COMPARATIVE ANALYSIS OF THE SEAFARING CAREER PERSISTENCE OF NAUTICAL POST-BACCALAUREATE AND COLLEGE STUDENTS

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ABSTRACT

To foster more maritime human resources, Taiwan's Ministry of Education began to approve the establishment of nautical post-baccalaureate programs at three maritime universities in 2010. This study conducted a comparative analysis of the seafaring career persistence of nautical post-baccalaureate students and college students. Social cognitive career theory (SCCT) served as the research perspective, and data were collected through a questionnaire survey on persistence in the seafaring profession. The collected data were analyzed using structural equation modeling (SEM). This study revealed that seafaring career persistence, self-efficacy, and positive outcome expectation for seafaring careers were significantly higher among the post-baccalaureate students than they were for the college students. In addition, among the post-baccalaureate students, positive outcome expectation had the most significant direct effect on seafaring career persistence, whereas among the college students, vocational interest had the most significant effect on seafaring career persistence. The research findings are discussed in depth in this paper.

I. INTRODUCTION

According to statistics reported by the Institute of Shipping Economics and Logistics (ISL), the total tonnage of Taiwanese-owned merchant ships with more than 1,000 gross tonnage ranked 12th in the world at the beginning of 2017 (ISL, 2017), which indicates that the shipping industry in Taiwan operates on a global scale. Due to the notable achievements of the shipping industry in Taiwan currently, the diligence and competence of native seafarers cannot be ignored (Chen, 1998). However, with the development of Taiwan's economy, the improved living standards of the people, and the interaction with the international seafarer market, the employment market of Taiwanese seafarers has been gradually declining (Chen, 1998). As of the end of October 2017, the number of native seafarers on Taiwanese merchant ships was only 6,390 (MPB, 2017a), which is only one-fifth of that at its peak in 1978.

Seafarers' work is considerably different from normal work on land. This is because seafarers must live permanently in mobile, isolated, and residential work environments, and they are thus kept away from friends, family, and partners (Hsu, 1997). From a social perspective, some researchers have likened merchant ships to monasteries and prisons (Perry and Wilkie, 1974). Similarly, Forsyth and Bankston (1984) identified how marginality in the lifestyle of seafarers caused them to feel powerless and alienated from society. Therefore, the public does not consider "working on the ship" to be an ideal job (Sánchez-Beaskoetxea and Coca García, 2015).

However, management-level seafarers with practical experience at sea are an indispensable source of fleet management talent for the shipping industry (Pettit et al., 2005). To maintain the sustainable development of Taiwan's shipping industry, fostering ample native management seafarers is necessary. However, as the standard of living in Taiwan has risen, the career characteristics of seafarers cannot attract the majority of young people in Taiwan, and less than half of undergraduates majoring in navigation and marine engineering choose to work on

board ships after graduation. Therefore, the lack of ship officers in recent years has been a topic of concern for the shipping industry. In view of the severe shortage of ship officers, Taiwan's Ministry of Education has approved the establishment of "post-baccalaureate degrees in nautical affairs as a second expertise" at three maritime universities in Taiwan since 2010 (Chen et al., 2015). These programs are designed to attract college graduates whose majors are not navigation or marine engineering to enter the seafaring profession.

Because nautical post-baccalaureate students may become one of the most important sources of Taiwanese ship officers on merchant ships in the future, this study conducted a comparative analysis of the seafaring career persistence of nautical post-baccalaureate students and 4-year college students. Because social cognitive career theory (SCCT) has been widely used as a framework for career development in recent years (Lent, 2005), this study used SCCT as the research perspective. The study collected data on the participants' persistence in seafaring careers through a questionnaire survey. The data were analyzed using structural equation modeling (SEM). The study results can provide a reference for Taiwan's maritime education and training institutions, which will encourage more young Taiwanese to join the seafaring profession.

Although many studies have focused on nautical students' intentions to work on board ships (e.g., Guo et al., 2007; Hsieh et al., 2014; Lin et al., 2015), this study should be among the few related to nautical post-baccalaureate students (Chen et al., 2015). Therefore, the authors expect the results of this study to fill the gap in the research field of seafaring work and enrich the research on Taiwan's maritime education as well as the development of the seafaring profession. In addition to this section, the relevant literature review and research concepts are presented in Section 2, including the career characteristics of seafarers and a review of the SCCT-related literature. Section 3 describes the research design of this study, and the findings are presented in Section 4. Finally, in Section 5, the authors offer in-depth discussions based on the research findings.

II. LITERATURE REVIEW AND RESEARCH CONTEXT

1. Characteristics of a Seafaring Career

1) Narrow Threshold

The International Convention on the Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) was adopted by the International Maritime Organization (IMO) in 1978 and fully implemented in 1984 (IMO, 2011). Since then, those who wish to work as deck officers or marine engineers on board seagoing ships of 500 gross tonnage or more (seagoing ships powered by main propulsion machinery of 750 kW propulsion power or more) must have complete appropriate maritime education, professional training, at least 1 year of on board internship, and pass the Competency Test for seafarers, as held by government authorities (MPB, 2015). Only three universities

in Taiwan offer maritime education and training, namely National Taiwan Ocean University (NTOU), National Kaohsiung University of Science and Technology (NKUST), and Taipei University of Marine Technology (TUMT). This thus implies that individuals who desire to work as deck officers or marine engineers on merchant ships sailing international voyages must graduate from the navigation or marine engineering departments of these three universities.

Notably, in the past 5 years, the estimated qualifying rate of deck officer and marine engineer exams in Taiwan was only 30% (MPB, 2017b). Furthermore, there is little incentive for the shipping industry to provide internships for nautical students in Taiwan; this is because Taiwan's seafarers do not have the low-wage competitive advantage of foreign colleagues (Fang, 2004; Guo et al., 2007). Therefore, only students selected by a shipping company can undertake the internship trainings. In summary, it is difficult for Taiwan's nautical graduates to enter any large-scale shipping company (such as Evergreen, Yang Ming, and Wan Hai), unless they are fully prepared.

2) More Generous Pay

Numerous documents have indicated that a higher earning potential is the main motivation for seafarers to work on board ships (e.g., Alderton and Winchester, 2002; Guo et al., 2006). Alderton and Winchester (2002) further mentioned that the reason why seafarers are willing to endure the long-term absence of family members is to obtain a better salary than that obtained in work on land. Currently, a third officer or fourth engineer in Taiwan can earn a monthly salary of approximately US$5,000 on board large ocean-going ships of container shipping companies, which is approximately five times the average monthly salary of Taiwanese university graduates who work on land (Guo, 2018). This salary gap is attractive to some young people who are seeking to improve the economic condition of their families (Chen et al., 2015).

As mentioned, due to the career characteristics of seafarers, not all nautical students will choose to work on board ships after graduation. That is, only those who have strong expectations to earn a more generous salary will take such a job to improve their families' economic condition (Fang, 2004; Guo et al., 2006). This phenomenon echoes Maslow's hierarchy of needs (Maslow, 1943), suggesting that the reason most nautical students choose to work on board ships after graduation is to meet their physical and security needs. Therefore, this study deduced that the higher the nautical students' expectations of positive outcomes (e.g., the possibilities to improve their families' economic condition rapidly), the more interested they would be in a seafaring career, and the higher their persistence in the occupation would be.

3) Mobile, Isolated, and Residential Workplaces

Working on a ship is more than a career choice; it is also a lifestyle choice (Thomas, 2004). The task of a merchant ship is to carry goods safely and efficiently from one port to another. Thus, seafarers live at sea most of the time, remain separated

from their families for long periods, and perform laborious work (Wang, 2005). In particular, Thomas et al. (2003) determined that long-term separation from family members is both a professional expectation of seafarers and the largest contributor to their departure from the seafaring workplace. In addition, seafarers must face the professional pressure arising from technological progress. That is, the reduction of seafarers and increase of ship automation have caused seafarers to feel more pressure on board ships, which results in psychological problems for the seafarers (Agterberg and Passchier, 1998).

Similarly, Alderton and Winchester (2002) identified that in recent years, the most significant factor to change the working style of seafarers has been the emergence of seaborne containers. With containers, the turnaround time of a vessel is considerably shortened, resulting in an excessive concentration of seafarers' work in the port (Alderton and Winchester, 2002). This suggests that today's seafarers must withstand considerable work pressure, rather than enjoying the romantic and adventurous lifestyle imagined by the public (Guo et al., 2012). On the basis of these considerations, this study deduced that the greater the negative expectations of nautical students for working on board ships are, the less they are interested in the seafaring occupation, and the lower is their seafaring career persistence.

4) International Workplace

The shipping industry is arguably one of the most globalized industries (Li and Wonham, 1999; Alderton and Winchester, 2002), and Taiwan's seafarer market is inevitably affected by the international seafarer market (Fang, 2004; Guo et al., 2007; Wu et al., 2012). In such global competition, Taiwan's shipping companies strive to reduce operating costs, and reducing the cost of seafarers can obtain an instant effect (Fang, 2004). Therefore, in recent years, Taiwan's shipping industry has employed increasing numbers of foreign seafarers with low salaries (Chen, 2006; Guo et al., 2006; Wu et al., 2012). According to a survey by BIMCO/ISF, Taiwan has been a major importer of foreign seafarers since 1995 (Li and Wonham, 1999). Among them, seafarers from mainland China have become the most favored targets for Taiwan's shipping companies because of their similar language and culture as well as relatively low pay (Fang, 2004; Guo et al., 2007).

Inevitably, facing the global competition of the shipping industry, the chances of Taiwanese seafarers working on board ships will be considerably affected (Fang, 2004). Therefore, this study deduced that the higher the self-confidence of nautical students in becoming qualified deck officers or marine engineers is and the lower their concerns about the internationalization of the current seafarers' workplace are, the more they are interested in the seafaring occupation, and thus, their persistence may also be higher.

2. SCCT as the Research Framework

Lent et al. (1994) developed SCCT based on social learning theory proposed by Bandura (1977), which combines the concepts of many scholars. In recent years, SCCT has often been
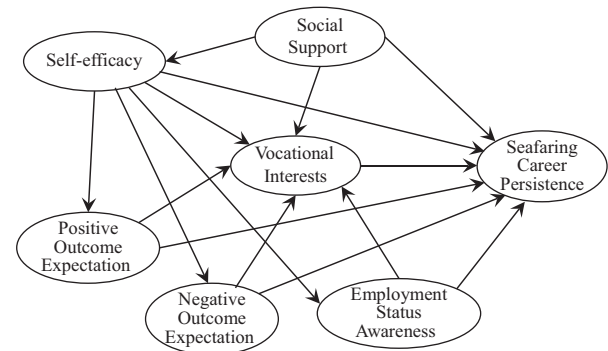

Fig. 1. Conceptual model of this study.

used as a research framework for exploring academic and career development (Lent et al., 1994; Turner et al., 2004; Lent, 2005). Many studies (e.g., Turner et al., 2004; Ali and Saunders, 2006; Lent et al., 2008) have also proved that SCCT is suitable for exploring careers and occupation choices; thus, it has value in practical application. Furthermore, although there are other career development theories such as occupational interest theory (Holland, 1959), person-environment fit theory (Muchinsky and Monohan, 1987), and attraction-selection-attrition theory (Schneider, 1987), several studies have shown that SCCT is suitable for exploring the seafaring choices of nautical students (Hsieh et al., 2014; Guo et al., 2015; Lin et al., 2015). Lent et al. (1996) specified that SCCT includes three modes. The first is the mode of interest development, which includes three major variables: self-efficacy, outcome expectation, and vocational interest. The second mode is that of occupation selection, which includes the target choice and the three aforementioned major variables. The third mode is the performance and result model, which includes the choice of action and achievement and the four aforementioned major variables.

III. METHODOLOGY

1. Research Concept

According to the related literature, as reviewed by the authors, this study utilized the occupation selection mode in SCCT as the basic framework and proposed the hypothetical model of this study, as illustrated in Fig. 1.

On the basis of SCCT, we could deduce that nautical students' seafaring career persistence may be directly influenced by their vocational interest, self-efficacy, and the outcome expectation of becoming deck officers or engineers. In addition, we inferred that self-efficacy indirectly affects their seafaring career persistence through outcome expectations and vocational interest. Moreover, the level of social support that enables nautical students to become deck officers or marine engineers may have a direct effect on their self-efficacy, seafaring career persistence, and vocational interest. To reflect the internationalization of seafaring careers in Taiwan, we also considered the characteristics of the seafaring career, divided the outcome expectations into

positive and negative outcome expectations (Guo et al., 2012), and incorporated employment status awareness as a variable into the model.

2. Definition and Measurement of Variables

1) Seafaring Career Persistence

Seafaring career persistence refers to the degree to which nautical students are affirmed and satisfied with their decision to engage in a seafaring career. This study used the career persistence measurement tool of Li et al. (2014), which consists of three measurement items, each of which is measured by a 7-point Likert scale. As stated by Johns (2010), Likert metrics not only provide a simple method of gauging specific opinions but also facilitate the construction of multiple-item measures, known as Likert scales, which can measure broader attitudes and values. A higher score represents a higher degree of acceptance by a respondent as well as higher seafaring career persistence.

2) Self-Efficacy

Self-efficacy refers to the degree of the confidence of nautical students in their ability to find employment on board ships and meet the competence requirements of deck officers or marine engineers. This study referred to the self-efficacy scale of Guo et al. (2012), which was adapted as a three-item measurement tool. Each item is measured on a 5-point Likert scale, with a higher score representing stronger confidence in becoming deck of- ficers or marine engineers.

3) Vocational Interest

Vocational interest refers to the degree of the vision of nautical students toward seafaring work. This study adopted the vocational interest measurement tool of Guo and Liang (2009), which consists of three measurement items, where each item is measured on a 5-point Likert scale, with a higher score representing higher vocational interest of the respondent in a seafaring career.

4) Positive Outcome Expectation

Positive outcome expectation refers to nautical students' expectations of salaries and gains engendered by their seafaring careers in the future. This study referred to the positive outcome expectation scale of Guo et al. (2012), which was adapted as a three-item positive outcome expectation measurement tool. Each item is measured on a 7-point Likert scale, with a higher score representing higher expectations for a positive outcome regarding a seafaring job.

5) Negative Outcome Expectation

Negative outcome expectation refers to the plight and negative factors that nautical students are likely to face when considering a seafaring career. This study adopts the negative outcome expectation scale of Guo et al. (2012), which was revised to a 3-item negative outcome expectation measurement tool. Each item is measured on a 6-point Likert scale, with a higher score

representing a higher negative outcome expectation for seafaring work.

6) Social Supports

Social supports refer to the degree to which family members, teachers, and friends support students' future work on board ships. This study adopted the social context support measurement tool of Guo et al. (2006), which comprises three measurement items. Each item is measured on a 5-point Likert scale, with a higher score representing higher support from family members, teachers, and friends for the seafaring job of the respondent.

7) Employment Status Awareness

Employment status awareness refers to nautical students' perception of the measures employed by current major shipping companies in Taiwan, with particular focus on their preference for employing foreign seafarers. This study referred to the foreign seafarer employment measurement tool of Guo et al. (2006), which comprises three measurement items. Each item is measured on a 6-point Likert scale, with a higher score representing a higher degree of concern about the large number of foreign seafarers employed by Taiwan's shipping industry.

3. Research Subjects and Data Collection

Currently, Taiwan has only two maritime universities that offer a post-baccalaureate in a nautical program: NTOU and NKUST. This study conducted a general survey on the students of post-baccalaureate education in the nautical programs of these two universities. In addition, a survey was conducted on 4-year nautical students of NTOU. A total of 819 questionnaires were collected, including 725 valid questionnaires, of which 168 were from 1.5-year post-baccalaureate students and 557 were from 4-year maritime college students. The detailed composition of the valid questionnaires in this study is presented in Table 1.

4. Data Analysis Methods and Tools

This study utilized SEM as the main analysis method. SEM is a statistical methodology for processing and analyzing complex multivariate research data (Chiu, 2011). Because SEM combines two statistical techniques, factor analysis and path analysis, it has been widely used in the fields of social and behavioral science in recent years (Huang, 2003). Furthermore, because the Analysis of Moment Structures (AMOS) software uses graphics to create models and is simple to operate (Huang, 2002; Chiu, 2011), this study performed SEM evaluations using AMOS 18. Statistical Package for the Social Sciences (SPSS) software was also used as an auxiliary analysis tool.

Regarding SEM, suppose the existence of two latent variables ξ and η, where ξ is the explanatory variable and η is the resulting variable, and δ and ε are their measurement errors, respectively. These two latent variables can be defined by two sets of measurement model equations [i.e., Eqs. (1) and (2)] (Chiu, 2011):

$$x = \Lambda_x \xi + \delta \tag{1}$$

Table 1. Study participants' statistical characteristics.

Academic system	Post-baccalaureate nautical students				Four-year nautical college students			
School	NTOU	137	NKMU	31	NTOU	557		
Department	Deck	103	Engine	65	Deck	312	Engine	245
Gender	Male	143	Female	25	Male	446	Female	111
Grade	1st grade	65	2nd grade	103	1st grade	139	2nd grade	129
					3rd grade	154	4th grade	135
Total	168				557			

Table 2. Means and standard deviations of all variables.

Variables	Post-baccalaureate nautical students		Four-year nautical college students		Variables										
	Mean	SD	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender[a]	1.15	0.36	1.20	0.40		.05	-.09*	.07	-.12**	-.16**	.02	-.05	-.07	-.04	.02
2. Age	28.94	6.66	20.03	1.52	-.04		.01	.76**	-.01	.04	.01	-.06	.01	.09*	.05
3. Department[b]	1.39	0.49	1.44	0.50	-.09	.18*		.06	-.22**	-.14**	-.24**	-.14**	.09*	-.22**	-.13**
4. Grade	1.61	0.49	2.51	1.11	.06	.07	-.21**		-.08	-.01	-.07	-.09*	.06	.07	.03
5. Seafaring Career Persistence (SC)	5.86	2.58	5.06	3.53	-.20**	-.23**	-.08	-.03		.56**	.65**	.63**	-.15**	.54**	.08*
6. Self-Efficacy (SE)	3.89	2.04	3.70	2.27	-.14	-.11	-.15	.04	.55**		.41**	.36**	-.01	.39**	.01
7. Vocational Interest (VI)	4.08	2.03	3.58	2.28	-.03	-.01	-.06	.00	.55**	.37**		.54**	-.20**	.43**	.11**
8. Positive Outcome Expectation (PO)	5.81	2.78	5.27	3.46	-.20**	-.23**	-.03	-.22**	.64**	.25**	.39**		-.01	.45**	.12**
9. Negative Outcome Expectation (NO)	4.09	2.96	4.55	2.84	.01	-.14	-.13	-.17*	-.14	-.09	-.28**	-.10		-.12**	.30**
10. Social Support(SS)	3.87	2.06	3.76	1.90	-.24**	-.14	-.09	.04	.51**	.30**	.35**	.33**	-.09		.04
11. Employment Status Awareness (ES)	4.26	3.38	4.42	2.96	.10	.08	.06	-.03	-.14	-.27**	-.14	.09	.19**	.03	

Notes:

1. Diagonal data represent the reliability of the variable; the lower left diagonal data represent the correlation coefficients of the post-bachelor students' variables; the upper right diagonal data represent the correlation coefficients of the 4-year maritime students' variables.

2. SC and PO are 7-point scales; SE and VI are 5-point scales; NO and ES are 6-point scales.

3. [a] "1" for male, "2" for female; [b] "1" for deck department, "2" for engine department;* $p < .05$, ** $p < .01$.

$$y = \Lambda_y \eta + \varepsilon \qquad (2)$$

Because the variation of η is explained by other factors, it is called an endogenous variable; ξ is called an exogenous variable as an explanatory variable that affects others (Huang, 2002; Chiu, 2011). The part of the endogenous variable that cannot be fully explained is the estimation error (indicated by ζ). The relationship between the two latent variables can be expressed by Eq. (3), which is the structural model of SEM (Chiu, 2011).

$$\eta = B_\eta + \Gamma\xi + \zeta \qquad (3)$$

Integrating Eqs. (1) and (2) with Eq. (3) yields the best solution for simultaneous equations, and this constitutes the structural equation model analysis (Huang, 2002; Chiu, 2011).

Regarding the analysis of reliability and validity, the composite reliability (CR) and average variance extracted (AVE) were used to assess the reliability and validity of the measurement variables, respectively. The CR and AVE formulas are expressed by Eqs. (4) and (5), where λ represents the standardized factor loadings of observed variables belonging to the latent variable and θ represents the measurement errors of observed variables (Huang, 2002; Chiu, 2011).

$$CR = \frac{(\Sigma\lambda)^2}{(\Sigma\lambda)^2 + \Sigma(\theta)} \qquad (4)$$

$$AVE = \frac{\Sigma\lambda^2}{\Sigma\lambda^2 + \Sigma(\theta)} \qquad (5)$$

Table 3. Reliability and validity of all measurement variables.

Variables	Items	Loading Factors	Cranach's α	CR	AVE
1. Seafaring Career Persistence (SC)	SC-1	.539	.784	.823	.619
	SC-2	.902			
	SC-3	.867			
2. Self-Efficacy (SE)	SE-1	.851	.777	.759	.518
	SE-2	.576			
	SE-3	.705			
3. Vocational Interest (VI)	VI-1	.845	.790	.809	.590
	VI-2	.838			
	VI-3	.596			
4. Positive Outcome Expectation (PO)	PO-1	.747	.822	.805	.582
	PO-2	.669			
	PO-3	.861			
5. Negative Outcome Expectation (NO)	NO-1	.776	.755	.734	.497
	NO-2	.843			
	NO-3	.421			
6. Social Support (SS)	SS-1	.511	.670	.666	.403
	SS-2	.700			
	SS-3	.677			
7. Employment Status Awareness (ES)	ES-1	.812	.783	.806	.600
	ES-2	.969			
	ES-3	.450			

Note:

1. SC-1 represents the first measurement item of seafaring career persistence (SC), and so on.

2. CR refers to composite reliability; AVE refers to average variance extracted.

IV. RESULTS

1. Basic Analysis

As presented in Table 2, the average age of the post-baccalaureate students surveyed for this study was 28.94 years, meaning they were 8.91 years older than the 4-year nautical students of NTOU. Additionally, the average scores of the post-baccalaureate students and college students in Seafaring Career Persistence were 5.86 and 5.06, respectively, indicating a significant difference ($p < .001$); both of these average scores exceeded 4, which is the middle value of the measurement scale, and the standard deviations were 2.58 and 3.53, respectively. This shows that while both groups of students generally held a positive view of a seafaring career, post-baccalaureate students had a more positive view and were more consistent in their opinions.

Notably, the post-baccalaureate students' average scores in self-efficacy, positive outcome expectation, and social supports were all higher than the college students' average scores, and the differences were all significant ($p < .05$). This reveals that the post-baccalaureate students were more likely to be confident about their seafaring career and large salaries compared with the college students

As mentioned, this study validated the SEM implementation hypothesis model and performed a parameter estimation using the maximum likelihood (ML) method. However, when the ML method is used in general, the sample data must be consistent with a multivariate normal distribution. After the examination of the observed variables in this study, the absolute values of skewness and kurtosis were both less than 2. Thus, the observational variables could be considered normal (Bollen and Long, 1993).

2. Reliability and Validity Analysis

In terms of reliability, this study first examined the internal consistency of each study facet by using Cronbach's α coefficient. In general, the value of Cronbach's α is between 0.70 and 0.98, which is considered to indicate good reliability (Huang and Lin, 1994). As presented in Table 3, the Cronbach's α values of most of the measurement tools in this study were greater than 0.75; only the Cronbach's α value of social supports was slightly lower than 0.70. This study also examined the CR of each study facet, with a higher CR value being considered to indicate a higher internal consistency level. In general, the CR value should be greater than 0.6 (Bagozzi and Yi, 1988). As shown in Table 3, the CR values for each of the variables were greater than 0.6, indicating good internal consistency among the measured variables in this study. Overall, the reliability levels

of the measurement variables in this study were acceptable.

Regarding validity, according to Campbell and Fiske (1959), construct validity can be tested by convergent validity and discriminant validity. Therefore, this study first analyzed the convergent validity of the hypothesis model facets. The analysis results revealed that all the measurement items of the study facets had relatively high factor loadings, and the *t* values of the estimation parameters were all greater than 1.96. As presented in Table 3, the AVE values for most of the study facets were greater than 0.5, with the values for only two facets being slightly lower; this finding is in line with the recommendations of Hair et al. (2006). Therefore, this study assumed that all the facets of the model had convergent validity. The study subsequently assessed discriminant validity. The assessment results showed that the differences between the chi-square values of the seven-facet model and the six-facet basic model combined with any two-facet were all significant, showing the existence of a high degree of discriminant validity between the facets of the hypothesis model.

3. Overall Model Analysis

To conduct a comparative analysis of the seafaring career persistence of the nautical post-baccalaureate and college students, this study analyzed the influencing patterns of the two sample groups' seafaring career persistence, respectively.

1) Model Analysis of Nautical Post-Baccalaureate Students

This study adopted the recommendations of Hair et al. (1998) and examined the hypothesis patterns and adaptability of the observation data by using absolute fit measures, incremental fit measures, and parsimonious fit measures. A chi-square value relative to its degree of freedom (χ^2/df) and a root mean square error of approximation (RMSEA) were used as absolute fit measures. The estimation results revealed a χ^2/df value of 1.684 and RMSEA of .064 (Fig. 2), which were determined to meet the fit threshold values suggested by Chiu (2011) and Hu and Bentler (1999), respectively. The comparative fit index (CFI) was used as the incremental fit measure. The estimation result revealed a CFI of .902, which is in line with the threshold proposed by Huang (2002). Furthermore, the parsimonious normed fit index (PNFI) and parsimonious goodness-of-fit index (PGFI) served as the parsimonious fit measures. The estimation results revealed a PNFI of .659 and PGFI of .646, which are in line with the threshold values proposed by Huang (2002). In summary, the estimation results indicate that the proposed model of post-baccalaureate students' seafaring career persistence had acceptable adaptation with the observed data.

As illustrated in Fig. 2, the nautical post-baccalaureate students' seafaring career persistence was positively and directly influenced by self-efficacy, positive outcome expectation, and social supports and was negatively and directly influenced by negative outcome expectation. Positive outcome expectation had the most significant effect, up to .78. Additionally, self-efficacy and social supports had direct effects on seafaring career persistence and indirect effects through other variables, and the cor-
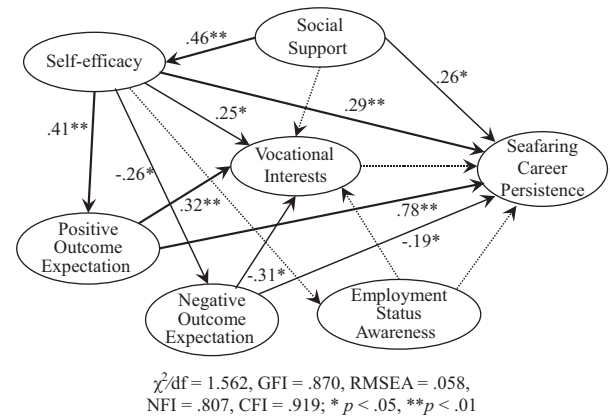

χ^2/df = 1.562, GFI = .870, RMSEA = .058, NFI = .807, CFI = .919; * *p* < .05, ** *p* < .01

Fig. 2. Post-baccalaureate students' seafaring career persistence model.

χ^2/df = 3.605, GFI = .903, RMSEA = .068, NFI = .887, CFI = .915; * *p* < .05, ** *p* < .01
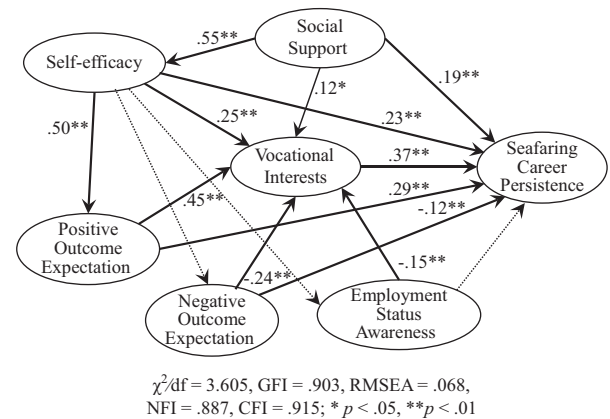
Fig. 3. Maritime college students' seafaring career persistence model.

responding values were .37 and .30, respectively. Notably, vocational interest and employment status awareness had no effect in the assessment model.

The effects of each of the variables on nautical post-baccalaureate students' seafaring career persistence are summarized in Table 4. Positive outcome expectation had the highest total effect, reaching .78, followed by self-efficacy and social supports, reaching .66 and .56, respectively.

2) Model Analysis of Nautical College Students

The estimation results showed the following fit indices of the model of nautical college students' seafaring career persistence: χ^2/df = 3.590, RMSEA = .068, CFI = .915, PNFI = .735, and PGFI = .680 (Fig. 3). These indices are in line with the model adaptation thresholds proposed in the literature. This indicates that the proposed model of nautical students' seafaring career persistence had acceptable adaptation with the observed data.

As shown in Fig. 3, the nautical college students' seafaring career persistence was significantly and directly affected by all the study variables except employment status awareness. Furthermore, self-efficacy, social supports, positive outcome expectation, and negative outcome expectation indirectly affected the nautical students' seafaring career persistence through other variables.

Table 4. Effect analysis of post-baccalaureate nautical students' seafaring career persistence.

Variables	Direct effects	Indirect effects	Total effects
Self-Efficacy	.29	.37	.66
Vocational Interest	---	---	---
Positive Outcome Expectation	.78	---	.78
Negative Outcome Expectation	-.19	---	-.19
Social Support	.26	.30	.56
Employment Status Awareness	---	---	---

Note: --- represent no significant effect.

Table 5. Effect analysis of 4-year college nautical students' seafaring career persistence.

Variables	Direct effects	Indirect effects	Total effects
Self-Efficacy	.23	.32	0.55
Vocational Interest	.37	---	0.37
Positive Outcome Expectation	.29	.17	0.46
Negative Outcome Expectation	-.12	-.09	-.21
Social Support	.19	.35	0.54
Employment Status Awareness	---	-.06	-.06

Note: --- represent no significant effect.

As presented in Table 5, self-efficacy had the greatest effect on the nautical college students' seafaring career persistence, with a total effect of .55, followed by social supports and positive outcome expectation, with total effects of .54 and .46, respectively.

V. CONCLUSIONS AND SUGGESTIONS

Due to the unique challenges of the seafaring profession, most young people in Taiwan are not inclined to work on board ships (Guo et al., 2007). Therefore, in 2010, Taiwan's Ministry of Education instructed maritime universities to open nautical post-baccalaureate programs, with the aim of fostering a greater number of native nautical professionals. However, this raised the following questions: Is the seafaring career persistence of nautical post-baccalaureate students higher than that of nautical college students? What is the mechanism through which their seafaring career persistence is affected? To resolve these questions, taking SCCT as the research perspective, this study conducted a comparative analysis of the seafaring career persistence of nautical post-baccalaureate and college students.

1. Study Results

The results of this study are summarized into the following four items. First, this study found that seafaring career persistence, self-efficacy, and positive outcome expectation for seafaring work were significantly higher for nautical post-baccalaureate students than they were for nautical college students. Second, positive outcome expectation had the most significant effect on the seafaring career persistence of the nautical post-baccalaureate students, whereas vocational interests had the most significant

effect on the seafaring career persistence of the nautical college students. Third, the estimation results show that employment status awareness did not have direct or indirect effects on the seafaring career persistence of the nautical post-baccalaureate students but had only an indirect effect on the seafaring career persistence of the nautical college students. Fourth, for the nautical post-baccalaureate students and college students, the first three influencing variables of seafaring career persistence were self-efficacy, positive outcome expectation, and social supports.

2. Discussion and Implications

The first result mentioned in the preceding section indicates that the nautical post-baccalaureate students had a more positive view of seafaring work than did the nautical college students. In addition, the positive outcome expectation for a seafaring career was determined to be the main motivation for them to abandon their original professions. This phenomenon echoes the findings of Chen et al. (2015), who conducted in-depth interviews to explore the factors that influence the willingness of nautical post-baccalaureate students to work on board ships and found that most of the respondents were not satisfied with their original work. These respondents accidentally learned that they could earn generous salaries in seafaring. Therefore, they resolutely abandoned what they had learned and returned to the university campus to study the seafaring profession. In other words, nautical post-baccalaureate students look forward to meeting their own needs by working on board ships (Chen et al., 2015).

Regarding the second result mentioned in the preceding section, positive outcome expectation was the most significant factor affecting the seafaring career persistence of nautical the post-baccalaureate students, whereas vocational interest did not have

a direct significant effect on the students' seafaring career persistence. This result indicates that the level of vocational interest in seafarers' work does not seem to matter to the choice of seafaring career for nautical post-baccalaureate students. This phenomenon is not in line with Holland's (1959) theory of vocational interest. Holland (1959) considered that interest is closely related to vocation, and any vocation of interest can increase people's enthusiasm and encourage people to actively and happily engage in the profession.

According to the study statistics on NTOU nautical graduates, the rate of working on board ships for the nautical post-graduate students (approximately 40%) was not significantly higher than that observed for the 4-year nautical college students. This phenomenon suggests that nautical post-baccalaureate students have overly high expectations of the generous salary they can earn on board ships. Moreover, a gap may exist between expectations and the reality of seafaring work for nautical post-baccalaureate graduates.

The third study result mentioned in the preceding section implies that the current nautical students in Taiwan seem to care less about the effect of the internationalization of the seafaring workplace (Li and Wonham 1999, Fang, 2006). The global competition in the shipping industry has led to the internationalization of seafarers, and this diversity has become the norm in the Taiwan seafaring workplace (Guo et al., 2006). Thus, adapting intern trainees to the multicultural atmosphere on board ships should be one of the strategies for the continued development of Taiwanese seafaring careers, which seems particularly relevant to nautical post-baccalaureate students.

Regarding the fourth result mentioned in the preceding section, in the two estimation models, the first three influencing factors of seafaring career persistence were self-efficacy, positive outcome expectation, and social support. This result shows that for both nautical post-baccalaureate students and college students, the stronger the expectation of self-confidence for seafaring work and earning a generous salary is, the more support their relatives and friends would give and the stronger the students' persistence for the seafaring profession would become. This result can guide Taiwan's maritime education institutions and authorities to raise the enthusiasm of Taiwan's young people for the seafaring profession. However, young seafarers should be informed of the negative characteristics of seafaring work—living far away from family members and partners in the long term and the current internationalization of the seafaring workplace in Taiwan-before they get on board, in order to encourage realistic expectations.

In summary, the practical implications of this study can be summarized into the following three items. First, the most effective means of encouraging nonnautical college graduates to enter the seafaring workplace is to inform them that they can earn generous salaries on board ships. However, to avoid misconceptions about the seafaring profession, the negative effect of working on board ships must be clearly explained. Second, although vocational interest is the most direct and significant factor affecting the seafaring career persistence of nautical college students, the self-confidence of the seafaring work and the support of their social context are two major additional factors that ultimately affect their seafaring career persistence. Therefore, the removal of the public's prejudice and misunderstanding of the seafaring profession may be an effective strategy to promote nautical college students to stay in the seafaring career. Third, to enable nautical post-baccalaureate students and college students to stay in the seafaring workplace for greater durations after graduation, teachers should be forthright about the negative effects of working on board ships and the current situation of multinational seafarers as a part of the nautical curriculum.

3. Study Limitations

This study sought to contribute the aforementioned knowledge to the seafaring profession and provide feasible recommendations for seafaring human resource management in Taiwan on the basis of the study findings. However, the following limitations of this study should not be ignored. First, a cross-sectional design was applied for the collection of analysis data in this study; therefore, evidence of the causal relationship presented by the analysis results may be insufficient. Second, the analysis data of this study were collected in Taiwan alone; hence, the broad applicability of the research findings is limited. This study suggests that future related research collect transnational data. Third, although the measurement tools of this study were determined to have good reliability and discriminant validity, the convergence validity of the two constructs social support and negative outcome expectation was slightly insufficient. This study recommends that follow-up studies maximize the convergence validity of all measurement tools.

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