successful in their chosen careers in container ports. TVET institutions could have insight into sector-specific employability skills preferred by employers, which should be incorporated into the curriculum. Further, the findings could provide valuable information on skill development strategies used by employers after hiring maintenance technicians to bridge any employability skill gaps. Finally, we have not come across studies that investigated employability skill requirements for maintenance technicians engaged in container ports, which could have important implications for maritime education and training initiatives. Therefore, the findings could be of interest to a broader community comprised of researchers, practitioners, and policymakers as well.

The paper is organized as follows. The next section reviews the literature with direct relevance to the scope of the study. This is followed by the methodology used for the study. After the presentation of the findings, the last section discusses the contribution of the study and implications.

2. Review of literature

2.1 Employability Skills

The literature provides evidence for studies conducted to identify employability skills in general or for specific industry sectors or study fields (Andrews & Higson, 2008; McGunagle & Zizka, 2020; Ng et al., 2021; Puwakgahawela et al., 2023; Shah et al., 2015; Tomlinson, 2012). However, there is no pre-agreed "specific" or "exact" set of employability skills. The National Research Council (2012) identifies complications in recognizing the most important employability skills due to the availability of a vast number of employability skills. Hence, the National Research Council (2012) highlighted the value of identifying employability skills specific to study fields. For example, Wickramasinghe and Perera (2010) identified the importance of self-confidence, teamwork, positive attitude, problem-solving, and creativity for entry-level undergraduates in the study field of computer science. Today, emphasis is increasingly on identifying employability skills under broad categories specific to industry sectors or study fields. For example, Puwakgahawela et al. (2023) identified 31 employability skills, which were broadly categorized into cognitive, intrapersonal, and relational skills that are valuable for information technology graduates seeking entry-level jobs. Saunders and Zuzel (2015) identified 36 employability skills under three categories of personnel qualities, core skills, and subject knowledge for biomolecular science. In support of specific employability skills for different study fields, Scott and Willison (2021) emphasize the importance of addressing an individual study field's specific requirements if using centralized employability skill development subject modules within a university.

2.2 Different perspectives- employability skill gaps

The literature provides evidence for differences in the perceptions of students/employees, education institutions, and employers in their evaluations of the priorities of employability skills (for example, Collet et al., 2015; Hollister et al., 2017; Puwakgahawela et al., 2023; Wickramasinghe & Perera, 2010). In other words, there are differences in employability skills that students/employees, employers, and education institutions value which are brought to the workplace.

The literature provides evidence for studies that investigated employability skill gaps. For example, Collet et al. (2015) identified employability skills gaps between preferred and possessed levels through the eyes of CEOs and senior managers of the Australian innovation and

commercialization sector. Islam et al. (2015) identified significant employability skill gaps between entry level graduates' assessments of self-rated capability levels and the employers' level of expectations, where the expectations gap is calculated through mean differences. According to Islam et al. (2015), the largest gap existed for decision-making skills, whereas the smallest gap existed for communication skills. In the Sri Lankan context, the Sri Lanka ICT Association (2013) identified a mismatch of employability skills in demand and supply, where employers identified job seekers possessing more less-demanded skills and not possessing more-demanded skills by the industry. Further, Wickramasinghe and Perera (2010) showed evidence of significant gaps between employer expectations of employability skills and entry-level graduates' capabilities of the same. Puwakgahawela et al. (2023) identified differences in priorities given for employability skills required from information technology graduates across students, employers, and university academics. Although identifying employability skills under broad categories is useful, the National Research Council (2012) suggested that broad skill descriptors need to be identified at the level of skill elements to effectively address the employer needs.

The existence of skill gaps has consequences for potential job seekers, employers, and training institutions. According to Wickramasinghe and Perera (2010), skill gaps have implications for potential job seekers in finding relevant job positions, for employers by increasing the training budget for newly hired employees if personnel were hired with insufficient skills, and for education and training institutions by questioning the contributions of their existence. As per Islam et al. (2015), it is important for higher education institutions to produce graduates with improved skill levels and reasonable expectations. In this regard, Brooks and Everett (2008), Fletcher-Brown et al. (2015), Jusoh et al. (2011), and Lim (2015) emphasized the need of addressing employability skill gaps using training interventions. For example, Lim (2015) highlighted the importance of incorporating employability skills into program curriculum. In a similar vein, the Ministry of Higher Education Malaysia (2012) highlighted that skill gaps can also be addressed to a certain extent through work-based experience and volunteer assignments at industry establishments during study programs.

2.3 Hypotheses

The present study is bult on previous studies that emphasized the importance of investigating perceived gaps between students' supply of employability skills and employers' demand for the same, such as McGunagle and Zizka (2020), Ng et al. (2021), Puwakgahawela et al. (2023), and Wickramasinghe and Perera (2010). However, previous studies have not been found with the scope of the present study. Based on the above reviewed literature, this study is, therefore, aimed at investigating any differences in the expectations of maintenance technicians' and their port sector employers. It is argued that maintenance technicians' and employers' preferences for employability skills could vary. In other words, differences may exist in employers' preferences (demand) for employability skills and maintenance technicians' supply of the same- each party gives priority to different employability skills, implying they are not on the same page when it comes to their priorities for employability skills. Therefore, it is first hypothesized that differences could exist between maintenance technicians' evaluations of the level of current possession of employability skills and the expected level to be possessed of the same. Second, it is hypothesized that differences could exist between maintenance technicians' evaluations of the expected level of employability skills for the current job tasks and immediate superiors' evaluation of the importance of the same for the current tasks.

3. Method

3.1 Sample

Three main commercially operating container terminals of Colombo port and one terminal in Hambantota port were taken into consideration. The study was designed to have two independent samples- maintenance technicians and their immediate superiors. By the time of the study, there were

a total of around 600 maintenance technicians engaged in these terminals. When selecting the sample of maintenance technicians, their qualifications were taken into consideration. In 2004, the Tertiary and Vocational Education Commission of Sri Lanka introduced a National Vocational Qualification (NVQ) framework to standardize the national vocational education system. NVQ levels 2 to 4 have been categorized as technicians or skilled craftsmen level. It is mandatory to have on-the-job apprentice training to obtain NVQ level 3 and 4 qualifications (Tertiary and Vocational Education Commission, 2016). The study was confined to maintenance technicians with NVQ level 4 qualifications. The authors identified 160 maintenance technicians using convenience and snowball sampling methods, and their immediate superiors, for the data collection. At the end of the data collection, valid responses were received from 133 maintenance technicians and 42 immediate superiors. Maintenance technicians belonged to six job categories- mechanical, electrical, air conditioning, information technology, welding, and plumbing, with mechanical and electrical maintenance technicians dominating the sample (over 65 %). More than 50 % of the respondents obtained their qualifications from TVET institutions located in the western province, which is the commercial hub of the country. Respondents' ages ranged between 23 to 55 years, having 34 as the mean age. The average total work experience was 12 years, while the average total work experience in ports was eight years. Concerning the respondents' immediate superiors, the average number of maintenance technicians supervised was 17. The average total work experience was eight years, while the average total work experience in ports was five years. All the respondents belonging to the two groups identified themselves as male.

3.2 Measures, method of data collection, and methods of data analysis

After a rigorous review of literature and practitioner views, forty employability skills important for maintenance technicians engaged in container port terminals were identified under six categories, namely, cognitive skills- listening and communication, cognitive skills- thinking, cognitive skills- capability, relational skills, intrapersonal skills, and technical skills. This list of skills was used to investigate maintenance technicians' views on the level of current possession of each skill and the expected level to be possessed, as well as immediate superiors' views on the importance of each skill for the technician in question for their current job tasks. The skill levels were evaluated on a five-point scale (1 = very low to 5 = very high). The immediate superiors were also asked suggest any employability skills which, in their opinion, will be important for the next few years, which were not included under the 40 skills mentioned above. Additionally, maintenance technicians were asked about skill development strategies used by their port sector employers to impart employability skills after they obtained employment in the container port terminals. For this purpose, 10 types of skill development strategies were listed on a five-point scale (1 = never used to 5 = very highly used).

Regarding the method of data collection, two separate self-administered questionnaires were developed to collect the data from maintenance technicians and their immediate superiors. The maintenance technicians' questionnaire comprised three parts, in addition to the section on demographic characteristics- the level of current possession of each skill for current job tasks, the expected level to be possessed for current job tasks, and skill development strategies they were exposed to after joining the container port terminal. The immediate superiors' questionnaire comprised two parts, in addition to the section on demographic characteristics- the importance of each skill for the technician in question for their current tasks and important skills for the next few years, which had not already been identified. A contact person was identified at each port terminal. The first author of the article, together with the contact person, distributed the survey questionnaires.

Regarding methods used for data analysis, two main methods were used to evaluate differences in the perceptions of the two groups, i.e., independent sample t-test and paired sample t-test. Factor analysis was used to better understand skill development strategies. These methods were used in addition to descriptive statistics.

Table 1 Maintenance technicians- current and expected levels.

	Current possession Mean	Expected for current job tasks Mean
Cognitive skills- listening and communication:		
Reading	3.045	3.827
Written communication	3.075	3.797
Active listening	3.038	3.500
Oral communication	2.909	3.378
Cognitive skills- thinking:		
Creativity	3.406	3.859
Decision making	3.353	3.758
Ability to visualize	3.008	3.391
Adaptive learning	2.962	3.344
Reasoning/argumentation	3.068	3.461
Cognitive skills- capability:		
Time management	3.333	3.848
Cost consciousness /manage costs	3.303	3.540
Manage materials/facility resources	3.235	3.603
Manage personnel	2.931	3.198
Manage/mitigate risks	3.106	3.802
Relational skills:		
Working as a team member	3.519	3.920
Learning and sharing with others	3.271	3.654
Customer focus in daily work	3.144	3.370
Demonstrate leadership in daily work	3.353	3.778
Negotiation	3.316	3.492
Appreciation of diversity	3.241	3.575
Intrapersonal skills:		
Ability to take responsibility	3.594	3.929
Self-confidence	3.759	3.953
Sociability	3.474	3.583
Self-management	3.481	3.693
Honesty/integrity	4.599	3.929
Adaptability and flexibility	3.523	3.680
Ability to work without supervision	3.386	3.709
Managing multiple priorities	3.136	3.575
Workplace health and safety	3.481	3.938
Commitment to own work	3.526	3.696
Punctuality	3.647	3.889
Attitude to meet targets	3.624	3.786
Achievement orientation	3.571	3.778
Technical skills:		
Capacity to understand work systems	3.000	3.339
Capacity to observe, apply, and improve technology to tasks	3.000	3.307
Capability to select work methods/techniques	3.293	3.764
Maintaining and troubleshooting at work	3.639	4.203
Technical decision-making and problem-solving	3.511	3.914
Information technology and computer skills	3.068	3.492
Capacity to analyze numerical information	2.880	3.156

3.3 Limitations of the study

The study covered both container ports of the country- the three container port terminals of the Colombo port and one terminal in the Hambantota port. Maintenance technicians were pooled using convenience and snowball sampling techniques. After a rigorous review of the literature and practitioner views, 40 employability skills were investigated to accomplish the first and second objectives of the study, as well as 15 skill development strategies to accomplish the third objective of the study. Still, it was believed that these 40 employability skills under six broad categories were valid, and findings had value, considering the ranking of the Colombo port in the global container port rankings. Still, future studies could expand the scope by incorporating more employability skills of value to maintenance technicians engaged in container port terminals. Furthermore, the study relied on the perceptions of maintenance technicians in rating the current level of possession and the importance of employability skills. Still, the self-rating method is a well-recognized mechanism when investigating employability skills. However, future research could consider combining self-rating with other methods of evaluation, such as the performance evaluation data of maintenance technicians.

4. Results and discussion

Appendices **Tables A1 - A3** show the ranking of employability skills by maintenance technicians and immediate superiors. The first objective of the study was to identify and analyze any gaps in the current and expected levels of employability skills of maintenance technicians. **Table 1** shows the results. Maintenance technicians rated honesty/integrity as the current highly possessed skill, followed by self-confidence. They rated maintaining and troubleshooting at work as the highly expected skill for current job tasks, followed by self-confidence. Overall, as a skill category, intrapersonal skills received the highest mean values for the level of current possession, as well as for the expected level to be possessed.

The first hypothesis was that significant differences existed between maintenance technicians' evaluations of the level of current possession of employability skills and the expected level to be possessed of the same. **Table 2** shows the results under six main employability skill categories. The data supports the hypothesis.

Table 2 Maintenance technicians- current and expected levels- paired sample t-test.

	Current possession Mean	**Expected for current job Mean**	***t***	**Sig.**
Cognitive skills listening and communication	3.018	3.627	-6.143	0.000
Cognitive skills- thinking	3.162	3.563	-9.539	0.000
Cognitive skills- capability	3.185	3.608	-8.799	0.000
Relational skills	3.309	3.638	-5.878	0.000
Intrapersonal skills	3.600	3.791	-5.594	0.000
Technical skills	3.199	3.601	-9.501	0.000

Note: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 3 shows the results relating to gaps in the maintenance technicians' evaluation of the expected level of skills for current job tasks and immediate superiors' evaluation of the importance of each skill for current job tasks. Immediate superiors rated workplace health and safety as the most important skill for current job tasks, followed by working as a team member. As a skill category, intrapersonal skills received the highest mean values from the immediate superiors.

Table 3 Maintenance technicians vs immediate superiors- expectation and importance.

	Maintenance technician- expected for current job tasks Mean	Immediate superior- importance for current job tasks Mean
Cognitive skills- listening and communication:		
Reading	3.827	4.024
Written communication	3.797	3.683
Active listening	3.500	4.049
Oral communication	3.378	4.146
Cognitive skills- thinking:		
Creativity	3.859	4.024
Decision making	3.758	4.000
Ability to visualize	3.391	3.829
Adaptive learning	3.344	3.854
Reasoning/argumentation	3.461	3.561
Cognitive skills- capability:		
Time management	3.848	4.293
Cost consciousness /manage costs	3.540	3.854
Manage materials/facility resources	3.603	4.122
Manage personnel	3.198	3.439
Manage/mitigate risks	3.802	4.244
Relational skills:		
Working as a team member	3.920	4.488
Learning and sharing with others	3.654	3.951
Customer focus in daily work	3.370	3.927
Demonstrate leadership in daily work	3.778	3.927
Negotiation	3.492	3.488
Appreciation of diversity	3.575	3.854
Intrapersonal skills:		
Ability to take responsibility	3.929	4.415
Self-confidence	3.953	4.122
Sociability	3.583	3.976
Self-management	3.693	4.122
Honesty/integrity	3.929	4.342
Adaptability and flexibility	3.680	3.900
Ability to work without supervision	3.709	4.073
Managing multiple priorities	3.575	4.244
Workplace health and safety	3.938	4.725
Commitment to own work	3.696	4.220
Punctuality	3.889	4.171
Attitude to meet targets	3.786	4.293
Achievement orientation	3.778	4.463
Technical skills:		
Capacity to understand work systems	3.339	4.146
Capacity to observe, apply, and improve technology to tasks	3.307	3.976
Capability to select work methods/techniques	3.764	3.732
Maintaining and troubleshooting at work	4.203	4.317
Technical decision-making and problem-solving	3.914	3.902
Information technology and computer skills	3.492	3.342
Capacity to analyze numerical information	3.156	3.079

The second hypothesis was that significant differences existed between technicians' evaluations of the expected level of skills for current job tasks and immediate superiors' evaluation of the importance of each skill for current task performance. **Table 4** shows the results under six main employability skill categories. The data supports the hypothesis.

Table 4 Maintenance technicians vs immediate superiors- expectations and importance- independent sample t-test.

	Maintenance technician- expected for current job tasks Mean	**Immediate superior- importance for current job tasks Mean**	***t***	**Sig.**
Cognitive skills- listening and communication	3.627	3.976	-3.847	0.000
Cognitive skills- thinking	3.563	3.854	-2.641	0.009
Cognitive skills- capability	3.608	3.990	-3.853	0.000
Relational skills	3.638	3.939	-2.278	0.024
Intrapersonal skills	3.791	4.234	-5.442	0.000
Technical skills	3.601	3.796	-2.075	0.040

Note: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

The results of the inquiry on any important employability skills for the next few years, which have not already been included in the survey, are shown in **Table 5**. All the employability skills listed in **Table 5**, except Chinese language proficiency, are universal, which are important to possess. However, with regard to Chinese language proficiency, China is the main stakeholder of one of the container terminals of the Colombo port and the Hambantota container port. Hence, Chinese language proficiency may have specific importance to the Sri Lankan context.

Table 5 Immediate superiors- additional employability skills for the next few years.

	Mean	**Std. Deviation**	**Skewness**	**Kurtosis**
Social intelligence	3.878	0.7139	-0.250	0.057
Skills to promote lifelong learning	3.878	0.6780	-0.354	0.513
Technology-mediated communication	3.875	0.5157	-0.203	0.770
User experience mindset	3.750	0.5883	-0.696	1.131
Design thinking	3.683	0.8496	-0.352	-0.300
Emotional intelligence	3.675	0.6938	-0.915	0.876
Complex problem-solving	3.634	0.8293	-1.142	1.789
Critical thinking	3.585	0.8937	-0.380	-0.521
Cognitive flexibility	3.525	0.5986	-0.855	-0.188
Ability to use *new media* tools involving digital technology	3.366	0.7333	0.092	-0.129
Technology management	3.244	0.7341	-0.423	1.398
Chinese language proficiency	2.829	0.7383	-0.498	0.470

Table 6 shows descriptive statistics for maintenance technicians' exposure to skill development strategies after joining the container port terminal.

Table 6 Maintenance technicians- skill development strategies.

	Mean	Std. Deviation	Skewness	Kurtosis
Recommended to learn by referring to manuals and drawings	4.091	0.984	-1.063	0.823
Recommended to learn by observing others	3.481	0.934	-0.596	-0.152
On-the-job training with the immediate superior	3.288	1.037	-0.312	-0.418
Recommended independent search of information	3.233	1.021	-0.051	-0.724
Practicing without supervision	3.083	0.937	-0.279	-0.096
Focused workplace discussions	2.587	1.045	0.130	-0.924
Self-learning using computer-based learning solutions	2.565	0.945	0.365	-0.277
Internal in-class training sessions	2.523	1.037	0.439	-0.197
Courses from external providers- off-the-job	2.504	1.192	0.406	-0.666
Recommended reading- operation standards and practices	2.369	1.086	0.582	-0.349

Table 7 shows the results of factor analysis for maintenance technicians' views on their exposure to skill development strategies after joining the container port terminal. The 10-item scale had a Cronbach's Alpha of 0.810. The factor analysis yielded two components, which were named self-learning and learning with others.

Table 7 Maintenance technicians- factor analysis- skill development strategies.

	Components	
	1 = Self-learning	2 = Learning with others
Recommended reading - operation standards and practices	0.819	
Practicing without supervision	0.769	
Recommended to learn by observing others	0.754	
Recommended to learn by referring to manuals and drawings	0.750	
Recommended independent search of information	0.732	
Self-learning using computer-based learning solutions	0.632	
Internal in-class training sessions		0.882
On-the-job training with the immediate superior		0.673
Focused workplace discussions		0.672
Courses from external providers- off-the-job		0.658
Eigenvalue	2.841	2.468
% of Variance- rotation sums of squared loadings	34.024	31.008
Cronbach's Alpha	0.780	0.711
Average variance extracted	0.512	0.566
Construct reliability	0.839	0.796

5. Conclusions and contributions of the study

The study was conducted with three specific objectives. The first was to investigate employability skill gaps between technicians' evaluations of the level of possession for current job

tasks and the expected level to be possessed. The study identified 40 employability skills under six main categories, namely, cognitive skills- listening and communication, cognitive skills- thinking, cognitive skills- capability, relational skills, intrapersonal skills, and technical skills. The highest rated employability skill category was intrapersonal skills, followed by relational skills. As shown in **Table 2**, there are significant differences between technicians' evaluations of the level of possession and the expected level to be possessed. The second objective was to investigate employability skill gaps between technicians' evaluations of the expected level of skills for current job tasks and immediate superiors' evaluation of the importance of each skill for current job tasks. As shown in **Table 4**, significant differences can be identified between the evaluations of employability skills by the two groups. Maintenance technicians, as well as immediate superiors, identified intrapersonal skills as the most important. However, maintenance technicians identified relational skills as the second most important, whereas immediate superiors identified the cognitive skills- capability category as the second most important. Data was also collected on any other employability skills that immediate superiors could identify in addition to 40 employability skills evaluated to accomplish first and second objectives, as shown in **Table 5**. Social intelligence or understanding and managing interpersonal relationships, skills to promote lifelong learning, and technology-mediated communication or virtual collaboration were the most highly rated other important employability skills for the next few years. The third objective of the study was to investigate maintenance technicians' exposure to skill development strategies after joining the container port terminals. The results identified 10 skill development strategies under two main categories- self-learning and learning with others. Overall, employability skills may change over time, or may change from one business sector to another. The present study investigated employability skills for maintenance technicians engaged in container ports. The findings are of value to employers, employees, students, and education and training institutions.

5.1 Theoretical and practical contributions

First, as shown in **Tables 1** and **2**, there are differences between technicians' evaluations of current possession and the expected level to be possessed for current job tasks. This suggests they perceive the need to improve their employability skills to be successful in their current job tasks. However, **Tables 3** and **4** suggest the existence of differences between technicians' evaluations of expected level of skills for current job tasks and immediate superiors' evaluation of the importance of each skill for current job tasks. Overall, these findings suggest that, first, as employees, maintenance technicians should understand the preferences of their employers (as rated by immediate superiors). These findings have both theoretical and practical contributions. The findings of our study support previous studies that emphasized the need of employees identifying the expectations of employers in the Sri Lankan context, as well as in the global context (such as Collet et al., 2015; Hollister et al., 2017; Puwakgahawela et al., 2023; Wickramasinghe & Perera, 2010).

Second, as shown in **Table 5**, employers prefer to see maintenance technicians possessing skills in the areas involving digital technologies, such as technology-mediated communication or virtual collaboration, the ability to use new media tools involving digital technology or new media literacy, and the ability to understand and manage interpersonal relationships or social intelligence. Since China is the main stakeholder of one of the container terminals of the Colombo port and the Hambantota container port, the importance of Chinese language proficiency has also been identified. Concerning the importance of lifelong learning, the promotion of self-directed learning skills could be valuable. These findings are in line with the recent literature on employability skills involving digital technologies (such as Bakhshi et al, 2017; Marr, 2019; Mulay, 2018; Suarta & Suwintana, 2020).

Third, the findings highlight the importance of TVET institutions identifying the preferences of business sectors and of being prepared to impart employer-preferred skills to their trainees and to bridge any gaps in expectations. Therefore, from the point of view of TVET, the institutions that offer

courses for the maritime field should take a key responsibility in imparting appropriate employability skills to personnel engaged in various fields of maritime operations. These institutions should consider incorporating employability skills preferred by employers into their existing curriculum, or introducing new training courses. The incorporation of employability skills allows TVET institutions to easily describe course outcomes to those outside of the institution with consistent terminology, while boosting their attempts for quality assurance. This will also lead employees to develop realistic expectations of employer preferences.

Fourth, the findings revealed 10 skill development strategies maintenance technicians were exposed to after joining the container port terminals. On the usage, "recommended to learn by referring to manuals and drawings" rated the highest, followed by "recommended to learn by observing others". The factor analysis yielded two factors that are identified as self-learning and learning with others. After being an employee, every individual should have a clear view of how to maintain employment, how to survive in his/her job, and how to grow in his/her chosen profession. The findings suggest that they should be prepared for self-learning and learning with others.

References

Andrews, J., & Higson, H. (2008). Graduate employability, "soft skills" versus "hard" business knowledge: A European study. *Higher Education in Europe, 33*(4), 411-422. https://doi.org/10.1080/03797720802522627

Bakhshi, H., Downing, J. M., Osborne, M. A., & Schneider, P. (2017). *The Future of Skills - employment in 2030*. London: Pearson and Nesta. Retrieved from https://futureskills.pearson.com/research/assets/pdfs/technical-report.pdf

Brooks, R., & Everett, G. (2009). The predominance of work-based training in young graduates' learning. *Journal of Education of Work, 21*(1), 61-73. https://doi.org/10.1080/13639080801956966

Byrom, T., & Aiken, V. (2014). Doing it differently: Re-designing the curriculum to face the challenges of student work-based learning opportunities. *Higher Education, Skills and Work-based Learning, 4*(3), 271-283. https://doi.org/10.1108/HESWBL-05-2014-0017

Collet, C., Hine, D., & du Plessis, K. (2015). Employability skills: Perspectives from a knowledge-intensive industry. *Education + Training, 57*(5), 532-559. https://doi.org/10.1108/ET-07-2014-0076

Detsimas, N., Coffey, V., Sadiqi, Z., & Li, M. (2016). Workplace training and generic and technical skill development in the Australian construction industry. *Journal of Management Development, 35*(4), 486-504. https://doi.org/10.1108/JMD-05-2015-0073

Employeepedia. (2023). *Skills needed to be an equipment maintenance technician*. Retrieved from https://www.employeepedia.com/hire/job-skills/8447-skills-needed-to-be-an-equipment-maintenance-technician

Fletcher-Brown, J., Knibbs, K., & Middleton, K. (2015). Developing "employability": The 3Es case for live-client learning. *Higher Education, Skills and Work-Based Learning, 5*(2), 181-195. https://doi.org/10.1108/heswbl-05-2014-0011

Gibb, J., & Curtin, P. (2004). *Overview*. In Gibb, J. (Ed.). Generic skills in vocational education and training: Research readings (pp. 7-18). Adelaide. Australia: National Centre for Vocational Education Research. Retrieved from https://ncver.edu.au/__data/assets/file/0013/5143/nr2200.pdf

Hollister, J. M., Spears, L. I., Mardis, M. A., Lee, J., McClure, C. R., & Liebman, E. (2017). Employers' perspectives on new information technology technicians' employability in North Florida. *Education + Training, 59*(9), 929-945. https://doi.org/10.1108/ET-02-2017-0019

Islam, T., Ahmed, I., Khalifah, Z., Sadiq, M., & Faheem, M. A. (2015). Graduates' expectation gap: The role of employers and higher learning institutes. *Journal of Applied Research in Higher Education, 7*(2), 372-384. https://doi.org/10.1108/JARHE-05-2014-0056

Jusoh, M., Simun, M., & Choy-Chong, S. (2011). Expectation gaps, job satisfaction, and organizational commitment of fresh graduates, *Education + Training, 53*(6), 515-530. https://doi.org/10.1108/00400911111159476

Kavirathna, C. A., Hanaoka, S., Kawasaki, T., & Shimada, T. (2021). Port development and competition between the Colombo and Hambantota ports in Sri Lanka. *Case Studies on Transport Policy, 9*(1), 200-211. https://doi.org/10.1016/j.cstp.2020.12.003

Lim, N. C. (2015). Towards an integrated academic assessment: Closing employers' expectations? *Education +Training, 57*(2), 148-169. https://doi.org/10.1108/ET-08-2013-0102

Mahajan, R., Gupta, P., & Misra, R. (2022). Employability skills framework: A tripartite approach. *Education + Training, 64*(3), 360-379. https://doi.org/10.1108/ET-12-2020-0367

Marr, B. (2019). *The 10 vital skills you will need for the future of work*. Retrieved from https://www.forbes.com/sites/bernardmarr/2019/04/29/the-10-vital-skills-you-will-need-for-the-future-of-work/?sh=e332ac93f5bd

McGunagle, D., & Zizka, L. (2020). Employability skills for 21st-century STEM students: The employers' perspective. *Higher Education, Skills, and Work-Based Learning, 10*(3), 591-606. https://doi.org/10.1108/HESWBL-10-2019-0148

Ministry of Higher Education Malaysia. (2012). *The national graduate employability blueprint 2012-2017*. Putrajaya: Ministry of Education. Retrieved from https://masurimasooded770.files.wordpress.com/2014/03/national-graduate-employability-blueprint-2012-2017.pdf

Mulay, H. (2018). *15 Vital skills to make you employable in the future*. Retrieved from https://www.linkedin.com/pulse/15-vital-skills-make-you-employable-future-dr-harshada-mulay

National Research Council. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13398.

Ng, P. M. L., Chan, J. K. Y., Wut, T. M., Lo, M. F., & Szeto, I. (2021). What makes better career opportunities for young graduates? Examining acquired employability skills in higher education institutions. *Education + Training, 63*(6), 852-871. https://doi.org/10.1108/ET-08-2020-0231

Oresanya T. O., Omodewu O. S., Kolade T. T., & Fashedemi A. O. (2014). Vocational education and employability: The Nigerian Situation. *Journal of Poverty, Investment and Development, 5*, 158-160. https://core.ac.uk/download/pdf/234695112.pdf

Puwakgahawela, A., Mahakalanda, I., & Wickramasinghe, V. (2023). *Employability skills of information technology graduates: A comparison of expectations, priorities, and strategies*. In Proceedings of the Open University Research Sessions, The Open University of Sri Lanka. Sri Lanka.

Saunders, V., & Zuzel, K. (2010). Evaluating employability skills: Employer and student perceptions. *Bioscience Education, 15*(1), 1-15. https://doi.org/10.3108/beej.15.2

Scott, F. J., & Willison, D. (2021). Students' reflections on an employability skills provision. *Journal of Further and Higher Education, 45*(8), 1118-1133. https://doi.org/10.1080/0309877X.2021.1928025

Shah, M., Grebennikov, L., & Nair, C. S. (2015). A decade of study on employer feedback on the quality of university graduates. *Quality Assurance in Education, 23*(3), 262-278. https://doi.org/10.1108/QAE-04-2014-0018

Sri Lanka ICT Association. (2013). *Rising demand: The increasing demand for IT workers spells a challenging opportunity for the IT industry-national IT workforce survey*. Colombo: Sri Lanka ICT Association.

Suarta, I. M., & Suwintana, I. K. (2020). The new framework of employability skills for digital business. *Journal of Physics: Conference Series, 2020*, 1833. https://doi.org/10.1088/1742-6596/1833/1/012034

Tertiary and Vocational Education Commission. (2016). *National Skills Development Report 2016/2017*. Colombo, Sri Lanka: Tertiary and Vocational Education Commission. Retrieved from https://www.parliament.lk/uploads/documents/paperspresented/annual-report-tertiary-and-vocational-education-commission-2016.pdf

The World Bank. (2023). *The Container Port Performance Index 2022: A Comparable Assessment of Performance based on Vessel Time in Port*. Washington, DC: The World Bank. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099051723134019182/p1758330d05f3607f09690076fedcf4e71a

Tomlinson, M. (2012). Graduate employability: A review of conceptual and empirical themes. *Higher Education Policy, 25*(4), 407-431. https://doi.org/10.1057/hep.2011.26

Tymon, A. (2013). The student perspective on employability. *Studies in Higher Education, 38*(6), 841-856. https://doi.org/10.1080/03075079.2011.604408

Wickramasinghe, V., & Perera, L. (2010). Graduates', university lecturers' and employers' perceptions towards employability skills. *Education +Training, 52*(3), 226-244. https://doi.org/10.1108/00400911011037355

World Shipping Council. (2023). *The top 50 container ports*. Retrieved from https://www.worldshipping.org/top-50-ports

Appendices

Table A1 Maintenance technicians- current possession of employability skills.

	Current possession Mean	Std. Deviation	Variance	Skewness	Kurtosis
Honesty/integrity	4.599	0.472	0.059	0.452	0.456
Self-confidence	3.759	0.729	0.533	-0.424	0.188
Punctuality	3.647	0.780	0.609	0.131	-0.544
Maintaining and troubleshooting at work	3.639	0.710	0.505	-0.119	-0.161
Attitude to meet targets	3.624	0.784	0.615	0.106	-0.503
Ability to take responsibility	3.594	0.738	0.546	-0.559	0.002
Achievement orientation	3.571	0.751	0.565	0.242	-0.406
Commitment to own work	3.526	0.774	0.600	0.259	-0.394
Adaptability and flexibility	3.523	0.714	0.511	0.110	-0.236
Work as a team member	3.519	0.691	0.479	0.559	-0.256
Technical decision-making and problem-solving	3.511	0.734	0.540	-0.680	1.091
Self-management	3.481	0.812	0.661	-0.583	0.347
Workplace health and safety	3.481	0.744	0.555	0.065	-0.274
Sociability	3.474	0.866	0.751	-0.166	-0.661
Creativity	3.406	0.696	0.485	-0.204	-0.326
Ability to work without supervision	3.386	0.748	0.560	0.008	0.293
Decision making	3.353	0.665	0.442	0.241	0.015
Demonstrate leadership in daily work	3.353	0.740	0.548	0.007	-0.324
Time management	3.333	0.748	0.560	0.255	0.478
Negotiation	3.316	0.711	0.506	0.227	-0.049
Cost consciousness /manage costs	3.303	0.809	0.656	-0.522	0.666
Capability to select work methods/techniques	3.293	0.693	0.482	0.224	0.001
Learning and sharing with others	3.271	0.708	0.502	0.077	-0.228
Appreciation of diversity	3.241	0.719	0.517	0.100	-0.251
Manage materials/facility resources	3.235	0.780	0.609	-0.243	0.603
Customer focus in daily work	3.144	0.752	0.567	-0.136	0.212
Managing multiple priorities	3.136	0.779	0.607	-0.244	0.770
Manage/mitigate risks	3.106	0.812	0.660	0.062	0.380
Written communication	3.075	0.692	0.479	-0.379	0.893
Reasoning/argumentation	3.068	0.773	0.598	-0.018	0.526
Information technology and computer skills	3.068	0.750	0.564	-0.657	0.494
Reading	3.045	0.712	0.786	0.305	0.307
Active listening	3.038	0.678	0.461	-0.489	0.646
Ability to visualize	3.008	0.848	0.720	0.061	-0.332
Capacity to understand work systems	3.000	0.758	0.576	0.106	-0.391
Capacity to observe, apply, and improve technology to tasks	3.000	0.758	0.576	0.211	0.470
Adaptive learning	2.962	0.801	0.643	0.068	0.406
Manage personnel	2.931	0.846	0.716	-0.257	-0.397
Oral communication	2.909	0.725	0.526	-0.226	0.469
Capacity to analyze numerical information	2.880	0.728	0.531	-0.646	0.707

Table A2 Maintenance technicians- employability skills expectation.

	Expected for current job tasks Mean	Std. Deviation	Variance	Skewness	Kurtosis
Maintaining and troubleshooting at work	4.203	0.807	0.651	-0.479	-1.031
Self-confidence	3.953	0.485	0.236	-0.125	1.307
Workplace health and safety	3.938	0.801	0.642	0.114	-1.430
Ability to take responsibility	3.929	0.508	0.259	-0.125	0.863
Honesty/integrity	3.929	0.683	0.467	-0.062	-0.435
Work as a team member	3.920	0.517	0.268	-0.116	0.715
Technical decision-making and problem-solving	3.914	0.803	0.646	-0.120	-0.844
Punctuality	3.889	0.683	0.468	0.144	-0.840
Creativity	3.859	0.528	0.279	-0.145	0.339
Time management	3.848	0.596	0.356	-0.172	0.278
Reading	3.827	0.578	0.335	-0.725	1.547
Manage/mitigate risks	3.802	0.858	0.736	0.087	-1.085
Written communication	3.797	0.552	0.305	-0.063	-0.131
Attitude to meet targets	3.786	0.640	0.410	0.036	-0.292
Demonstrate leadership in daily work	3.778	0.584	0.846	0.646	0.300
Achievement orientation	3.778	0.605	0.366	0.143	-0.470
Capability to select work methods/techniques	3.764	0.672	0.452	0.000	-0.276
Decision making	3.758	0.585	0.342	-0.143	0.010
Ability to work without supervision	3.709	0.592	0.351	0.186	-0.562
Commitment to own work	3.696	0.686	0.471	0.477	-0.811
Self-management	3.693	0.781	0.611	-0.512	0.558
Adaptability and flexibility	3.680	0.663	0.440	0.134	-0.362
Learning and sharing with others	3.654	0.780	0.609	-0.932	1.385
Manage materials/facility resources	3.603	0.658	0.433	0.466	-0.496
Sociability	3.583	1.003	1.007	-1.140	1.081
Appreciation of diversity	3.575	0.781	0.611	-0.303	0.795
Managing multiple priorities	3.575	0.707	0.500	0.141	-0.281
Cost consciousness /manage costs	3.540	0.882	0.778	-0.584	0.082
Active listening	3.500	0.652	0.425	-0.087	-0.196
Information technology and computer skills	3.492	0.720	0.520	0.220	-0.220
Negotiation	3.492	0.787	0.620	0.077	-0.387
Reasoning/argumentation	3.461	0.762	0.581	0.188	-0.287
Ability to visualize	3.391	0.932	0.870	-0.622	0.380
Oral communication	3.378	0.744	0.554	-0.509	1.285
Customer focus in daily work	3.370	0.906	0.822	-0.611	0.584
Adaptive learning	3.344	0.934	0.873	-0.329	0.131
Capacity to understand work systems	3.339	0.808	0.654	0.310	0.643
Capacity to observe, apply, and improve technology to tasks	3.307	0.812	0.659	0.194	0.515
Manage personnel	3.198	1.035	1.072	-0.452	0.081
Capacity to analyze numerical information	3.156	0.991	0.983	-0.419	-0.224

Table A3 Immediate superiors' employability skills priorities.

	Importance for current job tasks Mean	Std. Deviation	Variance	Skewness	Kurtosis
Workplace health and safety	4.725	0.554	0.307	-1.949	3.042
Working as a team member	4.488	0.596	0.356	-0.693	-0.427
Achievement orientation	4.463	0.595	0.355	-0.599	-0.530
Ability to take responsibility	4.415	0.631	0.399	-0.602	-0.518
Honesty/integrity	4.342	0.761	0.580	-1.035	0.812
Maintaining and troubleshooting at work	4.317	0.686	0.472	-0.994	1.815
Time management	4.293	0.601	0.362	-0.211	-0.515
Attitude to meet targets	4.293	0.642	0.412	-0.944	2.634
Manage/mitigate risks	4.244	0.537	0.289	0.160	-0.177
Managing multiple priorities	4.244	0.623	0.389	-0.215	-0.507
Commitment to own work	4.220	0.724	0.526	-0.778	0.833
Punctuality	4.171	0.667	0.445	-0.206	-0.682
Oral communication	4.146	0.792	0.628	-0.906	0.944
Capacity to understand work systems	4.146	0.527	0.278	0.177	0.508
Manage materials/facility resources	4.122	0.599	0.360	-0.041	-0.125
Self-confidence	4.122	0.678	0.460	-0.152	-0.734
Self-management	4.122	0.640	0.410	-0.107	-0.462
Ability to work without supervision	4.073	0.685	0.470	-0.093	-0.771
Active listening	4.049	0.773	0.598	-0.427	-0.219
Reading	4.024	0.688	0.474	-0.514	0.834
Creativity	4.024	0.651	0.424	-0.023	-0.503
Decision making	4.000	0.921	0.850	-0.805	0.058
Sociability	3.976	0.757	0.574	-0.683	0.795
Capacity to observe, apply, and improve technology to tasks	3.976	0.473	0.224	-0.085	1.916
Learning and sharing with others	3.951	0.589	0.348	0.005	0.082
Customer focus in daily work	3.927	0.877	0.770	-0.554	-0.205
Demonstrate leadership in daily work	3.927	0.685	0.470	0.093	-0.771
Technical decision-making and problem-solving	3.902	0.583	0.340	-1.586	4.927
Adaptability and flexibility	3.900	1.127	1.272	-2.053	5.693
Adaptive learning	3.854	0.937	0.878	-0.270	-0.883
Cost consciousness /manage costs	3.854	0.792	0.628	-0.678	0.534
Appreciation of diversity	3.854	0.691	0.478	0.201	-0.824
Ability to visualize	3.829	0.738	0.545	-0.106	-0.302
Capability to select work methods/techniques	3.732	0.742	0.551	-0.672	0.589
Written communication	3.683	0.722	0.522	-0.267	0.080
Reasoning/argumentation	3.561	0.807	0.652	-0.207	-0.305
Negotiation	3.488	0.977	0.956	0.205	-0.923
Manage personnel	3.439	0.708	0.502	-0.438	-0.286
Information technology and computer skills	3.342	0.824	0.680	-0.165	-0.654
Capacity to analyze numerical information	3.079	0.818	0.669	-0.463	-0.500